Preface

GOALS OF THIS BOOK
Relating Research to Practice

This book on research methods differs most significantly from other books of its type in its emphasis on helping educators see the relevance of research to their daily work. This goal of making research relevant is accomplished by focusing on “problems of practice,” a phrase that we use to refer to the ongoing calls for curriculum improvement, the urgent demands of new federal and state policies for schools, and the compelling unmet needs of students and their teachers. Throughout the book, we demonstrate how empirical research helps educators think methodically about problems of practice and work toward their solution.

Each chapter begins with a list of the problems of practice featured in the chapter’s research examples and full-text article reprint. Here are examples of the problems, stated in the form of questions:

Chapter 1. What can be done to improve high school graduation rates?
Chapter 5. What can be done to increase the currently small percentage of females who take courses and pursue careers in STEM disciplines (science, technology, engineering, math)?
Chapter 9. Is an online course sufficient, or does it need to be blended with some form of classroom instruction?
Chapter 12. What can be done to improve middle school students’ life skills, especially avoidance of harmful drugs?
Chapter 14. How can YouTube and other social websites help us understand students’ interests and perspectives on the world around them?
Chapter 19. Should the evaluation of schools and teachers be focused primarily on how well their students perform on achievement tests?

This book includes these and more than 100 other problems of practice that educators are likely to encounter in their careers and research-based efforts to help solve them. In other words, educators learn research skills in a context that contributes to their work lives and professional development.

Comprehending Research Terms and Procedures

In order to read or conduct research studies, educators need to learn research terminology and procedures. Therefore, we have sought to explain all of the research terms and procedures that educators are likely to come across as they review or conduct research studies. For this reason, Applying Educational Research can serve both as a textbook for a research methods course and as a reference book for professional use.

Locating Relevant Research Studies

As educators encounter problems of practice, they need efficient procedures for locating relevant research studies. Chapter 4 and Appendix 2 teach these procedures. If educators need to prepare a formal literature review to synthesize what they have learned from their search, Chapter 3 teaches the requisite skills.

Evaluating Research Studies

Any research study is likely to have both strengths and weaknesses. Therefore, one of our goals is to help educators develop skills for evaluating research studies. Most chapters in this book provide criteria for evaluating studies that used the research design presented in that chapter. Also, three of the appendices include questions that educators can ask themselves when evaluating quantitative and qualitative research studies in general, supplemented by questions for evaluating the specific design of a study.

Conducting Research Studies

Many educators will need to conduct a research study as a requirement for earning an advanced degree. Therefore, one of our goals is to explain all of the skills that novice researchers will need to conduct their study. These skills also provide a foundation for educators whose careers require advanced training in research methodology. Chapter 2 provides an overview of all aspects of a research study, from the initial design and pilot study to the
preparation of a final report of the study’s findings. Once educators have this overview, they can study the specialized steps for conducting a study using any of the research designs in Parts Three, Four, and Five of the book.

NEW TO THIS EDITION

This book is a substantial revision of the sixth edition of Applying Educational Research. It updates the problems of practice that concern educators and also the research studies within the chapters and the resources for further study, and it provides more recent reprinted articles at the end of chapters as well. It also presents new developments in research methodology.

- We present 136 examples of current problems of practice distributed across 19 chapters. A new feature of the book is that the problems are stated as questions and put in list form at the beginning of each chapter. We selected problems that confront educators at all levels of schooling, from kindergarten through graduate school, and educators who serve in a variety of roles, including teachers, administrators, counselors, school psychologists, higher education personnel, staff development specialists, and teacher educators.

- The book includes 18 full-text research articles, 13 of which are new to this edition. Nine of the new articles were published in 2010 or later, and all address significant problems of practice that confront educators today.

- The chapters illustrate various research procedures by referring to more than 90 research studies and literature reviews conducted in the United States and other countries. Approximately one-third of the studies have publication years of 2010 or later.

- All but two of the chapters describe a problem of practice that has been brought to the public’s attention by a newspaper or other news service. Most of these news reports are new to this edition.

- The previous edition had two chapters (Chapters 4 and 5) to present skills in using search engines and making use of available literature reviews. We combined them into one chapter (Chapter 4), because user input indicated that many educators learn how to use search engines prior to taking a research methods course. Educators who wish to build on these skills can study Appendix 2, which focuses specifically on the ERIC search engine because it is the one that educators are most likely to use.

- We switched the order of the chapters on tests of statistical significance and the practical significance of statistical results. This change was based on user input that the issue of practical significance is more meaningful to educators if they first study tests of statistical significance.

- We switched the order of the chapter on ethnography and critical research and the chapter on narrative research. Users of the sixth edition noted that qualitative case study research developed to a large extent from ethnography, and, therefore the chapter on ethnography should immediately follow the chapter on case studies.

- The Resources for Further Study section of each chapter has been updated to include articles, books, and other publications that have appeared since the previous edition.

ORGANIZATION OF THE BOOK

The first chapter of Part One is an overview of the nature of educational research and its relevance to solving problems of practice in education. Chapter 2 summarizes all of the steps involved in designing and completing a research study. It is supplemented by Appendix 1, which contains a form for outlining a research proposal.

The first chapter of Part Two (Chapter 3) describes a systematic process for conducting and writing a literature review. Chapter 4 describes the use of search engines and published literature reviews.

Part Three begins with Chapter 5, which is an overview about how to read and evaluate reports of quantitative research studies. The next three chapters explain various types of statistical analysis: descriptive statistics in Chapter 6, tests of statistical significance in Chapter 7, and ways to determine the practical significance of statistical results in Chapter 8. The remaining chapters in Part Three explain various quantitative research designs: descriptive (Chapter 9), group comparison (Chapter 10), correlational (Chapter 11), and experimental (Chapter 12).
Part Four starts with Chapter 13, which describes the methods used in the most basic type of qualitative research—case studies. The remaining chapters explain specialized qualitative designs: ethnography and critical research in Chapter 14, narrative research in Chapter 15, and historical research in Chapter 16.

Part Five includes a single chapter (Chapter 17), which is about mixed-methods research. This approach to research design is discussed separately because it incorporates elements of both quantitative designs, the subject of Part Three, and qualitative designs, the subject of Part Four.

Part Six includes chapters on action research (Chapter 18) and evaluation research (Chapter 19). These research methods can employ either quantitative or qualitative designs, or elements of both.

ORGANIZATION OF THE CHAPTERS

Beginning of Chapter
Each chapter begins with a list of the problems of practice that are featured in the full-text article reprint and in the research studies discussed in the body of the chapter. Next comes a list of the chapter's important ideas. This list provides an initial overview when one is starting to read a chapter, and it then serves as a convenient summary when reviewing the chapter later.

The third list includes the chapter's key terms. Each key term is boldfaced at the point where it is defined in the chapter. Definitions also appear in the book's glossary.

Body of Chapter
The main text of each chapter describes the techniques for using a particular research design or statistical method, or for conducting a literature search. Published research studies, each focused on a particular problem of practice, are used to illustrate these procedures. Another significant feature of most chapters is a section on how to analyze and evaluate reports of studies that used a particular research design. Most chapters also include a section that illustrates how particular research designs can be used to investigate a problem of practice that was brought to the public's attention by an actual news article.

End of Chapter
This section includes a self-check test (with answers provided at the end of the book), chapter references, and resources for further study. Most chapters also include a full-text article that is reprinted from the original publication source. Each article is an exemplar of the research design covered in the chapter.

SUGGESTED STUDY STRATEGY

Examine the Book's Organization
Before reading the book, explore its layout: the table of contents, the list of reprinted articles, the organization of each chapter in the Detailed Contents, and the end matter (self-check test answers, appendices, glossary, and name and subject indexes).

Start Each Chapter by Reading the Lists
Studying the lists of problems of practice, important ideas, and key terms will help you see what you already know about the chapter's topics and what will be new to you.

Read the Body of the Chapter
As you read the chapter, reflect on how the research techniques and examples relate to a problem of practice that is familiar to you or to a study that you might conduct.

Read the Full-Text Article(s)
As you read each reprinted research article, analyze how it employs the techniques described in the chapter. Also, consider how the findings of the study contribute to your understanding of problems of practice that you encounter in your work. If you come across an unfamiliar technical term in an article, you will most likely find it defined in the glossary. Another option is to look for it in the subject index, and then read the section of the book that explains it.

Check Your Mastery
After reading the chapter, return to the list of important ideas and see whether you can elaborate
on them in your own words. Similarly, see if you can provide your own definition for each term in the list of key terms. If you come across a topic that you have not mastered, study the chapter further or use another resource, such as Google, which often yields informative websites. Then take the self-check test in the chapter, which includes multiple-choice items related to the chapter’s important ideas. If you wish to expand your understanding of particular topics, you can read the resources for further study listed at the end of the chapter.

Prepare for Tests

You can prepare for the instructor’s tests by reviewing the lists of important ideas and key terms, any chapter material that you highlighted, and your class notes. Another useful strategy is to hold a review session with one or more of your classmates. You can take turns acting as the instructor, making up questions about the chapter content and having classmates answer them.

Complete Homework Assignments

If your instructor gives you assignments that involve preparing a research proposal or conducting a study, you can refer to Chapter 2 and the guide in Appendix 1 to help you. If you are given assignments involving the preparation of a literature review, you can refer to the chapters in Part Two and Appendix 2.

If an assignment requires you to evaluate a full-text research article, you can refer to Appendix 3 (general criteria for evaluating quantitative research studies), Appendix 4 (general criteria for evaluating qualitative research studies), and Appendix 5 (evaluation criteria that are specific to a particular research design). Also, you can read about these evaluation criteria in the chapter where they are explained.

If you are asked to identify a problem of practice and explain how research might shed light on it, you will find it helpful to refer to the section titled An Example of How [chapter topic] Can Help in Solving Problems of Practice at the end of most chapters.

INSTRUCTOR’S MANUAL

The Instructor’s Manual for the seventh edition of Applying Educational Research includes suggestions for designing an introductory research course for undergraduate or graduate students in education and related fields, teaching activities related to each chapter’s content, and a test-item bank with both multiple-choice and short-answer items covering the content of each chapter.

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CHAPTER ONE

Using Research Evidence to Improve Educational Practice

PROBLEMS OF PRACTICE in this chapter

- How much emphasis should a language arts curriculum place on nonfiction works versus fiction?
- Is students' physical fitness important for their learning?
- Does the Internet support or hurt student learning?
- What criteria should be used to evaluate teacher performance?
- What can be done to improve high school graduation rates?
- How can educators help the many students who switch from one school district to another each year?
- What can be done to help elementary teachers place more emphasis on developing children's thinking skills?
- How much federal funding for education should be allocated for research?

IMPORTANT Ideas

1. Educational research is having an increasing impact on educational policy and practice.
2. Evidence-based practice is becoming more prevalent in medicine, psychology, education, and other professions.
3. Teachers' traditional motivations and workplace conditions have not been conducive to evidence-based practice.
4. Evidence-based practice in education has four key elements: (1) focus on problems of practice, (2) reliance on research evidence, (3) clinical expertise, and (4) respect for stakeholders' values.
5. An important impetus for improving education is heightened awareness of pressing problems of practice and a commitment to solve them.
6. Educators need to understand research methodology so they can evaluate the quality of others' research or conduct their own research.
7. Educators need to view research evidence from multiple ethical perspectives.
8. Educators can collaborate productively with researchers by participating in their research studies or by joining with them in shaping policy agendas to improve education.
9. Research differs from other forms of inquiry in its emphasis on (1) making direct observations of phenomena; (2) taking steps to eliminate, or make explicit, personal bias in data collection, analysis, and interpretation; and (3) carefully determining the generalizability of findings to individuals and situations other than those that were studied.

10. Research produces four types of knowledge: (1) descriptions, (2) predictions, (3) evidence about the effects of experimental interventions, and (4) explanations.

11. The purpose of basic research is to understand fundamental processes and structures that underlie observed behavior, whereas the purpose of applied research is to develop and validate interventions that can be used directly to improve practice.

12. Postmodernists believe that no one method of inquiry is inherently better than any other, whereas social scientists believe that their methods of inquiry have a special legitimacy and claim to authority, based on use of (1) explicitly defined concepts or procedures available for inspection by anyone; (2) replication studies to test the soundness of findings from a single study; (3) knowledge claims that can be tested, and possibly refuted, by empirical data; and (4) explicit procedures to minimize researcher errors and biases.

13. Quantitative and qualitative research differ in various ways, but chiefly in epistemology. Quantitative researchers assume an objective social reality that exists independently of observers and participants, whereas qualitative researchers assume that social reality is continuously constructed by observers and participants.

14. Mixed-methods research studies make use of both quantitative and qualitative research methods.

**KEY TERMS**

- action research
- APA Presidential Task Force on Evidence-Based Practice
- applied research
- basic research
- clinical expertise
- Cochrane Collaboration
- construct
- descriptive research
- educational research
- epistemology
- evaluation research
- evidence-based practice
- experimental method
- interpretivism
- No Child Left Behind Act
- positivism
- postmodernism
- prediction research
- progressive discourse
- qualitative research
- quantitative research
- reflexivity
- refutation
- replication
- theory
- triangulation
- What Works Clearinghouse

Each of the principal authors of this book (Mark Gall and Joy Gall) has had a career in education spanning more than 40 years. Our experience leads us to stand in awe of the many educational practitioners (called educators in this book) who do such a remarkable job of teaching increasingly diverse students while also performing many other school functions, all in the face of ever-present budgetary challenges and shifting policy initiatives.

We also are impressed by the expansion of educational research over the past 40 years. An ever-growing network of researchers throughout the world has developed sophisticated methods for studying the educational enterprise, producing a substantial body of research knowledge and efficient electronic methods for accessing it.

Unfortunately, something is missing from this picture of progress. We have not yet witnessed a
meaningful bridge between educational research and educational practice. Researchers and educators live mostly in separate worlds. They come together only occasionally in university courses, workshops, conferences, and journals that both groups read.

There are signs, though, that the two worlds—the world of educational practice and the world of educational research—are coming closer. The signs, mostly seen at the level of national legislation and policy making, point to a sea change in education. The findings of educational research are becoming increasingly influential in shaping national and state legislation about education, which in turn is compelling changes in educational practice.

If you are an educator, these changes mean that you will need to study research if you wish to enter into a dialogue with researchers and the policy makers who make decisions based on research findings. Otherwise, you and your colleagues might find yourselves in the uncomfortable position of trying to implement programs and policies that you did not have a voice in shaping.

In short, we claim that educational research is becoming too important for anyone interested in schooling to ignore. In the next sections, we make our case for the validity of this claim. We invite you to reflect on the soundness of the claim and, if you think it has merit, how you plan to respond in your role as an educator.

**EVIDENCE-BASED PROFESSIONAL PRACTICE**

The movement called evidence-based practice has created a remarkable change in the relationship between educational research and practice. This relatively new approach to professional decision making relies on rigorous research findings rather than custom, personal experience, or intuition. For example, suppose a teacher recommends that a student needs one-on-one tutoring to come up to grade level in writing skills. Suppose the parents ask whether tutoring is likely to help their child. A teacher who is well versed in evidence-based practice would be able to refer to research findings demonstrating the effectiveness of tutoring and then justify the applicability of this research to their child’s needs.

Evidence-based practice is changing the foundations of various professions. We will consider two of these professions—medicine and clinical psychology—before discussing evidence-based practice in education. Perhaps you will agree with us that evidence-based practice is not just a passing fad, but rather a fundamental advance.

**Evidence-Based Practice in Medicine**

Suppose you have a heart problem and seek treatment for it. How do you decide on the best treatment? You might try to contact other patients with the same problem. Perhaps they will offer testimonials about some medicine or individual who helped them. Another option is to seek a professional opinion, probably by making an appointment to see a doctor with expertise, such as a board-certified doctor in cardiology.

Testimonials, case examples, and expert opinions can be worthwhile. On the other hand, they might lead you astray if they are based on untested beliefs, inaccurate observations, or reliance on outmoded research. Evidence-based practice in medicine represents an effort to avoid such pitfalls. It does so by basing treatment decisions on the best possible research evidence about a patient’s condition (Straus et al., 2010).

Evidence-based medical practice has two significant features. The first involves the need to identify good research evidence. The fact that a research study has been published does not necessarily guarantee that its findings are sound. Professionals need to sift through research findings to determine which ones hold up well under critical scrutiny. Although researchers might be in the best position to do this screening, medical practitioners also need to understand research methodology to validate for themselves what others consider good research evidence for a particular treatment option. For example, medical practitioners need to understand that researchers use systematic procedures to synthesize evidence collected across research studies on a particular medical intervention, such as meta-analysis, which we describe in Chapter 4.

Several organizations coordinate and publish these research syntheses. Among the most prominent is the Cochrane Collaboration, whose website (cochrane.org) publishes reviews of research on interventions for various medical problems. For
example, when we visited the site, we found featured reviews on the use of sound therapies for autism spectrum disorders, behavioral interventions to reduce the transmission of HIV infection, and the comparative effectiveness of computer-assisted and oral-and-written methods for recording the diet history of patients with diabetes.

The second feature of evidence-based medical practice is the use of clinical expertise in applying research evidence. A treatment option that is generally effective might be harmful for a particular patient. For this reason, the Cochrane Collaboration states: “Evidence-based medicine is the conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients” (Cochrane Collaboration, n.d.). Clinical expertise is the ability to make informed ethical judgments about whether a particular professional intervention is both evidence-based and appropriate for the needs of an individual client.

We see then that evidence-based medicine does not seek to improve medical practice by research evidence alone or by clinical expertise alone. Both are necessary in order to create a sound bridge between medical research and medical practice.

Evidence-Based Practice in Psychology

Psychological practice to help clients with various emotional, cognitive, and medical problems has grown enormously over the past half-century. Recently, it has evolved into evidence-based practice. In 2005, the American Psychological Association (APA) commissioned the APA Presidential Task Force on Evidence-Based Practice (APA Task Force, 2006). The work of this task force should be of interest to educators because educational practice has been influenced greatly by psychology, especially in the areas of achievement testing, instructional design, and behavior management.

The APA Task Force defined evidence-based practice in psychology as “the integration of the best available research with clinical expertise in the context of patient characteristics, culture, and preferences” (APA Task Force 2006, p. 273). You will notice that this definition is similar to the Cochrane Collaboration’s definition of evidence-based medicine, but with an even greater emphasis on the importance of the client’s individual characteristics in determining an effective intervention.

The Task Force concluded that a variety of research methods can generate evidence to guide psychological practice, among which are methods that are also commonly used in educational research. These methods are covered in different chapters of this book:

- Clinical observation, including individual case studies (Chapter 13)
- Single-case experimental designs (Chapter 12)
- Ethnographic research (Chapter 14)
- Experiments on treatment efficacy (Chapter 12)
- Meta-analysis to synthesize research results from multiple studies (Chapter 4)

Keep in mind, then, that learning about the methods of educational research described in this book has multiple benefits. Your learning will apply to education but also will generalize to research as it is conducted in other professions, including psychology, medicine, business, and technology development.

The Task Force analyzed eight components of clinical expertise in psychology. Struck by their applicability to clinical expertise in teaching, we list them in Figure 1.1. As you study the list, we invite you to draw parallels to the teaching process and to reflect on how it is possible to interweave clinical expertise and research evidence.

EVIDENCE-BASED PRACTICE IN EDUCATION

Robert Slavin (2002) provides us with a concise statement about the history of educational practice and its current status:

At the dawn of the 21st century, education is finally being dragged, kicking and screaming, into the 20th century. The scientific revolution that utterly transformed medicine, agriculture, transportation, technology, and other fields early in the 20th century almost completely bypassed the field of education. If Rip Van Winkle had been a physician, a farmer, or an engineer, he would be unemployable if he awoke today. If he had been a good elementary school teacher in the 19th century, he would probably be a good elementary school teacher today. It is not
that we have not learned anything since Rip Van Winkle’s time. It is that applications of the findings of educational research remain haphazard, and that evidence is respected only occasionally, and only if it happens to correspond to current educational or political fashions. (p. 16)

We believe that Slavin’s assessment is accurate. This leads us to ask, Why has education been so resistant to research?

**Traditional Educational Practice**

Most educators start their careers by preparing to be teachers. Their motivations often involve a love of children, personal gratification in seeing students learn and develop, a passion for particular subject areas (e.g., science, social studies, literature), and a desire to instill this passion in others. Another motivating factor is that the teaching profession allows for independence and creative freedom; teachers typically have responsibility for their own classroom with minimal supervision by others. The desire to apply research to practice, if present, does not have nearly the same priority as these other motivations for entering the teaching profession.

Another attraction of teaching is that the professional preparation program is not as demanding as that for other professions such as medicine and psychology. In fact, in regions with teacher shortages, college graduates are typically able to begin teaching immediately if they agree to professional preparation, either concurrently or over several summers. There is relatively little opportunity for research training within the typical teacher preparation curriculum.

**FIGURE 1.1 • Components of Clinical Expertise in Evidence-Based Psychological Practice**

1. *Diagnostic judgment and treatment planning.* “The clinically expert psychologist is able to formulate clear and theoretically coherent case conceptualizations, assess patient pathology as well as clinically relevant strengths, understand complex patient presentations, and make accurate diagnostic judgments.”
2. *Treatment implementation and monitoring.* “Clinical expertise entails the skillful and flexible delivery of treatment. Skill and flexibility require knowledge of and proficiency in delivering psychological interventions and the ability to adapt the treatment to the particular case.”
3. *Interpersonal expertise.* “Central to clinical expertise is interpersonal skill, which is manifested in forming a therapeutic relationship, encoding and decoding verbal and nonverbal responses, creating realistic but positive expectations, and responding empathically to the patient’s explicit and implicit experiences and concerns.”
4. *Self-reflection and self-development.* “Clinical expertise requires the ability to reflect on one’s own experience, knowledge, hypotheses, inferences, emotional reactions, and behaviors and to use that reflection to modify one’s practices accordingly.”
5. *Evaluation and application of research evidence.* “Clinical expertise in psychology includes scientific expertise. . . . An understanding of scientific method allows psychologists to consider evidence from a range of research designs, evaluate the internal and external validity of individual studies, evaluate the magnitude of effects across studies, and apply relevant research to individual cases.”
6. *Sensitivity to individual differences.* “Clinical expertise requires an awareness of the individual, social, and cultural context of the patient, including but not limited to age and development, ethnicity, culture, race, gender, sexual orientation, religious commitments, and socioeconomic status.”
7. *Willingness to draw on other resources.* “When research evidence indicates the value of adjunctive services or when patients are not making progress as expected, the psychologist may seek consultation or make a referral.”
8. *Planning phase prior to treatment.* “Clinical expertise requires a planful approach to the treatment of psychological problems. . . . Psychologists rely on well-articulated case formulations, knowledge of relevant research, and the organization provided by theoretical conceptualizations and clinical experience to craft interventions designed to attain desired outcomes.”

After becoming licensed and employed by a school system, teachers typically find that the work of a classroom teacher is time-consuming and often stressful. They also experience professional isolation because they and their colleagues are so busy meeting their students’ needs. There is little free time to discuss issues and ideas or how to apply research evidence to problems of practice.

Many teachers are able to develop increasing expertise as their careers progress, but they have little opportunity to share it with others. They eventually retire and take their hard-won expertise with them. There is no system for recording that expertise, testing its validity through systematic research, and then making it available to novice teachers.

During their careers, some teachers earn additional licenses and degrees. With these credentials, they can assume positions as instructional specialists, school administrators, or education professors. Their basic outlook on education, however, continues to be shaped by their experiences as classroom teachers, not by their knowledge of research evidence.

Other roadblocks exist to building bridges between research and existing educational practice. Even if researchers have strong evidence to support a new instructional method, they lack authority to require its use. Also, researchers who ask educators to join in seeking legislation to fund educational research might find that educators’ priority is to seek funding for their own pressing needs.

The Movement Toward Evidence-Based Education

As we noted above, the APA created an official definition of evidence-based practice in psychology. We have modified this description to define evidence-based practice in education as the art of solving problems of practice through the integration of the best available research combined with educators’ clinical expertise and values. Clinical expertise involves the types of skills listed in Figure 1.1. Values, as we explain later in this chapter, govern the ethics of both research and practice.

The federal government has moved strongly in the direction of evidence-based education. The No Child Left Behind Act of 2001 (commonly referred to as NCLB) requires every state to specify standards of achievement in basic skills that all students in certain grades are expected to meet. Furthermore, educators are required to use scientifically based research evidence in choosing programs and procedures to help students achieve those standards. NCLB administrators and many researchers believe that randomized experiments (see Chapter 12) produce the best possible research evidence for improving educational practice.

NCLB has been heavily criticized (e.g., Ravitch, 2011) for various reasons, such as imposing requirements on schools without providing adequate funding, focusing only on basic skills, forcing teachers to “teach to the test,” and threatening public education by allowing parents with children in “failing” schools to transfer them to nonpublic schools.

We do not know at the present time whether NCLB will survive in the political arena. However, even if it is revoked, some elements of it are likely to continue, including a continued push to base educational practice on the best possible research evidence. Because medicine, psychology, and other professions appear to have made a long-term commitment to evidence-based practice, it will be difficult for education to stand alone against this movement.

Another sign of the movement toward evidence-based education is the establishment of the Institute of Education Sciences (IES) by the U.S. Department of Education in 2002. The mission of this institute is “to provide rigorous evidence on which to ground education practice and policy” (U.S. Department of Education, n.d.). IES currently includes four centers, all of which support scientifically based research to improve student learning outcomes.

IES also administers the What Works Clearinghouse (WWC), whose mission is “to promote informed education decision making through a set of easily accessible databases and user-friendly reports that provide education consumers with high-quality reviews of the effectiveness of replicable interventions (programs, products, practices, and policies) that intend to improve student outcomes” (Institute of Education Sciences, n.d.). WWC’s syntheses of research on educational interventions are similar to those of the Cochrane Collaboration, described earlier in the section on evidence-based medicine. We describe WWC in more detail in Chapter 4.

Problems of Practice in Education

The greatest impetus for improving professional practice is the acknowledgement of problems. The medical profession is a good example of this
principle. Disease and injuries, and the human suffering that accompanies them, are problems that cry out for solutions. For this reason, basic and applied medical research is heavily funded by governmental agencies and the private sector all over the world. New treatments that ameliorate a medical problem, even to a modest degree, gradually find their way into medical practice.

Serious problems also abound in education, and the news media continually bring them to the public’s attention. Consider this statement by Dana Hawkins-Simons (2008) in _U.S. News & World Report_: 

> Each week seems to bring more evidence of how the United States is losing step with the rest of the developed world when it comes to educating children. Seventy percent of eighth graders are not proficient in reading, over a million high schoolers drop out each year, and nearly one third of college freshmen must take remedial math or English courses. (p. 29)

If evidence-based programs and procedures are available to lessen the severity of these problems, the education profession has a moral imperative to examine them closely and to consider adopting them.

You can develop your own sensitivity to the problems that educators need to solve by reading various news sources, including daily newspapers. These news sources often publish articles about school incidents, academic achievement data, poll results, and policy debates that highlight problems of educational practice. In fact, some of the problems of practice that we present as features of educational practice. In fact, some of the problems of practice that we present as features near the end of each chapter in this book (including this chapter) are drawn directly from news sources.

_ASCD SmartBrief_ is a particularly informative news source about problems—and successes—that are likely to be of interest to educators. Each item in the newsletter summarizes a recent newspaper article, journal article, or institutional report that has educational relevance. Published by the Association for Supervision and Curriculum Development, one of the largest professional organizations for educators in the United States, it is available online (smartbrief.com/ascd).

We reviewed _SmartBrief_ newsletter items from 2012 to identify which educational problems were the frequent subject of news reports. A sample of the problems revealed by our search is shown in Figure 1.2.

Individual teachers and school districts might try to solve problems like these on their own. However, their magnitude is so great that more systematic, well-funded efforts are necessary, involving the development of innovative programs and procedures whose effectiveness is tested by researchers. On the other hand, some problems require _basic research_, which seeks to go beyond the surface manifestations of a problem and study it at a more fundamental level to identify underlying processes and structures. Eventually, basic research should yield insights that have practical applications.

In summary, evidence-based practice that addresses compelling problems of teaching and learning probably is our best long-term approach to improving education. For this approach to work, every educator and policy maker will need to understand how research evidence is generated and the factors that differentiate high-quality research from weak research. The purpose of this book is to help you acquire this understanding, either for the purpose of doing your own research or for judging whether research done by others is sound and applicable to your own professional practice.

### The Ethics of Educational Research and Practice

Ethical issues in research are of great concern to the general public and to the research community. These issues are two types: (1) issues involving the conduct and reporting of research studies and (2) issues involving the use of research findings.

An example of the first type of issue is whether researchers have taken adequate steps to protect sensitive data (e.g., individual students’ scores on high-stakes tests) from nonauthorized groups. Another example is whether researchers have obtained consent from individuals to participate in their studies.

In Chapter 2, we discuss these and many other issues that researchers must consider when undertaking a study. Here, we consider the second type of issue, that is, the ethical use of research findings. We start by noting that education is a thoroughly human enterprise. As humans, our values can, and should, influence our judgments and behavior. For example, researchers might identify an effective set of procedures for reducing the incidence of student misbehavior in school. However, the procedures...
might have harmful effects on students’ self-esteem, motivation, or respect for teachers. Other solutions that are effective for students and do not have negative side effects might be so expensive that they diminish the budget for other educational priorities.

Evidence-based practice, then, must not endorse blind use of research evidence, no matter how sound it is. For example, in medicine, doctors might have effective procedures for prolonging the life of a patient, but it may be at the cost of great suffering with only a small probability of a positive outcome. All stakeholders, therefore, including the patient and the patient’s loved ones, need to weigh treatment effectiveness and values in reaching a decision. Some professionals, called medical ethicists, specialize in identifying and weighing the values that are an inextricable part of medical research and practice. Similarly in education, all stakeholders concerned about students’ and educators’ well-being need to examine research evidence from the perspective of their own personal values as well as the shared values of society.
CHAPTER 1 • USING RESEARCH EVIDENCE TO IMPROVE EDUCATIONAL PRACTICE

Keep in mind, too, that the relationship between research and practice is a two-way street. Educators need to make value judgments about research evidence as it becomes available. However, they also need to realize that their willingness to support research and seek out research findings is itself a value judgment. Educators who prefer to rely only on their own beliefs and experiences, without considering research evidence, might be denying students access to more effective programs and procedures than they are providing. In other words, the dismissal of evidence-based practice is a value-laden decision that should not be made lightly.

The use of research findings is an ethical issue even in basic research. For example, a study about a bird flu virus became a major news item recently (Grady & McNeil, Jr., 2011). Researchers were experimenting with the deadly virus H5N1. The mutated airborne virus created by the researchers could infect many people quickly and cause a pandemic. Without mutation, though, the deadly virus’s harm is limited because it only can be transmitted from one bird to another or, more seldom, from one human to another.

Some experts argued that the experiment should not have been done because the procedures used to create the mutated virus and the virus itself might somehow fall into the wrong hands, with deadly consequences. Other experts argued that the experiment was worthwhile because the mutation might occur naturally in birds. Research findings about the deadly consequences of the mutation would alert scientists worldwide to monitor the bird population. If they found the mutated virus, they would alert appropriate authorities to take immediate steps to kill infected birds before the virus spread.

This example shows how an apparently innocent basic research study raises difficult ethical issues. These issues are not limited to the physical sciences but also can arise in educational research. For example, Arthur Jensen (1973), an educational researcher, conducted studies to determine whether white and black students differed in intelligence. He reported racial differences favoring white students and subsequently came under attack by fellow researchers and community leaders. They believed that the findings lent themselves to several interpretations, not just a genetic explanation, and that racists could use the findings to create unjust discrimination against racial minorities. More recently, two researchers (Herrnstein & Murray, 1994) came to similar conclusions about race differences in IQ and created a national controversy with the publication of their book, *Bell Curve*.

Resolving the ethical issues raised by the bird virus and intelligence studies is by no means straightforward. The medical profession has created the role of medical ethicist to help doctors with these issues, but there currently is no such role in the education profession. Instead, we rely on professional educational organizations, such as the American Educational Research Association, to monitor and take positions on ethical issues in research as they arise. As an educator, you too should examine research findings that affect you and your profession from multiple perspectives, including the all-important ethical perspective.

**THE PURPOSE OF EDUCATIONAL RESEARCH**

Up to this point in the chapter, we have discussed the relationship between research and educational practice, showing how evidence-based education can bridge these two enterprises. We now turn our attention to the nature of educational research and how it differs from other forms of inquiry.

We start with a definition. Educational research is the systematic collection and analysis of empirical data in order to develop valid, generalizable knowledge in the form of (1) descriptions of educational phenomena, (2) predictions about future events or performance, (3) evidence about the effects of experimental interventions, and (4) explanations of the basic processes that underlie observed phenomena.

This definition will become clearer as you study the chapters of this book. For now, we wish to highlight the fact that research seeks to produce valid knowledge, meaning that it uses special methods to control for personal biases and confounding factors that might compromise the soundness of its findings. Also, research seeks to produce generalizable knowledge, meaning that it uses special methods to produce knowledge applicable to other situations besides the one that was investigated. Finally, research relies on empirical data, meaning that it uses special methods to make replicable observations of the phenomena being studied.
Other forms of inquiry, such as personal observations and intuitive thinking, can also result in useful knowledge. However, they do not employ the special methods of educational research.

Our definition of educational research asserts that it produces four types of knowledge: (1) descriptions, (2) predictions, (3) evidence about the effects of experimental interventions, and (4) explanations. In the next sections, we discuss how research produces each of these types of knowledge.

Descriptive Research

The purpose of descriptive research is to make careful, highly detailed observations of educational phenomena. For example, Marilyn Adams’s monumental synthesis of research on learning to read includes findings about how an individual’s eyes move while reading text (Adams, 1990). Contrary to popular belief, researchers have found that good readers process every word in the text rather than engage in selective scanning, a finding with important implications for teaching children to read.

Descriptive research is particularly good for discovering problems of practice. For example, Mary McCaslin and her colleagues (2006) observed 145 teachers’ classrooms (grades 3–5) during 447 visits for 2,736 ten-minute intervals. Among their many research findings they discovered:

- the cognitive demands of most observed instructional opportunities were judged as only basic facts and skills content (37%) or a mixture of basic facts and skills, elaborations, and related thinking (37%). In comparison, 3% of the instructional opportunities were judged to involve students only in tasks that involved higher-order thinking/reasoning. (p. 324)

McCaslin and colleagues note that these observations of normative practice are discrepant from “best practice” recommendations of groups such as the National Association for the Education of Young Children and the National Council of Teachers of Mathematics. These groups recommend “considerably more opportunities for ‘constructive’ learners to think, reason, and construct personally meaningful learning than we observed” (McCaslin et al., 2006, p. 327).

This discrepancy between normative and best practice in elementary schools is a serious problem whose solution would greatly improve education. If individuals claim that the problem might exist elsewhere but not in their particular school system, we might reasonably ask them to present empirical data to back their claim.

You will study methods of descriptive research in Chapters 5 and 9 involving the collection of numerical data. Other types of descriptive research rely primarily on verbal data, such as interviews, historical records, or ethnographic data. This research approach—often called qualitative research—is explained in the chapters of Part Four.

Prediction Research

Prediction research seeks to determine whether data collected at one point in time can predict behavior or events that occur at a later point in time. This type of research can be helpful in solving problems of practice. For example, we know that a substantial percentage of students drop out of high school or have poor academic achievement. If we could identify these students at a younger age, we might be able to provide them with instruction and other interventions to prevent these problems. Prediction research can provide knowledge to guide this identification process.

Another example involves college administrators, who often face the problem of having more applicants than they can accept. Prediction research can be helpful in identifying characteristics of students who will do well academically and in other aspects of college life. Future applicants then can be assessed on these characteristics in order to select those most likely to be successful in a particular college.

Prediction studies typically involve the use of group comparison or correlational methods, which are explained in Chapters 10 and 11.

Experimental Research

Some research studies try to determine the effects of a particular intervention in a natural or laboratory setting. Studies of this type use what is commonly called the experimental method. For example, many researchers have conducted experiments to determine whether introducing cooperative learning into a classroom improves students’ learning. Any observed improvement in student learning can be considered an effect of the intervention and therefore an indicator of the intervention’s effectiveness.
The findings of experimental research are particularly important to educators. Virtually everything they do is an intervention of some sort. For example, teachers intervene in students’ lives in order to facilitate their learning or to help them with their personal problems. Administrators intervene by engaging in leadership behavior that facilitates the work of other individuals in the organization or that solves workplace problems. Experiments can determine which types of interventions are most likely to be successful.

Methods of experimentation involving quantitative data are explained in Chapter 12. Some researchers study the effects of an intervention by in-depth exploration of its use in one or a few situations. This type of research involves the use of case study methodology, which we explain in Chapter 13.

Educators, either on their own or in groups, can do small-scale experiments to improve local practice. They can test locally developed programs, or they can determine whether evidence-based programs developed elsewhere are effective in their particular school system. This approach, called action research, is explained in Chapter 18.

Educators, working together or with a professional researcher, can do studies to determine not only the effects of an intervention but also the value or worth of the intervention. For example, they might wish to determine whether the intervention is cost effective, better than other possible interventions, or valued by the community. This type of investigation, called evaluation research, is explained in Chapter 19.

Explanatory Research

The purpose of some research studies is to explain individual or group behavior. Explanatory research, as we use the term here, involves statements about cause-and-effect relationships. For example, a common explanation of the finding that students in some schools do better than average on state or national tests is that they come from families with a high socioeconomic status. In other words, socioeconomic status (the cause) is invoked as an explanation of students’ academic achievement (the effect).

All the research methods previously mentioned, with the exception of purely descriptive methods, can be used to investigate cause-and-effect relationships. The researchers hypothesize that one or more factors are causes and one or more factors are effects. They then collect data to determine whether variations in the presumed cause (e.g., schools with high teacher morale versus schools with low teacher morale) are associated with variations in the presumed effect (e.g., high student attendance rate versus low student attendance rate).

Some researchers investigate cause-and-effect relationships to develop and test theories. Indeed, some researchers believe that the ultimate goal of educational research is to develop theories that explain various aspects of education. A theory is an explanation of particular phenomena in terms of a set of underlying constructs and principles that relate these constructs to each other. Constructs are structures or processes that are presumed to underlie observed phenomena.

Theories about brain structures and processes are currently of great interest to professionals in various disciplines, including education. If researchers can determine how the brain works to facilitate or hamper students’ learning and motivation, this understanding might well lead to new solutions to problems of practice. The journal article reprinted at the end of this chapter presents brain theories that help us understand the effects of sleep on students’ learning. It also includes suggestions about how to help students get sufficient sleep. The author of the article is a neurologist who became a classroom teacher.

Basic and Applied Research

Researchers do not use a single approach to inquiry. Some of their investigations can be characterized as basic research, whereas others can be characterized as applied research. The purpose of basic research, as previously noted, is to understand fundamental processes and structures that underlie observed behavior.

For example, we can observe teachers and students in a classroom as they engage in their activities. We might note that the teacher distributed a worksheet to the students and gave directions for completing it and that students took a writing instrument and made marks on their worksheet. These behavioral observations might be useful information, but they do not tell us what the teacher and students were thinking or what neural–chemical processes were activated in the students’ brains as
they learned new skills and concepts by completing the worksheet. The study of processes that underlie observed behavior is the province of basic research.

In contrast, the purpose of applied research is to develop and test interventions that can be used directly to improve practice. In education, the development and testing of a new method to help students engage in mathematical problem solving would be an example of applied research. The published research articles that are included in Chapters 12 (Experimental Research), 18 (Action Research), and 19 (Evaluation Research) are examples of applied research.

Some educators believe that applied research is more valuable as a guide to their work than basic research and that it should therefore have funding priority over basic research. A study of medical research by Julius Comroe and Robert Dripps (1976) raises doubts about this view. Comroe and Dripps studied the advances in research knowledge that were necessary for innovations in the treatment of cardiovascular and pulmonary disease (e.g., cardiac surgery and chemotherapy). Surprisingly, many more basic research studies were instrumental in the development of these innovations than were applied research studies. Basic research leads to the theoretical understanding of underlying processes and structures, and this understanding is the best foundation for constructing interventions that are likely to be effective.

The postmodern critique of scientific inquiry has caused social science researchers (including educational researchers) to rethink their claims to authority in the pursuit of knowledge. They have identified several characteristics of research that they believe help to establish its claim to authority and that differentiate it from other forms of inquiry. We describe these characteristics in the following sections.

**Use of Concepts and Procedures That Are Shared, Precise, and Accessible**

Social science researchers have developed specialized concepts (e.g., test reliability), procedures (e.g., purposeful sampling), and carefully defined terminology. Their terminology, concepts, and procedures are explicit and accessible. Everyone is free to learn and use them. Indeed, most journals that publish research reports use a “blind” review procedure, meaning that reviewers do not have access to the authors’ names or other identifying information.

Of course, there are power struggles in the arenas of funding and publicity for research findings, but it is highly unlikely that important theories or findings can be suppressed over the long term because researchers generally are committed to progressive discourse (Bereiter, 1994). Anyone at any time can offer a criticism about a particular research study or research methodology, and if it proves to have merit, that criticism is listened to and accommodated.

Many educators perform their work at a high level of excellence and have developed many insights from their personal inquiries. However, they lack carefully refined concepts and forums for making their ideas widely accessible. Hence, their knowledge cannot be publicly debated, and it generally disappears when they retire. By contrast, new researchers are able to learn from experienced researchers, and the results are available in research journals for all to study.

**Replicability of Findings**

For researchers to have their findings published, they must be willing to make public the procedures by which those findings were obtained. Because
CHAPTER 1  •  USING RESEARCH EVIDENCE TO IMPROVE EDUCATIONAL PRACTICE

the procedures are public, other researchers can conduct similar studies to compare results. Called replication studies because they involve repetition of the original study under similar conditions but with a new sample of participants, such studies can provide additional confidence in the original findings, or refutation of them.

Individuals who engage in nonscientific inquiry might discover potentially important interventions and insights. However, their inquiries are of limited value because they do not make their procedures sufficiently explicit for others to replicate. Thus we have no way of knowing whether an individual’s claimed findings and insights are unique to that individual or can inform the work of other individuals.

Refutability of Knowledge Claims
Karl Popper (1968) proposed a standard for testing knowledge claims that has won general acceptance among social science researchers. Popper argued that science advances through the process of refutation, which involves submitting knowledge claims (theories, predictions, hunches) to empirical tests that allow them to be challenged and disproved. If the data are inconsistent with the knowledge claim, we can say that it is refuted. The knowledge claim must then be abandoned or modified to accommodate the negative findings. If the data are consistent with the knowledge claim, we can conclude that it is supported, but not that it is correct. We can say only that the knowledge claim has not been refuted by any of the tests that have been made thus far.

Refutation tests knowledge claims more rigorously than we usually test everyday knowledge claims. For example, suppose a school administrator visits a teacher’s classroom one day and discovers that (1) the teacher has attended a recent workshop on classroom management, and (2) the teacher’s class is unusually quiet and orderly. The administrator might conclude that the workshop is effective and therefore mandate participation from all teachers. In effect, the administrator made an observation first and then formulated a broad knowledge claim. In contrast, researchers who follow Popper’s logic make a knowledge claim first, perhaps based on a similar observation, and then test it by making further observations before reaching any conclusions.

Control for Researcher Errors and Biases
Researchers acknowledge the likelihood that their own errors and biases will affect their data collection. Therefore, they design research studies to minimize the influence of such factors. For example, in making observations, researchers often seek to reduce error by using multiple observers and training them beforehand in the system for collecting data on observational variables. In addition, they typically use statistical procedures to estimate the observers’ level of agreement. While the observations of different observers rarely agree perfectly, a certain level of agreement must be achieved before the observational data are accepted as valid.

An approach often used in case study research is to validate findings by triangulation of data sources. Triangulation refers to researchers’ attempts to corroborate data obtained by one method (e.g., observation of individuals) by using other methods (e.g., interviews of individuals or examination of documents).

Other research procedures described throughout this book are also intended to minimize various researcher errors and biases in data collection and analysis. We invite you to compare the rigor of these methods with the everyday methods that individuals use to arrive at and justify knowledge claims.

QUANTITATIVE AND QUALITATIVE RESEARCH
Educational research is not a unified enterprise. The approaches to research described in Part Three, called quantitative research, involve the study of samples and populations and rely heavily on numerical data and statistical analysis. In contrast, the research traditions described in Part Four, called qualitative research, rely on the study of individual cases and make little use of numbers or statistics, preferring instead verbal data and subjective analysis.

Why does educational research include such diverse approaches? To answer this question, we need to consider the different epistemologies—that is, the different views about the nature of knowledge—that guide educational researchers.
Some researchers assume that features of the human environment have an objective reality, meaning that they exist independently of the individuals who created them or are observing them. These researchers subscribe to a positivist epistemology. Positivism involves the belief that there is a real world “out there” available for study through scientific means similar to those developed in the physical sciences.

Most quantitative research is carried out by researchers who subscribe to the positivist epistemology. They define their topics of interest in terms of observable behavior (e.g., “feeling good about one’s teacher” might become “students report positive attitudes”). They attempt to define that behavior in terms of the specific operations used to measure it (e.g., “students with positive attitudes gave average ratings of 3 or higher on 5-point scales”). They also are concerned about generalizing what they discover about a research sample to the larger population from which that sample was presumably drawn.

Other researchers take the epistemological position known as interpretivism (Erickson, 1986), believing that aspects of the human environment are constructed by the individuals who participate in that environment. Interpretivism involves the belief that social reality has no existence apart from the meanings that individuals construct for it. For example, a teacher might form the construction that the students in his first-period class are “13 boys and 16 girls,” or “29 unique individuals, each with their own needs,” or “easier to teach than students I’ve had other years,” depending on when the teacher is thinking about them. If the principal steps into the teacher’s classroom, her construction of the students in the class might vary depending on how they are behaving at the moment, how the principal is feeling, or many other factors.

Most qualitative research is carried out by individuals who subscribe to interpretivist epistemology. These researchers believe that scientific inquiry must focus on the study of the different social realities that different individuals in a social situation construct as they participate in it. Because of the complexity of these constructions, qualitative researchers usually study single individuals or situations, each of which is called a case. They determine the applicability of case findings to other situations mainly by comparing cases or suggesting that educators do this comparison with their own situation.

Qualitative researchers also acknowledge their own role in constructing the social realities that they describe in their research reports and thus often include their own experiences in their reports. This focus on the researcher as a constructor of social reality is called reflexivity.

While some scholars refer to positivism and interpretivism to distinguish these two approaches to research, the terms quantitative research and qualitative research are more commonly used, and we will use these terms in this book. The words quantitative and qualitative highlight the differences in the kinds of data that typically are collected by researchers and how these data are analyzed and interpreted. Table 1.1 provides a further elaboration of the distinguishing characteristics of quantitative and qualitative research.

Given that both quantitative and qualitative methods are used to study education, several questions arise. Is one approach better than the other? Do they complement each other in some way? Do they produce conflicting findings? We address these questions in Chapter 17. For now, we will observe that many researchers believe that the methods of qualitative research and quantitative research are complementary and that researchers who use a combination in mixed-methods research studies are in the best position to create a meaningful picture of educational practices and problems.

COLLABORATING WITH RESEARCHERS

In order for educational research to play a role in improving practice, educators need to participate in an ongoing dialogue with professional researchers. Maintaining a dialogue is no easy matter, though. One challenge is that researchers and educators tend to have very different views about knowledge and research. According to Lilian Katz and Dianne Rothenberg (1996), researchers’ main interest in knowledge is scientific. When confronted with a problem, they seek to explore and discover the nature of the problem, no matter how long that might take. In contrast, educators’ main interest in knowledge is clinical. When confronted with a problem, they seek information that will allow them to solve it, usually under the pressure of a time limit. Katz and Rothenberg also note that effective practice “depends to some extent on the
certainly with which the practitioner approaches his or her task. And by definition, the researcher’s task is to prize doubt and uncertainty and be open to being wrong” (p. 8).

Nonetheless, researchers and educators have a shared desire to improve educational practice. Therefore, they should take steps to understand each other’s needs and to communicate clearly with each other. For example, researchers can develop research agendas that are responsive to educators’ needs. Also, they can write reports of their findings in nontechnical language and spell out their implications for practice. In turn, educators need to make an effort to understand the language and methods used by researchers. In addition to improving lines of communication, educators and researchers can strengthen the application of research to practice through collaboration, as described in the following sections.

Being a Research Participant

Researchers often ask educators to participate in their studies. The effort required might be minimal (e.g., filling out a questionnaire) or more extensive (e.g., volunteering your class to be part of the experimental group or control group in an experiment). By volunteering to participate, you might be eligible to receive special training, consultation, or free use of innovative curriculum

<table>
<thead>
<tr>
<th>TABLE 1.1 • Differences Between Quantitative and Qualitative Research</th>
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<tr>
<td><strong>Quantitative Researchers</strong></td>
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<tr>
<td>Assume an objective social reality.</td>
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<tr>
<td>Assume that social reality is relatively constant across time and settings.</td>
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<tr>
<td>View causal relationships among social phenomena from a mechanistic perspective.</td>
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<tr>
<td>Take an objective, detached stance toward research participants and their setting.</td>
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<tr>
<td>Study populations or samples that represent populations.</td>
</tr>
<tr>
<td>Study behavior and other observable phenomena.</td>
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<tr>
<td>Study human behavior in natural or contrived settings.</td>
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<tr>
<td>Analyze social reality into variables.</td>
</tr>
<tr>
<td>Use preconceived concepts and theories to determine what data will be collected.</td>
</tr>
<tr>
<td>Generate numerical data to represent the social environment.</td>
</tr>
<tr>
<td>Use statistical methods to analyze data.</td>
</tr>
<tr>
<td>Use statistical inference procedures to generalize findings from a sample to a defined population.</td>
</tr>
<tr>
<td>Prepare impersonal, objective reports of research findings.</td>
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I also will have the opportunity to learn how research is actually done.

**Participating in Program Evaluations**

Educational institutions occasionally receive grants from private or government funding sources to implement experimental programs. These grants typically require the grantee to carry out an evaluation of the program. If your institution employs evaluation specialists, you can work alongside them to design an appropriate evaluation study. For this collaboration to happen, however, you need to be knowledgeable about evaluation research. If no evaluation specialists are available to help you in securing a grant and satisfying its criteria for evaluation, you will need to know even more about evaluation research to deal effectively with the grant's requirements.

Chapter 19 explains how to conduct an evaluation study and also how to decide whether you can apply the findings of an existing evaluation study to your own situation. Because evaluation research typically involves one or more of the research approaches described in Parts Three and Four of this book, study of those chapters will be helpful to you, too.

**Influencing Policy Agendas for Education**

Various policy-making bodies, ranging from national and state legislatures to the central offices of local school districts, are constantly proposing changes in educational practice that directly affect educators’ work. We described one such change, the No Child Left Behind Act, earlier in the chapter.

Some policy-driven changes are sound, but others make little sense to the educators who must implement them. For example, many states have implemented or are considering mandatory achievement testing of all students in order to make educators accountable for student learning outcomes. Many teachers are concerned about the validity of these tests and whether they respect the huge individual differences in students’ learning needs and family situations. However, without knowledge about research on achievement testing and student characteristics, teachers and other educators are handicapped in their ability to influence statewide testing programs.

Ill-considered policies perhaps could be avoided if educators and researchers would collaborate to make their views and knowledge known to policy makers. For this to happen, though, researchers and educators must be familiar with each other’s knowledge, goals, and perspectives. One way to achieve this familiarity is to become a member of the American Educational Research Association, which is the primary organization for individuals interested in current trends and issues in educational research.

**A PERSONAL NOTE: THE RESEARCH “SPARK”**

We are well aware that some individuals do not have an interest in formal research methodology, which is what this book is primarily about. Those individuals might take great interest in new discoveries, such as breakthroughs in medicine or alternative sources of energy or how the brain affects our ability to learn, but not in the research processes that led to those discoveries. In fact, many adults have had little or no exposure to the kind of work that researchers do in creating new knowledge.

We believe that interest in research methodology and the desire to do one’s own research are set off by some “spark” that differs among people. Since we (Mark and Joy Gall) know our own “sparks” best, we will recount them briefly here.

**Mark Gall**

I began my doctoral studies with the intention of becoming a clinical psychologist in private or group practice. Gradually, I began to wonder whether psychotherapy was actually as effective as was claimed. That was the “spark” that led to my interest in research; I wanted to know what researchers had learned about the effectiveness of different psychotherapeutic approaches (e.g., Freudian, Jungian, Adlerian) and how I could do my own research to determine their effectiveness.

Later in my career, after I became a teacher educator, I became interested in teacher enthusiasm, which some research studies had found to be positively associated with student learning. Several of my doctoral students wondered whether it was possible to train teachers to become more enthusiastic.
during classroom instruction. That question was the “spark” for a series of doctoral studies that I chaired. To do these studies, both the students and I needed to learn how to use particular research methods. In particular, we needed to study methods for conducting experiments (see Chapter 12), because each study involved training some teachers to use indicators of enthusiasm (the experimental group) but not others (the control group) and then observing the effects of this intervention on their instructional behavior and on their students’ learning.

Joy Gall

I began my doctoral studies with an interest in social psychology and the ways in which groups such as families, work organizations, or schools shape individuals’ thinking, emotions, and behavior. While doing my doctoral studies, I was hired by two psychology professors who had a funded grant to develop curriculum materials for young students based on the latest principles of scientific discovery. I developed materials that were designed to bring science alive for young learners. The work of developing curriculum or training materials based on the findings of research is known as research and development. My understanding of how research and practice could be connected began with this work.

During my career, I have continued to apply my psychological research and writing skills by developing research-based curriculum and training materials for educational administrators, teachers, and students. I also have addressed the learning needs of various community groups, including parents of students. My “spark” involves the desire to discover ways to help individuals understand and improve their social environment through individual and joint learning endeavors.

You

You might already have experienced your own “spark.” Perhaps that spark is a desire to find answers to a question or problem that you can’t stop thinking about. Perhaps it is a desire to test a personal theory about a better way to teach. If you have a research “spark” for this or another reason, you have the requisite motivation to study this book.

If your primary “spark” is a desire to get into schools and help students learn, we encourage you to be on the lookout for what works and also for problems that trouble you and your colleagues. You might find answers in the workplace, but we encourage you to look also at the research literature on education. You might find answers there, or at least new ways of thinking about what works, and what doesn’t, in education. You might even find that you wish to do your own research project.

An example of

How Research Can Help in Solving Problems of Practice

Note to the reader. You will find features similar to this section in most of the other chapters of this book. We present a problem of practice that has reached public attention through newspapers or other media. Then we suggest how the research methodology described in the particular chapter can be used to design studies that address the problem.

These vignettes are designed to develop your understanding of the relationship between educational problems and educational research. We hope you will see that conventional wisdom and individual effort alone are insufficient to solve many of the pressing problems in education. Empirical knowledge generated by well-designed research studies also is necessary.

An editorial about the status of educational research in the United States appeared in November 2008 in The Boston Globe. The following excerpts are from the newspaper editorial:

Grover Whitehurst, who heads the research arm of the U.S. Department of Education, says that the quality of education research today is the rough equivalent of medical research in the 1920s.

[Whitehurst recommended] operating a national education department that spends just $575 million—1 percent of its budget—on research.
A few years later, Michael McPherson, president of the Spencer Foundation, made a similar point at a briefing held on Capitol Hill on February 14, 2011. He stated that “we are a very impatient nation” and “we spend very little on education research” (AERA Highlights, 2011, p. 66).

Medical research has led to huge advancements in practice. Could research do the same for educational practice? Some educators, such as Grover Whitehurst and Michael McPherson, believe that research can accomplish this goal. Other educators, however, believe that federal monies are best used for direct service to students. A research study might help educators and their professional organizations decide what the priority should be.

A simple survey study should be sufficient to learn educators' views. For example, a sample of educators could be asked to read The Boston Globe's editorial and then respond to a question such as: “Based on what you just read and what you know about research, do you think that the U.S. Department of Education should allocate 1 percent of its budget for research?”

In designing this study, we would need to pay particular attention to the sampling procedure. The population should be defined as all educators in the United States. A large random sample should be drawn from that population so that we have confidence that the survey results represent the views of educators in general, not just educators from one region or educators who volunteer to complete the survey.

**SELF-CHECK TEST**

1. Evidence-based practice requires that educators
   a. collect evidence on their own effectiveness as teachers.
   b. make use of relevant research findings in solving problems of practice.
   c. disregard stakeholders' values in decision making unless they are consistent with research evidence.
   d. use instructional programs and procedures that rely primarily on educators' clinical expertise.

2. The Institute of Education Sciences and the What Works Clearinghouse exemplify education's movement in the direction of
   a. basic research.
   b. qualitative research.
   c. postmodernism.
   d. evidence-based practice.

3. Assuming that policy agendas for education become more evidence-based, educators will most likely
   a. seek to develop a greater understanding of research concepts and procedures.
   b. use their professional organizations to resist such agendas.
   c. argue that education's problems are unique and cannot be solved by research.
   d. claim that evidence does not lead to improvement in professional practice.

4. Educational research emphasizes
   a. collection of empirical data.
   b. control for personal biases in collecting, analyzing, and interpreting empirical data.
   c. sample selection such that findings can be generalized to other individuals and situations.
   d. All of the above.

5. The role of theory in educational research is primarily to
   a. develop precise descriptions of educational phenomena.
   b. evaluate the effectiveness of specific instructional interventions.
   c. explain phenomena in terms of constructs and principles.
   d. provide a language that facilitates collaboration between researchers and educators.
6. Postmodernists argue that
   a. contemporary research methods have overcome serious deficiencies of research methods used in the first part of the 20th century.
   b. educational research is not superior to other forms of inquiry about problems of practice.
   c. basic research is ultimately more important than applied research in solving problems of practice.
   d. any knowledge claim can be refuted.

7. Triangulation is a method by which researchers
   a. look for explanations about why a finding from one research study fails to replicate in a subsequent study.
   b. obtain data from different sources in order to check for errors and biases in their findings.
   c. determine whether a problem of educational practice can be studied by collecting empirical data.
   d. collaborate with educators and policy makers in the design of an empirical study.

8. Positivist researchers
   a. subscribe to the belief that there is an objective reality that exists independently of the observer.
   b. believe that aspects of the human environment are constructed by the participants in the environment.
   c. emphasize description as the goal of scientific inquiry.
   d. disregard the possible effects of their own biases on research findings.

9. Qualitative researchers typically
   a. focus on making subjective judgments about the quality of educational programs and procedures.
   b. include quantitative measures to represent the qualities of each case they study.
   c. argue that the methods of social science inquiry are not superior to other forms of investigation.
   d. emphasize the study of individual cases of a phenomenon.

10. Mixed-methods research
    a. is designed to produce descriptive and predictive findings within a single study.
    b. was developed to speed up the transfer of research findings into educational practice.
    c. uses a combination of quantitative and qualitative research methods.
    d. uses theories from multiple disciplines to study problems of practice.

CHAPTER REFERENCES


RESOURCES FOR FURTHER STUDY


The chapter authors examine the process by which educators use information to improve schools. They consider the use of quantitative and qualitative research evidence, standardized test scores, and survey and interview data. They also examine various materials, including samples of students' works. This book identifies the difficulties, but also the promise, of evidence-based practice in education.


Most of us understand something about how scientists, including educational researchers, work. However, few of us are aware of the fundamental assumptions that underlie scientific inquiry and also the ongoing controversies about these assumptions. If you wish to deepen your understanding of science, this book will enlighten you.


This book is written for teachers who are interested in incorporating evidence-based practice into their instructional repertoires. The author describes skills needed to critically evaluate research reports and to carry out one's own school-based research.
Sample Educational Research Study

How Students’ Sleepy Brains Fail Them


The author of the following journal article notes that many students, from kindergarten through high school, experience sleep deprivation. She cites research studies that have found serious decrements in student learning resulting from sleep deprivation. In reading this article, you will see the importance of basic research in helping us understand the brain’s role in the learning process. You also will see how applied research is used to document positive results from interventions designed to reduce sleep deprivation among students. The author of the article is both a board-certified neurologist and middle school teacher.

The article is reprinted here in its entirety, just as it appeared when originally published.

How Students’ Sleepy Brains Fail Them

JUDY WILLIS
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Educators are barraged with information about the value of brain food, water, exercise, and vitamins on student learning. This information is often contradictory to and not substantiated by medical or cognitive research. As a neurologist and middle school teacher, I have found the evidence supporting the value of these factors limited, particularly when scrutinized through a medical lens.

One aspect of brain health that has been well examined through neuroimaging and cognitive testing is the influence of sleep on the brain. The findings are indeed a wake-up call with regard to the impact of sleep on focus, memory, test performance, mood, and high-risk behavior.

Sleep Tight

Nearly 40 percent of students in kindergarten through fourth grade have sleep disturbances, and those poor sleep habits in children carry into adolescence. Some sleep deprivation in children has been attributed to the rising use of computers, video games, iPods®, and text messaging, as well as to the increased volume of homework compounded by earlier school start hours (Carskadon, Acebo, and Seifer 2001).

Sleep performs a restorative function for the body and the brain, and many brain functions become considerably less efficient after a sleepless night (Maquet 2001). Sleep-deprived children display lower brain activity while working on math problems than they do when rested, and they make more mistakes and omit more answers on tests (Drummond et al. 1999).

fMRI scans monitored activity in the brains of subjects performing simple verbal learning tasks. The temporal lobes—which are important for language processing—and the prefrontal cortex—which is active during coordinated attention and memory processing—were significantly more active during verbal learning in rested subjects than in sleep-deprived subjects. When two groups were tasked with memorizing short lists of words following either a full night’s sleep or about 35 hours without sleep, word recall and recognition dropped sharply in the sleep-deprived group (Drummond et al. 2000).

Harvard researchers studied the brain’s need for sleep to solidify the new information learned during the day. In a study test group of 60 students, each participant was asked to memorize 20 pairs of random words. Half were told to return 12 hours later, after a good night’s rest. The other half were told not to sleep and to return in 12 hours. Seventy-six percent of the rested students correctly recalled all the words on a test, while only 32 percent of the sleepless students had all words correct (Ellenbogen 2005).

Rehearsals During Sleep

Sleep influences both the encoding and consolidating of memories, as well as the construction of new connections within networks that store the new memories. The sleeping brain is less distracted by the sensory input

Judy Willis, a neurologist and credentialed teacher at Santa Barbara Middle School in California, combines her training in neuroscience and neuroimaging with her teacher education training and years of classroom experience. She is an authority in the field of learning-centered brain research and teaching strategies derived from this research.
that bombards it all day, leaving a greater portion of its energy (metabolism) available for organizing and storing memories formed during the day. During sleep, when the prefrontal cortex receives less environmental sensory input, the executive functioning areas are less metabolically active. This reduced-activity brain state may provide the opportunity for recently learned material to be rehearsed, repeated (perhaps in dreams), and consolidated into long-term memory.

“Sleep performs a restorative function for the body and the brain, and many brain functions become considerably less efficient after a sleepless night.”

“Dream sleep” associated with rapid eye movement (REM) sleep may be the time of encoding and consolidating during which new information is reviewed and coded into relational memories. Non-REM sleep appears to be the time during which new connections in neural networks are constructed to store the new memories and existing connections are strengthened.

During late stages of REM sleep, memories may be rehearsed and strengthened. Human subjects performing difficult tasks tend to improve their scores between sessions on consecutive days, but not between sessions on the same day—implicating sleep in the learning process (Walker et al. 2002). Mice allowed to sleep after being trained “remembered” what they had learned (connecting a sound to an electric shock) better than those deprived of sleep when tested several hours after the conditioned learning took place (Graves 2003).

REM sleep and its dreams—as forms of replaying and rehearsing new information to consolidate it from short-term to long-term memory—is an area ripe for study in the neuroscience of learning. In one research project, rats were trained on a track to reach a food reward. Electrical activity in the “place cell” neurons reflected the same or very similar activity during sleep as these hippocampal and prefrontal cortex neurons displayed during the track running behavior; even specific patterns of activity based on the rats’ location on the track could be identified both in waking and sleep. Researchers concluded that during sleep, the rats were reconstructing their movements through locations on the track that led them to the reward by reactivating their original memory tracts (Ji and Wilson 2007).

During REM sleep, the brain stem sends messages to the visual center of the cortex as it does during wakefulness (Dement 1960). Because the sleeping person cannot respond to these messages physically, dreams may be the response to these neural impulses. This neural processing during sleep, therefore, could come from internal sources rather than from the physical world, yet still serve to consolidate the memory through the restimulation of the memory network (Purves et al. 2004).

“Increasing sleep time from six or less to eight hours can increase memory up to 25 percent.”

Sleep Construction

The term neuroplasticity describes the brain’s ability to change or increase the dendrite connections and synapses between neurons, and thereby impact memories stored in neural networks. It is during the later hours of REM and non-REM sleep that the brain converts the greatest amount of amino acids into the proteins that are the building blocks of neuron-to-neuron connections such as dendrites (Benington and Frank 2003).

To convert the circulating amino acids into the proteins from which new connections are constructed, the brain needs nerve growth hormones and neurotransmitters such as neurotrphic growth factor and serotonin. The levels of both of these chemicals are especially high during later stages of sleep, the period when most new dendrite branching takes place (Murck et al. 2001).

In animal experiments, memory consolidation is associated with the synthesis of new proteins in the hippocampus and subcortical frontal lobe memory storage areas. Dendrite growth and new synapse formation correlate with the levels of nerve growth factor BDNF, brain-derived neurotrophic factor protein (Lo 1995). The increased release of nerve growth factor and serotonin during the later REM and non-REM sleep states—aft six to eight hours of sleep—appears to influence plasticity through chemical and physical changes (McAllister, Katz, and Lo 1996; Alsina, Vu, and Cohen-Cory 2001).

In animals, increased brain oxygen use triggers the construction of proteins from amino acids. This increase is evident on their fMRI scans 24 hours after information is stored (Drummond et al. 2000).

The More One Knows, the Easier It Is to Learn More

According to neuroplasticity theory and animal research, these brain cell networks that form connections with increasing dendrites and synapses are the hard-wiring associating newly learned information with previously stored, related knowledge in permanent memories (Benington and Frank 2003). The brain cell networks grow when increasing numbers of dendrites branch out from the nerve cells and link more and more neurons together. A correlation appears to exist between the number of dendrites and the efficiency of the brain to recognize similarities between new experiences and already stored ones (patterning) and to link new information with existing categories of knowledge (encoding into the memory circuit) (Leutgeb et al. 2005).

Construction of neural networks takes time, as dendrite sprouts grow and new synapses form (Benington and Frank 2003). This construction of memory storage
appears most active during the longest periods of uninterrupted deep (non-REM) sleep that begin after six to eight hours of sleep. During these hours, the brain may construct the physical structures that represent the networks where the recent memories can, with further rehearsal (review and network restimulation), become long-term memories (Maquet 2001). This sleep/memory research provides support for what many students have discovered through their own study habits: reviewing notes while still alert is more effective than reviewing right before falling asleep. The quality and quantity of retained memory is superior when students review their notes thoroughly, stop, and go to sleep when they begin to feel drowsy. Retained memory diminishes when students extend their review time any number of hours once they become drowsy and thereby reduce their sleep time to less than six or eight hours (Stickgold, James, and Hobson 2000). A study of students who received low grades (C and lower) reported sleeping an average of 20 minutes less and going to bed an average of 40 minutes later on school nights than students with higher grades. The recognition of the correlation between sleep and memory has led some researchers to test and confirm their predictions that increasing sleep time from six or less to eight hours can increase memory up to 25 percent (Frand 2000).

Sleep and Syn-naps
Nightly sleep is not the only way to maintain healthy brains and support learning and memory. Syn-naps, or brain breaks, are important throughout the day to keep neurons firing efficiently. Depending on students’ ages and focus abilities, the number of syn-naps needed will vary. Syn-naps should take place before fatigue, boredom, distraction, and inattention set in. As a general rule, to keep children alert and engaged, syn-naps should be scheduled after 10 minutes of concentrated learning for elementary school and 15–30 minutes for middle and high school students (Willis 2006). These three- to five-minute breaks do not need to disrupt the flow of learning. Simply stretching, drinking water, or moving to a different part of the room can provide a fresh outlook. A bit of physical activity, such as jumping jacks or singing a song can be revitalizing. During these breaks, the newly learned material has the opportunity to go from short-term to working memory while children relax and refresh their supply of neurotransmitters (the brain’s chemical messengers). Physical movement during syn-naps increases blood flow to the cranial circulation, and the deep breathing of exercise increases the blood levels of oxygen.

Teens
Adolescents need up to two hours more sleep than when they were in elementary school for their brains to consolidate and cement new knowledge and experience into memory and avoid behaviors associated with sleep deprivation that interfere with cognitive and attention skills. This recommendation is in part attributed to the finding that, during sleep, teenagers start to secrete melatonin, a sleep promoting neurochemical, up to two hours later in their sleep cycle than when they were younger (Wurtman and Lieberman 1985). Yet, only 15 percent of adolescents reported sleeping 8 or more hours on school nights and the older teens reported an average of 7.7 hours of sleep a night, with 11 percent sleeping less than 6.5 hours a night (Javaheri et al. 2008).

A number of problems stem from sleep deprivation in adolescents. Auto accidents among teens are a prime example. Drowsy drivers are attributed with causing 100,000 auto accidents a year in the United States; drivers age 25 or under caused more than half of these crashes by falling asleep at the wheel (Wu and Yan-Go 2006).

Academic achievement also takes a hit by sleep deprivation. During the earliest classes in middle and high school, teachers notice a comparatively lower level of alertness in their students. Twenty percent of all high school students fall asleep in school, and more than 50 percent of students report being most alert after 3:00 p.m. High school students who sleep less than six hours a night generally have poorer grades even when they study the same reported number of hours as higher-achieving students (Wolson and Carskadon 1998).

Sleep deprivation additionally reduces the body’s supply of cortisone and growth hormone and disrupts hormones that regulate appetite. Teens who sleep less than 7 hours a night are more likely to be obese (Vgontzas et al. 1999) and have more than twice the risk of high blood pressure even when the data are adjusted for sex, weight, and socioeconomic status (Javaheri et al. 2008). With less than 7 hours of sleep, teens also have higher levels of stress, anxiety, and depression, and tend to take more unnecessary risks including drug and alcohol abuse, sexual promiscuity, and unsafe driving (Williamson and Feyer 2000).

Reports indicate that some high school students drink as many as five cans of “energy drinks” a day to combat sleep deprivation. The consumption of these drinks by teens compounds the problems associated with sleep deprivation. When teens mix these drinks with alcohol, the likelihood of them becoming victims or perpetrators of aggressive sexual behavior increases (Miller 2008).

Creating Sleep-Friendly Schools
School systems can help positively influence sleep patterns in several ways when educators, school health providers, and other school personnel are knowledgeable about sleep needs and patterns as well as the signs of sleep loss. Further benefits come from informing parents about the importance of optimizing sleep quality for their children with regular sleep and wake times.
and bedrooms that are kept quiet, dark, and conducive to sleep. Students need to be knowledgeable about the physiology and benefits of sleep and the consequences of sleep deprivation in their academic success and physical health and safety.

In 2004, Duke University stopped scheduling any 8 a.m. classes because students weren't getting enough sleep. "They’re coming in to see us, and they’re ragged," said Assistant Dean Ryan Lombardi. Duke also has offered students individual health assessments to help them learn what to eat and how many hours to sleep (Grace 2004).

Minneapolis Public Schools was the first major school district to change its starting times to meet adolescent sleep needs. During the 10-year period after this change, positive impacts were noted: improvements in attendance rates, less falling asleep in school, fewer incidents of misbehavior, and increased alertness in class (Wahlstrom et al. 2001). In addition, students reported that it was easier to stay awake when doing homework, and their moods improved as well as their grades (Kubow, Wahlstrom, and Bemis 1999; Wahlstrom 2000). Even parents reported better relationships with their children (Kubow et al. 1999).

Other school districts have adopted patterns similar to the Minneapolis schools, changing the start time for high school from 7:15 a.m. to 8:40 a.m., and middle school from 7:40 a.m. to 9:40 a.m. Among the sleep-sensitive schools with later start times are schools in Lynchburg, Virginia; West Des Moines, Iowa; and Orange County, Florida.

As sleep research has demonstrated, students from elementary school through college need an age-associated number of hours of sleep to learn effectively. Armed with this information, students can make more informed decisions. When students understand the physiology of sleep, they may realize that it's better to review their notes thoroughly and go to sleep for nine hours than to cram for an extra hour. Knowledge can help students make better decisions when they are faced with choices of an extra hour of sleep, an extra hour of study, or an hour spent playing video games and sending text messages.

REFERENCES


CHAPTER TWO

Doing Your Own Research: From Proposal to Final Report

PROBLEMS OF PRACTICE in this chapter

- Is it better to use symbolic representations or concrete examples in teaching math to children?
- Do kindergarten children’s academic achievement, socioemotional status (hyperactivity, prosocial behavior, anxiety, depression), and attentiveness determine their academic performance and socioemotional status at subsequent grade levels?
- Does the effectiveness of college instruction affect students’ decision to drop out or re-enroll?
- Is the program known as Project ALERT actually effective in achieving its goals of affecting adolescent students’ intentions to use alcohol, cigarettes, and marijuana?
- Should teachers “teach to the test”?
- Do teachers in fact align their instruction and assessment with state curriculum standards and assessment?
- Do students perform better on their teachers' assessments and on statement assessments if their teachers improve their curriculum alignment?

IMPORTANT Ideas

1. Preparing a proposal for your research study increases the probability that all the subsequent steps of the research process will be successful.
2. A good way to start identifying a research problem to investigate is by reading literature reviews and articles in your areas of interest.
3. Replication of previous research findings is important for the advancement of research knowledge.
4. You are more likely to write a successful research proposal if you follow a standard proposal guide from your university or other authoritative source.
5. Test your understanding of your proposed research study by attempting to state its purpose in one or two sentences.
6. After stating the purpose of your study in general terms, you should make it more specific by formulating research questions or hypotheses and by identifying the variables (in quantitative research) or case features (in qualitative research) that you plan to study.
7. A systematic literature review will help you prepare a sound research proposal and solve problems of practice.
8. In preparing a research proposal, you need to decide on the research design that is most appropriate for answering your research questions or testing your hypotheses.
9. It usually is impossible to study everyone in the population that interests you, so you need to select a sample from that population and specify your sampling procedure in the research proposal.
10. Careful identification of variables or case features will make it easier to identify the measures or cases needed for your proposed study.
11. Specify your data analysis procedures in the research proposal to ensure that your eventual data can be analyzed appropriately.
12. You probably will need to submit your research proposal to an institutional review board, which will determine whether it adequately protects the research participants from certain risks.
13. In planning your research proposal, you need to think about the steps you will take to gain the cooperation of the research participants.
14. You should create a timeline for all the steps of your proposed study to ensure that there are no conflicts with your own time limitations or those of your research participants.
15. A pilot study of your measures and procedures, preferably completed as part of the proposal preparation process, helps to ensure that you will not encounter unexpected difficulties when you actually conduct the study.
16. Unexpected problems often arise while a study is being conducted, and you will need to find ways to solve them without compromising the integrity of the study.
17. To help in preparing the report of your completed research study, first read exemplary reports that are similar in format (e.g., dissertations, journal articles) to the one that you are writing.

KEY TERMS

- construct
- database
- empirical data
- human subjects
- hypothesis
- informed consent
- institutional review board
- review committee
- variable
- search engine
- theory
- replication research
- publication Manual of the American Psychological Association

If you are enrolled in a university degree program, you might be required to complete a research project. It might consist of library research, meaning a literature review on a topic that you select. A step-by-step process for doing a literature review is presented in Chapter 3, with several of the steps explained in more detail in Chapters 3 and 4. Another possible degree requirement is completion of your own research study, which is the subject of this chapter. In describing how to conduct a
research study, we refer to concepts and procedures that we explain in depth in other chapters. We recommend that you read this chapter first, though, because it provides a framework for understanding the other chapters.

Doing a research study involves three major steps:

1. preparing a proposal that describes the study to be done and its significance;
2. collecting and analyzing data; and
3. writing a report of the completed study.

The first step, preparing the proposal, is the most crucial because it provides the foundation for the other two steps of the research process. Others can review the proposal for flaws and offer suggestions while there is still opportunity to benefit from them. Obviously, the reviewers can provide better feedback if the proposal has detailed specifications.

Another benefit of a well-prepared proposal is that it can serve as the basis for the final report and thereby speed up the process of writing it. For example, if your proposal contains a good literature review and descriptions of tests or other measures, you can incorporate them directly into the final report.

If you publish your completed study as a master's thesis or doctoral dissertation or present it at a professional conference, you will be required to submit the proposal, perhaps in modified form, to an institutional review board, which we describe later in the chapter. This board will determine whether you have included adequate procedures for protecting the rights of your research participants. If the board rejects your proposal, you will need to revise it. Revision will delay the start of data collection, which can be a serious problem for studies that are dependent on the schedule of schools or other organizations.

IDENTIFYING A RESEARCH PROBLEM

The critical first step in conducting a study is identifying a suitable problem to investigate. How you frame the problem determines everything that follows and often is the difference between a study that genuinely advances knowledge about education and one that does not. Therefore, we advise you to take your time with this step.

Novice researchers often attempt to identify a problem solely by reflecting on their experience as educators or by simply thinking about education in general. Reflection is fine, but it must be supplemented by reading the research literature in an area of interest to you. You can start by reading a published literature review in your area of interest (see Chapters 3 and 4 for guidance on locating a suitable review) or by reading research articles in a relevant journal. Before long, you should come across a research study or set of related studies that attract your interest. It is highly likely that you will be able to identify a research problem by building on this study or set of related studies.

Some educators think that this approach does not lead to an “original” study or that they are somehow “cheating” by building on the ideas of others. In fact, the goal of research in the physical and social sciences is to construct a cumulative body of knowledge and theory, not to create a series of original findings that are unrelated to each other.

It is legitimate and useful to pursue this goal by doing replication research, which is an investigation that uses the methods of a previous study to determine whether the same findings are repeated. The replication study does not need to copy the previous study’s methods exactly, though. For example, it might include a sample drawn from a different population to determine whether the original study’s findings are generalizable beyond the population the researchers studied. Another possibility is that the replication study uses different measures of the constructs that were administered in the original study, with the purpose being to determine whether the study’s findings are affected by the use of particular measures.

If you examine the research literature in education, you will find some studies that are explicit replications, as exemplified by the use of the word “replication” in their title. Examples of such studies are presented in Figure 2.1. The abstracts shown in this figure are from the ERIC database (see Chapter 3). The studies demonstrate that replications are an integral part of the research literature in education and that they can make significant contributions to knowledge.
FIGURE 2.1 • Examples of Replication Studies in Education


Kaminski, Sloutsky, and Heckler (2008a) published in “Science” a study on “The advantage of abstract examples in learning math,” in which they claim that students may benefit more from learning mathematics through a single abstract, symbolic representation than from multiple concrete examples. This publication elicited both enthusiastic and critical comments by mathematicians, mathematics educators, and policymakers worldwide. The current empirical study involves a partial replication—but also an important validation and extension—of this widely noticed study. The study’s results confirm Kaminski et al.’s findings, but the accompanying qualitative data raise serious questions about their interpretation of what students actually learned from the abstract concept exemplification. Moreover, whereas Kaminski et al. showed that abstract learners transferred what they had learned to a similar abstract context, this study shows also that students who learned from concrete examples transferred their knowledge to a similar concrete context.


In this article we replicate and extend findings from Duncan et al. (2007). The 1st study used Canada-wide data on 1,521 children from the National Longitudinal Survey of Children and Youth (NLSCY) to examine the influence of kindergarten literacy and math skills, mother-reported attention, and mother-reported socioemotional behaviors on 3rd-grade math and reading outcomes. Similar to Duncan et al., (a) math skills were the strongest predictor of later achievement, (b) literacy and attention skills predicted later achievement, and (c) socioemotional behaviors did not significantly predict later school achievement. As part of extending the findings, we incorporated a multiple imputation approach to handle missing predictor variable data. Results paralleled those from the original study in that kindergarten math skills and Peabody Picture Vocabulary Test-Revised scores continued to predict later achievement. However, we also found that kindergarten socioemotional behaviors, specifically hyperactivity/impulsivity, prosocial behavior, and anxiety/depression, were significant predictors of 3rd-grade math and reading. In the 2nd study, we used data from the NLSCY and the Montreal Longitudinal-Experimental Preschool Study (MLEPS), which was included in Duncan et al., to extend previous findings by examining the influence of kindergarten achievement, attention, and socioemotional behaviors on 3rd-grade socioemotional outcomes. Both NLSCY and MLEPS findings indicated that kindergarten math significantly predicted socioemotional behaviors. There were also a number of significant relationships between early and later socioemotional behaviors. Findings support the importance of socioemotional behaviors both as predictors of later school success and as indicators of school success.


This study analyzed a multi-institutional and longitudinal data set to determine the impact of exposure to effective instruction on first-year persistence—defined as reenrolling for the second year of college at the same institution. Net of important confounding influences, exposure to effective instruction significantly increased the likelihood that the student would reenroll for the second year of college. The effect was mediated primarily through student satisfaction with the quality of the overall educational experience at the institution. These findings have implications for the role of the classroom experience in student persistence in higher education.


This article represents a replication and extension of previous studies of the effects of “Project ALERT”, a school-based substance use prevention program, on the prodrug beliefs of adolescents. Specifically, the authors’ research examined “Project ALERT’s” effects on adolescents’ intentions to use substances in the future, beliefs about substance use consequences, normative beliefs, and resistance self-efficacy. In all,
Even a simple replication of a previous study can make an important contribution to knowledge about education. Anthony Kelly and Robert Yin (2007) make the point this way:

A limitation of both qualitative and quantitative studies in education is that they are difficult to replicate, which has led to many one-time-only study reports in both genres. However, the findings from any single study cannot be the basis on which a practitioner or policymaker draws a conclusion about a phenomenon or takes action. The most responsible use of research articles follows an accumulation of knowledge across multiple research studies. (p. 133)

The phrase “accumulation of knowledge” in this statement expresses well the idea that one research study builds on another. In doing a research study, you should consider yourself a member of a community of fellow researchers, not a lone explorer.

The value of replication and knowledge accumulation is illustrated by research studies in the medical field (Tsouderos, 2011). Judy Mikovits and her research colleagues had reported in 2009 in the journal Science that a type of virus called XMRV appeared much more frequently in the blood of patients with chronic fatigue syndrome than in the blood of healthy peers. Many patients with this syndrome were greatly relieved to find that their symptoms had a medical basis and were not simply the product of their imagination. Some patients even began taking virus-fighting drugs to combat the syndrome.

Unfortunately, replication studies by independent researchers could not find the virus in patients with chronic fatigue syndrome or anyone else. These findings, plus flaws discovered in the study after it was published, led Science editors to retract the published paper. On the other hand, some chronic fatigue patients heaped praise on Mikovits and came to her defense when she ran into legal trouble.

We see, then, the necessity of replication to prevent the use of treatments, programs, or other interventions that initially appear to be helpful, but prove to be harmful or of no benefit. However, we should be careful to conclude that the story ends with a single replication attempt. It could be that Mikovits’s findings are valid and that the replication researchers reached the wrong conclusions. Knowledge must be accumulated through a series of replication studies before we can have confidence that a particular study has yielded valid results.

We recommend that you read some research articles in refereed journals. In the vast majority of them, you will find statements that indicate how the researchers grounded their study in the existing literature on the problem being studied. Also, you will find statements about possible directions that future research might take in light of the research results that they reported.

To illustrate the process of identifying a research problem, we start with a newspaper article that was cited in the ASCD SmartBrief, an online newsletter published by the Association for Supervision and Curriculum Development (see Chapter 1). The article, which appeared in the Christian Science Monitor (April 17, 2008), has the provocative title, “Good Teachers Teach to the Test.” The author, Walt Gardner, starts the article with this comment: “I have a confession to make. For the entire 28 years that I taught high school English, I taught to the test. And I’m proud to finally admit it.” Gardner goes on to note that, for him, teaching to the test means teaching the body of skills and knowledge represented by the test, not teaching the exact test items.
Gardner proceeds to make this claim: “If we’re being honest, teaching to the test is done by almost all other effective teachers.” We think that this claim frames a good problem for a research study. The problem to be investigated is whether the claim is true. We might put the claim to an empirical test by determining whether effective teachers spend more of their instructional time “teaching to the test” (as defined by Gardner) than do ineffective teachers.

Of course, we could not investigate this problem without defining what we mean by “effective” and “ineffective” teachers. Most likely, we would define teacher effectiveness as many other people do, as the teacher’s ability to promote student learning. By this definition, students would learn more from a highly effective teacher than from a less effective teacher.

Teacher effectiveness could be defined differently. That is the researcher’s choice. However, the researcher has the responsibility to provide an explicit definition and defend it. You might recall from Chapter 1 that the use of explicitly defined concepts and procedures is one of the hallmarks of scientific research.

At this point, our research problem is firmly grounded in practice because it is based on an assertion by a highly experienced teacher about his own teaching and that of his colleagues. Also, we know from reading newspapers and professional journals that many educators are critical of “teaching to the test,” especially the high-stakes tests mandated by the federal No Child Left Behind Act. A common criticism is that preparing students for these tests takes too much time away from instruction. Another criticism is that the tests focus on certain learning outcomes while ignoring other important learning outcomes.

Our next step is to start reading the research literature. We want to know how researchers have conceptualized the problem and what they have learned about it. Exploring the literature, we find that researchers typically conceptualize the problem as a “curriculum alignment” issue. They have investigated the extent to which state tests are aligned with state curriculum standards and the extent to which teachers align their classroom instruction with their own tests as well as with state tests and curriculum standards.

The claim underlying much of this research is that aligning instruction with one’s own tests, as well as with other tests required by government agencies, is part of good teaching. Similarly, Walt Gardner, the teacher whose article we cited above, claims that it is a good idea to “teach to the test,” which can be rephrased as a claim that teachers should “align” their instruction with the test. Of course, this is just a claim until it is tested by research involving empirical data. The data either will support or reject the claim.

### OUTLINING A RESEARCH PROPOSAL

The process of identifying an idea for a research study and developing it into a proposal is challenging, even for an experienced researcher. A research proposal includes many elements, each of which requires careful thought. For this reason, you will benefit from a guide that specifies each element of the proposal and the order in which it appears, as shown in Figure 2.2. The guide will help you organize your thinking and ensure that you have not overlooked any part of the process of getting the proposal approved, collecting and analyzing data, and writing the final report. Two sample proposals based on the guide in Figure 2.2 are presented at the end of the chapter.

The guide shown in Figure 2.2 organizes a research proposal into nine sections. Your university or other institution might require a different format for research proposals. It is unlikely, though, that their format differs markedly from the one shown in Figure 2.2. Also, most journals require or recommend that authors organize their research manuscripts into the sections stated in the *Publication Manual of the American Psychological Association* (APA) (American Psychological Association, 2010, p. 10):

- **introduction:** development of the problem under investigation, including its historical antecedents, and statement of the purpose of the investigation;
- **method:** description of the procedures used to conduct the investigation;
- **results:** report of the findings and analyses; and
- **discussion:** summary, interpretation, and implications of the results.

If you compare the APA guidelines and the proposal guide in Figure 2.2, you will see that they are similar. For this reason, following the proposal guide will facilitate not only the process of conducting...
FIGURE 2.2  • Guide for Outlining a Quantitative or Qualitative Research Proposal

This form consists of a list of items in the form of questions and directions. By completing each item, you can create an outline of a research proposal. The outline then can be elaborated into a formal research proposal.

1. Purpose of Study
   A. The purpose of this study is to . . . (state the purpose succinctly in one or two sentences)
   B. What previous research is your study most directly based on? (select three to five publications that are absolutely central)
   C. How does your study build on previous research?
   D. How will your study contribute to educational research and practice?

2. Research Questions, Hypotheses, Variables, and Case Delineation
   A. List your research questions or hypotheses.
   B. If you propose to test hypotheses, describe briefly the theory from which the hypotheses were derived.
   C. If your study is quantitative in nature, list the variables that you will study. For each variable, indicate whether it is an independent variable, a dependent variable, or neither.
   D. If the study is qualitative in nature, describe the case features on which data collection and analysis will focus.

3. Literature Search
   A. List the search engines and indexes that you will use to identify relevant publications.
   B. List the keywords and descriptors that you will use to identify relevant publications.
   C. Identify published literature reviews (if available) relating to your study.

4. Research Design
   A. Describe the research design that you selected for your study: descriptive, group comparison, correlational, experimental, qualitative (case study or specific qualitative research tradition), evaluative, mixed-method, or action research.
   B. If your study is quantitative in nature, what are the threats to the internal validity of your research design? (Internal validity means the extent to which extraneous variables are controlled, so that observed effects can be attributed solely to the independent variable.) What will you do to minimize or avoid these threats?
   C. If your study is quantitative in nature, what are the limitations to the generalizability (i.e., external validity) of the findings that will result from your research design? What will you do to maximize the generalizability of your findings?
   D. If your study is qualitative in nature, what criteria do you consider to be relevant to judging the credibility and trustworthiness of the results that will be yielded by your research design?

5. Sampling
   A. If your study is quantitative in nature, describe the characteristics of the population that you will study.
   B. If your study is qualitative in nature, describe the phenomenon you wish to study and the cases that comprise instances of the phenomenon.
   C. Identify your sampling procedure and sampling unit.
   D. Indicate the size of your sample, and explain why that sample size is sufficient.
   E. Indicate whether the sample will be formed into subgroups and, if so, describe the characteristics of the subgroups.
   F. If your study will involve the use of volunteers, explain whether their characteristics will affect the generalizability of the research findings.

6. Methods of Data Collection
   A. For each of the variables that you plan to study (see 2.C), indicate whether you will measure it by a test, questionnaire, interview, observational procedure, or content analysis. Indicate whether the measure is already available or whether you will need to develop it.
   B. For each measure stated above, indicate which types of validity and reliability are relevant and how you will check them.
   C. If your study is qualitative in nature, indicate whether your data collection will focus on etic or emic perspectives or both; how you will collect data on each case feature that you have chosen for study (see 2.D); and the nature of your involvement in the data-collection process.

7. Data-Analysis Procedures
   A. What descriptive statistics and inferential statistics, if any, will you use to analyze your data for each of your research questions or hypotheses?
FIGURE 2.2  • Guide for Outlining a Quantitative or Qualitative Research Proposal (Continued)

<table>
<thead>
<tr>
<th>B. If your study is qualitative in nature, indicate whether you will use an interpretational, structural, or reflective method of analysis.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C. How will you gain entry into your proposed research setting, and how will you gain the cooperation of your research participants?</td>
</tr>
</tbody>
</table>

8. Ethics and Human Relations

A. What risks, if any, does your study pose for research participants? What steps will you take to minimize these threats?

B. Will the study need to be approved by an institutional review board? If yes, describe the approval process.

9. Timeline

A. Create a timeline listing in order all the major steps of your study. Also indicate the approximate amount of time each step will take.

your study but also the preparation of a final report (e.g., a thesis or dissertation) and a manuscript submitted to a journal for publication.

The next sections of this chapter explain each section of the proposal guide and illustrate it by using the research problem about curriculum alignment that we introduced above.

You will note that the guide shown in Figure 2.2 specifies various ways in which a proposal for a quantitative research study differs from a proposal for a qualitative research study. We explain these differences in this chapter, and they are further elaborated in other chapters of the book.

Because we will continue to refer to Figure 2.2 throughout the book, we have helped you locate it easily by repeating it as Appendix 1.

Purpose of Study

A good self-check on whether you understand your proposed study is to see if you can state your research purpose in one or two sentences. Using our “teaching to the test” example, we might state our purpose in the following words:

One purpose of my study is to determine the extent to which teachers design their classroom instruction and assessments so that they are aligned with state standards and assessments. The other purpose is to determine what school districts are doing to help teachers improve their instruction/assessment alignment with state standards and assessments.

This statement is brief but sufficiently detailed to give direction to the design of the study. Note that we used the term assessment because it connotes a broader range of possible tests (e.g., projects, essays, class presentations) than the term test, which has more limited connotations (typically multiple-choice or brief-response items).

Before you can state your research purpose in such a concise form, you will need to review relevant educational literature, including articles and books written for practitioners and reports of research studies. You are likely to find many publications on important topics, but typically just a few that strongly influence the design of your study. You should discuss these publications in some depth to give the reader a sense of what is known about the topic and what you propose to study in order to advance knowledge about it.

We found a substantial number of research articles, opinion articles, and books about curriculum alignment in the literature. Several research articles and one book appeared to be particularly useful:


The studies included in these sources are relevant to our study’s purpose and therefore would facilitate the preparation of our own literature review.

The study by Alexander Kurz and his colleagues found a low level of alignment between teachers’ curriculum and state standards. They also found that the students of teachers with better curriculum alignment had better academic achievement than students of teachers with less curriculum alignment. These results support the importance of the proposed study because they demonstrate the importance of curriculum alignment and helping teachers improve it in their classrooms. The study by Sunhee Paik and colleagues is also relevant as it identified a professional development program that is effective in improving teachers’ curriculum alignment. Our proposed study is significant in that its aim is to determine whether this or other types of professional development are occurring in school systems other than the one they studied.

The book by David Squires is useful because it provides a review of major studies of curriculum development and the efforts to improve it, both nationally and internationally. The author’s knowledge and insights are likely to be valuable in helping us focus our study on key problems relating to the implementation of curriculum development.

Research Questions and Hypotheses

A purpose statement provides a general description of what you hope to learn by doing your research study. This statement then should be elaborated to make it more specific. Typically, specificity is achieved by preparing a set of research questions. The following research questions reflect the purpose statement in the previous section, with a specific focus on one aspect of the curriculum (science) and one age range of students (fourth-graders and sixth-graders):

1. To what extent are teachers’ instructional activities in science aligned with state assessments in science that are administered to fourth-grade and sixth-grade students?

2. To what extent are teachers’ classroom assessments in science aligned with state assessments that are administered to fourth-grade and sixth-grade students?

3. What professional development programs for science curriculum alignment do school systems make available to fourth-grade and sixth-grade teachers?

As we proceed to other sections of the research proposal, these questions will help us select appropriate procedures for data collection and data analysis. As we select each procedure, we will need to ask ourselves how appropriate the procedure is for answering our research questions.

The three questions above were written with the intent of doing a quantitative research study. Research questions for a qualitative research proposal typically will be written in a different style, because qualitative researchers do not dictate the specific direction of data collection and analysis in advance. They need to remain open to what they observe and what their research participants tell them; these observations and comments often open up new lines of inquiry within the study.

Now let us consider a possible qualitative research proposal. Suppose we find that a state is conducting professional development workshops to help teachers understand instruction–assessment alignment and incorporate it into their lesson planning. Further suppose that the purpose of our qualitative study is to learn about the benefits and drawbacks that teachers see in their state’s alignment program (i.e., state standards and state assessments aligned to them) and the problems that they see in trying to alter their classroom teaching to accommodate the alignment program.

The following are examples of research questions that might follow from this purpose statement if we chose to make an intensive qualitative case study of professional development workshops in one school district:

1. What benefits and drawbacks about the state’s alignment program and proposals for classroom implementation do each of the selected teachers mention as their professional development workshop proceeds?

2. How does curriculum alignment relate to each of the selected teachers’ personal philosophy of teaching?

3. What problems and opportunities do each of the selected teachers experience when they return to their schools after the professional development workshop?
Note that these research questions do not restrict the kinds of data collection and analysis procedures that can be used.

Depending on the qualitative study’s purpose, other research questions can be framed. For example, we might focus on just one school and pose research questions about how various stakeholders (e.g., teachers, administrators, specialists, students, parents) respond to the state’s alignment program over a designated period of time.

In qualitative research, we typically avoid seeking to predict our findings (or even specify all our data-collection methods) in advance, but instead allow them to emerge. Therefore, we are unlikely to state research hypotheses in our proposal.

Returning to quantitative research study proposals, we might choose to state research hypotheses that will guide our study instead of framing research questions. In simple terms, a hypothesis in a research study is a prediction about expected findings. For example, we posed the following research question: “Do fourth-grade and sixth-grade students whose teachers align their classroom assessments to a greater extent with state assessments perform better on the state assessments than students whose teachers align their classroom assessments to a lesser extent?”

This question instead can be stated as a hypothesis: “Fourth-grade and sixth-grade students whose teachers use classroom assessments that are well aligned with state assessments will achieve higher scores on the state assessments than students whose teachers use poorly aligned classroom assessments.”

Before you consider stating research hypotheses, you should be aware that hypotheses are a particular form of prediction in that they are explicitly derived from theories. As stated in Chapter 1, a theory specifies a set of constructs and how they relate to each other. We also stated that constructs are structures and processes that are believed to underlie observed events and behavior. For example, intelligence is a construct because many people believe that it is a real but unobservable structure that enables some students to learn better than others.

Hypotheses are more commonly used in basic research than in applied research because the main goal of basic research is to deepen our collective understanding of phenomena through the development of good theories. The soundness of a theory is determined by doing empirical tests of hypotheses derived from it. The following are titles of several recent studies that tested hypotheses derived from theories:


Each of these studies tested one or more hypotheses derived from the theory specified in the journal article’s title. If you come across such a study in your literature review or wish to do such a study, you will need to develop a deep understanding about the theory of interest.

**Quantitative Variables and Case Delineation**

Once you have stated your research purpose and research questions or hypotheses (items 1.A and 2.A in Figure 2.2), the next step is to specify the variables (in quantitative research) or aspects of cases (in qualitative research) that you will study. If specification of variables or case aspects is too difficult, it probably means that you need to read and think about the existing research literature in more depth.

If you are planning a quantitative study, you will need to identify each variable that you intend to measure. We explain the importance and meaning of variables in Chapters 5 and 6. For now, you can think of variables as anything you wish to study that has some degree of variability. For example, if students vary in the scores they receive on a test, we can say that student test performance is a variable. If all students take the same test, the test itself has not varied. In this case, a researcher would say that the test is a “constant,” not a variable.

Three main variables are expressed in the four research questions stated previously for the proposed quantitative study:

1. The degree of alignment of teachers’ instructional activities with the state assessment in science.
Literature Search

We stated earlier in the chapter that a good research study is built on a strong understanding of the existing literature on the problem that you wish to investigate. Chapters 3 and 4 will help you conduct a literature review to identify an interesting research problem and find what has been learned about it, as reported in books, journal articles, institutional reports, conference papers, and other publications.

We explain in those chapters that professional associations, governmental agencies, and commercial publishers create bibliographic citations for their publications, which other organizations incorporate into electronic databases. You can explore these databases using search engines and keywords. Most likely, you are already familiar with electronic databases, search engines, and keywords even if you have not studied research methodology. For example, you probably use Google, Yahoo!, or some similar search engine to look for information on the Internet.

We used a search engine and database for educators, ERIC (Education Resources Information Center), to look for studies relating to our research problem. We entered two phrases, “teaching to the test” and “curriculum alignment,” in the ERIC search bar, which generated hundreds of relevant citations and brief summaries (called abstracts) that helped us develop an understanding of what is already known about our research problem.

Your ability to search the education literature will enhance your professional expertise, whether you are preparing a proposal for a research study or looking for ideas to solve a problem of practice.

Research Design

The fourth set of items in Figure 2.2 involves the design of your research study. Over time, researchers have developed standard methods of inquiry (called designs) for answering their questions or testing their hypotheses. In fact, much of this book is concerned with explaining commonly used research designs.

To illustrate how research designs can differ, consider the problem of investigating teachers’ reactions to a state-mandated curriculum alignment program. We might use a case study design to study in depth a few teachers at one school. We could interview them extensively to learn what they think about the alignment program.

Alternatively, we could use an experimental design in which we compare two groups of teachers: one group participates in a workshop that attempts
to help them develop positive attitudes toward instruction–assessment alignment; a control group of teachers does not participate in the program. We measure the attitudes of both groups of teachers by a quantitative scale before and after the workshop interval.

The case study design is not better or worse than the experimental design. Both are well-established research designs, and each has advantages depending on the researchers’ preferences, needs, and constraints. Also, each is susceptible to different flaws. You need to be aware of these flaws and take steps to avoid them. That is why we explain not only the features of each research design in this book but also their potential weaknesses and how to minimize them.

**Sampling**

It is nearly impossible to study every instance of the phenomenon that interests you. For example, if you are interested in investigating teachers’ reactions to state-mandated tests administered in their classroom, it simply would be too expensive and time consuming to survey the entire population of teachers in the United States or any other country. However, there are ways to select a sample that is representative of the population that interests you. By using an appropriate sampling procedure, you can generalize your findings from the sample to that population if you have done a quantitative research study. If you have done a qualitative research study involving one or several cases, you can consider the applicability of your findings to other cases.

The section on sampling in Figure 2.2 specifies various factors that you will need to consider in selecting a sample for your study. Sampling procedures in quantitative and qualitative research are described in Chapters 5 and 13, respectively.

**Methods of Data Collection**

Whatever research design you choose, you will be collecting empirical data. In fact, the collection of empirical data to answer questions or test hypotheses is the very essence of research. **Empirical data** are direct observations or other measurements of the phenomena that we are studying. By contrast, our beliefs and theories are claims about what we would find if we collected empirical data. The major advances that we have seen over the past century in medicine, engineering, and other professions have come about, in large part, because researchers collected empirical data to make discoveries or to test their beliefs and theories.

Section 6 of the proposal guide in Figure 2.2 will help you think about the measures you will need for collecting empirical data and ensuring that they will hold up to critical scrutiny.

A complete listing of your variables or case features (Section 2 of Figure 2.2) will help you greatly in selecting methods of empirical data collection. If your list is complete, you will not find later on, to your dismay, that you failed to measure an important variable or case feature during the data-collection phase of your study.

Chapters 5 and 13 present a range of data-collection procedures used in quantitative and qualitative research, respectively. Other chapters describe measurement procedures specifically for use with particular research designs.

**Data-Analysis Procedures**

Raw data do not speak for themselves. They need to be analyzed and interpreted. Therefore, your research proposal should include a section on how you plan to analyze your data. Completing Section 7 of Figure 2.2 will help you determine whether your research design will generate data that are relevant to your research questions and hypotheses and can be analyzed by statistical or qualitative procedures.

The analysis of quantitative data involves the use of statistical techniques, which are described in the chapters in Part Three. Some qualitative data are also amenable to statistical analysis, but more likely you will use the analytical techniques described in the chapters in Part Four.

**Ethics and Human Relations**

The ethics of educational research has become an increasing focus of concern. The federal government has responded to this concern by requiring the establishment of **institutional review boards** (also called **human subjects review committees**). Their purpose is to ensure that research participants are protected from harm or risk of harm. For example, institutional review boards, commonly called IRBs, oversee medical research because the potential for
physical or emotional harm to individuals is high. IRBs also oversee educational research because of the potential for harm to participants, especially young children and students with disabilities.

A guiding assumption of IRBs is that researchers have greater power than the participants in a research study. An obvious example is a survey study: the researcher collects questionnaire or interview data from participants, but participants do not have the authority to collect data from the researcher. Similarly, in experiments, the researcher tests the effects of an intervention (e.g., a teaching method) on participants, but the participants do not test the effects of an intervention on the researcher. In certain kinds of qualitative research, however, researchers and participants share power in studying a phenomenon of interest to both of them. Proposed studies of this type can be problematic for IRBs. We discuss this problem in Chapter 13.

Your university or school district most likely has an IRB to monitor research conducted under its auspices. You will need to submit your research proposal, and likely complete a questionnaire as well, to the IRB before undertaking your study. An exception might be a small research project that is done as a course project, with no possibility that the research results will be disseminated. In this situation, the course instructor will need to consult with the IRB to ensure that the class projects do not require their review.

If you plan to do a research project because of personal interest, you still will need to have it approved by an IRB. You can search for an IRB that is located near you and ask whether it will undertake the approval process for you.

The American Educational Research Association (AERA) recently has published a code of ethics that you must follow as you plan a study, conduct it, and report its findings (American Educational Research Association, 2011). The approval process of IRBs likely incorporate most, if not all of AERA’s code of ethics. We highly recommend that you study it before preparing the documentation required by your IRB.

An outline of the Code of Ethics is shown in Figure 2.3. The complete code of ethics is available online. You should study it as you prepare your research proposal to be sure that you will not unintentionally violate any of its ethical standards for research. Unless your adviser asks you to address each of the 22 standards, you can focus on those standards that pose a potential risk for your study in the Ethics and Human Relations section of your proposal.

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**FIGURE 2.3 • Code of Ethics, American Educational Research Association. Approved by the AERA Council February 2011**

**PREAMBLE**

**BACKGROUND**

**PRINCIPLES**

Principle A: Professional Competence
Principle B: Integrity
Principle C: Professional, Scientific and Scholarly Responsibility
Principle D: Respect for People’s Rights, Dignity, and Diversity
Principle E: Social Responsibility

**ETHICAL STANDARDS**

1. Scientific, Scholarly, and Professional Standards
2. Competence
3. Use and Misuse of Expertise
4. Fabrication, Falsification, and Plagiarism
5. Avoiding Harm
6. Nondiscrimination
7. Nonexploitation
8. Harassment
9. Employment Decisions
   9.01 Fair Employment Practices
   9.02 Responsibilities of Employees
10. Conflicts of Interest
    10.01 Adherence to Professional Standards
    10.02 Disclosure
    10.03 Avoidance of Personal Gain
    10.04 Decision making in the Workplace
    10.05 Decision making Outside of the Workplace
11. Public Communications
    11.01 Researcher Communications
    11.02 Statements by Others
We comment below on standards that might not be obvious or that are particularly relevant to research studies that graduate students in education might do. In doing so, we wish to emphasize that our comments are no substitute for your own careful review of the entire Code of Ethics.

2. **Competence.** You should do research only on problems that you feel competent to investigate. An important aspect of competence is in-depth knowledge of the existing literature on your research problem.

3. **Use and Misuse of Expertise.** You should take care that your research study does not get co-opted by other individuals for their agenda.

For example, certain individuals might have a stake in a controversial program and wish you to demonstrate its effectiveness. In this case, you need to be assured that you have the authority to design your study independently of these individuals and that all stakeholders in your study have an opportunity to express possible concerns before it is conducted.

6. **Nondiscrimination.** In selecting a sample, you should consider carefully whether you are unwittingly excluding certain groups. For example, if you are studying classroom instruction, a school principal might give you a list of classes that does not include those for children with special needs. You need to take
7. **Nonexploitation.** A researcher might select a sample from his own school or school district because he has influence with a particular administrator or is himself an administrator. In this case, the sample might feel an element of coercion to participate in the study. The researcher needs to take steps to remove any element of coercion, perhaps by enabling potential participants to respond to an anonymous questionnaire asking their views about the value of the study and whether it will interfere with their duties or have potentially negative consequences for them.

10. **Conflicts of Interest.** Graduate students in education typically must complete a research project or dissertation in order to earn their master's or doctoral degree. Therefore, their study has a direct benefit for them. They cannot let this benefit interfere with the best interests of the individuals affected by their study. This problem usually can be avoided by being forthright in telling school officials or other individuals about this benefit and having an open discussion about it. Also, you should be able to state benefits that might accrue to the research participants and the education profession by agreeing to the study. If they see that the study has larger benefits, they are not likely to be concerned that the study is only being done to meet the graduate student’s personal need.

12. **Confidentiality.** Researchers should consider all data collected from participants as private and potentially harmful to them if revealed. Therefore, you must take steps to preserve the confidentiality of your data. One way to do this is to assign each participant an identification code (e.g., a number) and then create a name-code list linking each individual's name with her code. If persons other than you need access to the data (e.g., a statistician or your research adviser), they should have access only to the codes, not the name-code list, unless there is a compelling reason to give it to them. Also, you will need to determine where to store the name-code list and the data and for how long a period of time before destroying them.

13. **Informed Consent.** A researcher must seek the informed consent of each individual that she wishes to include in her study. Informed consent means that individuals have been informed about all the possible risks and costs involved in participating in the research study and that no coercion has been used to obtain their consent, including threats of possible negative consequences if they decline to participate. If an individual cannot be expected to understand the informed consent process (e.g., a young child), permission must be obtained from the individual’s parent or guardian. Informed consent is not necessary if data are to be collected in public places or if the researcher plans to use publicly available information. Waivers of consent can be requested from IRBs if the research involves minimal or no risk, or if informed consent would compromise the soundness of the research study.

15. **Authorship Credit.** Only the student is listed as the author of a master's thesis or doctoral dissertation. (There might be exceptions to this rule that we are not aware of.) Some students might report their findings in other forms as well, for example, as a conference presentation or journal article. In such cases, it is appropriate to include the student’s adviser and other individuals who contributed substantially to the study (e.g., a statistician who provided extensive consultation on data analysis). For this reason, you will find that many studies in the literature have multiple authors. If you are the senior author of a publication, it by no means diminishes your stature by including, as authors, other individuals who contributed to your study.

16. **Publication Process.** You cannot submit a manuscript to multiple journals or book publishers at the same time, except with their permission. Also, once you have published your findings in a journal or book, you cannot publish them elsewhere unless you cite the source where they were first published.

22. **Adherence to the Ethical Standards of AERA.** If you plan to conduct an educational research study, you have an ethical obligation to be familiar with AERA's Code of Ethics, the requirements of IRB reviews, and other ethical standards and legal requirements that are specific to your study. If you have reason to believe that a researcher associated with your study or another study has violated an ethical code, you have an obligation to bring it to the attention of that researcher or to an appropriate authority.
In addition to ethical considerations, Section 8 of Figure 2.2 refers to human relations. You cannot take it for granted that your intended research participants will allow you to collect data from them directly or from their students or clients. Whether your participants are individuals in a professional role (e.g., school staff) or community representatives (e.g., residents of a household), they typically will want assurance that you are conducting a research study that has the seal of approval from an institution they respect. They also will want assurance that you are trustworthy and will treat participants and the data they provide with respect.

These assurances can come from the IRB, which typically has a standard form that indicates its approval of your research study. Assurances also can come from representatives of an institution that the research participants respect, possibly in the form of a letter on official letterhead, indicating that they have studied your proposal and approve of it. Ideally, the letter would also state what benefits are expected and who would benefit from the findings of your study.

**Timeline**

As you have seen above, a research study involves many steps. The process might seem overwhelming at first, but it won’t be if you are systematic in your approach.

To be systematic, you need to analyze all the steps in your proposed study and estimate a completion date for each step. This process is particularly important if you plan to collect data in schools. For example, if you plan to collect data from teachers, you most likely will need to do it when school is in session. If you plan to collect data from students, you probably will need to do it on days when they are not involved in activities such as taking tests or going on field trips.

**OTHER STEPS IN THE RESEARCH PROCESS**

We believe that the intellectual exercise of preparing a detailed research proposal is at the heart of the research process. A detailed proposal greatly increases the likelihood of a successful study, and it also facilitates other steps in the research process, which we describe next.

**Pilot Study**

A pilot study of key measures and procedures helps to ensure the success of any research study. For example, if you plan to develop a questionnaire, test, or other data-collection instrument, it is helpful to try it out with a few research participants prior to formal data collection. You might discover that some of your questions and directions are unclear or require skills that data collectors or research participants do not possess. You can ask the pilot-study participants for guidance in revising the items and directions as needed.

The ideal situation is to conduct a pilot study of key measures and procedures before or during preparation of the research proposal. Reviewers of the proposal, including an IRB, will look at the proposal more favorably if you can state that your measures and procedures have been piloted and revised as needed.

If necessary, it might be possible to do a pilot study after the proposal has been reviewed and approved. However, you will probably need to submit to the IRB or review board any substantial changes made as a result of the pilot study.

**Data Collection**

The vast majority of research studies in education involve collecting data from humans, and there is always the possibility that your best-laid plans will go astray. For example, suppose your study involves administration of a test to a class of students. Some students might be absent on the day of testing. Makeup sessions are an option if they do not interfere with your research timeline.

Many other problems can occur during the data-collection phase of a research study. You will need to exercise judgment and ingenuity in dealing with them. More experienced researchers can help you devise the best solution for a particular situation. Most problems can be managed if you have designed the proposal well, pilot-tested key measures and procedures, and built good relations with all stakeholders involved with the study.

**Writing a Research Report**

Writing a research proposal that includes the items shown in Figure 2.2 will greatly facilitate the last step—writing your final report. The proposal is an outline, or framework, for the finished report, and most parts of a proposal are included in final reports,
such as theses, dissertations, journal articles, and conference papers. If your university or other institution has a required format for writing a research report, you simply need to follow that format.

We find it particularly helpful to locate good examples of research reports and adopt their organization and style. If you are writing a course paper, master’s thesis, or doctoral dissertation, you can ask your advisers to recommend completed papers, theses, or dissertations that they consider exemplary.

Another approach is to read articles in refereed journals that publish research studies similar to yours. After reading five or so articles, you will begin to develop a sense of the writing style and format that are appropriate for formal research reports.

Many universities require that their students in education and related disciplines follow the style specifications of the *Publication Manual of the American Psychological Association* (2010). We referred to this manual’s specifications for the format of research reports earlier in this chapter. The manual contains many additional specifications related to such matters as language bias, statistical symbols, tables and figures, and bibliographic citations.

The APA manual is approximately 270 pages and can appear intimidating. We do not recommend that you study it page by page. Instead, review the table of contents to get a sense of the topics that it covers. Then, refer to it as you have questions about the preparation of your research report, such as how to construct a table or prepare a list of references that you have cited.

One of the most important features of a research report is the tables and figures that present the results of statistical analyses. A well-prepared table or figure can create a picture in the reader’s mind that is more vivid than a written description of statistical findings. Standard procedures for creating tables and figures for different types of statistical analyses are available (Nicol & Pexman, 2010a, 2010b).

### A Final Note about Using a Proposal Guide

This concludes our explanation of how to conduct a research study. As you read the remaining chapters of the book, each step of the process should become clearer to you.

If you are planning to do a research study, we recommend that you review the proposal guide in Figure 2.1 or another suitable guide as you read each chapter. After reading a chapter, determine how its content pertains to a particular section, or sections, of the guide. Then complete the sections if they are relevant to your proposed study. Over time, you will see your study gradually taking shape.

We recommend that you occasionally show your evolving proposal to your research adviser for feedback and assurance that you are on the right track. It is relatively easy to revise an outline for a proposal, or trash it and start over again. It is much more difficult and emotionally draining to write a complete, polished proposal only to learn that it must undergo extensive revision or be scrapped.

### SELF-CHECK TEST

1. A study that seeks to replicate findings of previous research  
   a. adds nothing of value to the research literature.  
   b. is a worthwhile contribution to the research literature.  
   c. should be conducted only by the researchers who reported the original findings.  
   d. is important for theory building but not for an applied discipline like education.

2. Reviews of the research literature in your areas of interest  
   a. should be read only after you have formulated your research questions.  
   b. should be read only after you have formulated your research design.  
   c. are most useful when you are attempting to interpret the results of your data analyses.  
   d. are particularly useful for generating ideas for your own research project.

3. Hypotheses are  
   a. predictions about what you expect to find when you analyze your research data.  
   b. statements of the constructs that will best describe your research data.  
   c. primarily useful when conducting a replication study.  
   d. most useful in applied research.
4. Which of the following is the best example of a variable?
   a. All students in the research sample will read the same chapter in a history textbook.
   b. A researcher will study one teacher’s written comments on students’ essays over an entire school year.
   c. A researcher will measure individual differences in students’ academic self-esteem.
   d. A researcher states a hypothesis about the relationship between class size and students’ off-task behavior.

5. If a researcher is interested in how teachers view students with autism, case delineation would be particularly useful for
   a. determining which features of a teacher’s views will be the focus for interviews and classroom observation.
   b. determining how many teachers to include in the study.
   c. eliminating teachers who have difficulty in reflecting on their instruction.
   d. all of the above.

6. Search engines, databases, and keywords are most useful for
   a. conducting complex data analyses.
   b. conducting a literature review.
   c. deciding whether quantitative or qualitative research is most relevant to answer your research questions.
   d. deciding which sampling procedure will yield the most appropriate sample size.

7. Procedures for data analysis
   a. should be specified in a research proposal only for a quantitative study.
   b. should be specified in a research proposal only for a qualitative study.
   c. are the only part of the research process that cannot be specified in a research proposal.
   d. can be specified in a research proposal, even if no data of any sort have been collected.

8. The main function of an IRB (institutional review board) is to determine whether the research proposal
   b. follows all the specifications of the proposal guide published by the researcher’s university or other source.
   c. includes procedures that will avoid or minimize harm to the research participants.
   d. includes procedures to ensure that students complete every item on each test that is administered.

9. Pilot studies and timeline specifications
   a. are best completed as part of the process of writing a research proposal.
   b. are not necessary for a research study that is intended as a replication of previous research findings.
   c. are always required by an IRB (institutional review board).
   d. are useful only for a study that will use quantitative research methodology.

10. The publication manual of the American Psychological Association
   a. is useful only for studies that measure psychological variables.
   b. is primarily useful for helping a researcher prepare a report for publication.
   c. needs to be supplemented by the use of other publication manuals if a research report contains tables and figures.
   d. is used by many universities to dictate the format for research reports prepared by students majoring in education.

CHAPTER REFERENCES


**RESOURCES FOR FURTHER STUDY**


As the title suggests, this book covers all phases of conducting a qualitative research study as either a master’s thesis or doctoral dissertation. The authors discuss the elements both of a qualitative research proposal and the final report.


This book explains and illustrates standards for reporting psychological research, but the standards apply equally to reports of educational research studies. The standards are designed to help readers understand a published study and to help researchers search for patterns of findings across related studies. If you are planning to prepare a report of your study for a research journal, you will find help in this book.


The author provides advice about how to prepare a publishable manuscript and select an appropriate journal to which to submit it. The article includes an extensive list of education journals, with information about such matters as rejection rates and how to communicate with journal editors.


This book is a revision of a classic text on preparing a dissertation proposal. Although intended for doctoral students, anyone who is preparing a research proposal of any type can benefit from it.
Sample Outline of a Quantitative Research Proposal

We created two proposal outlines to illustrate the process of using the proposal guide shown in Figure 2.2. The proposals are for a research study about curriculum alignment. They are similar in certain respects to the example already presented in this chapter.

The first outline is for a quantitative research study. If you are planning to do a quantitative study using one of the research designs presented in Part Three, this example will be helpful.

1. Purpose of Study

A. Purpose Statement

The purpose of this study is to learn how educators go about aligning curriculum content with instruction and test content under conditions involving a federal or state mandate to improve students’ learning.

B. Relevant Previous Research

Among the studies we have identified in our literature review, the following three studies, all involving quantitative research designs, are particularly relevant to our research purpose. We provide the bibliographic citation and the abstract for each study as it appears in the ERIC database.


ABSTRACT The authors describe research on the extent to which mathematics classroom activities in Maryland were aligned with Maryland learning outcomes and the Maryland School Performance Assessment Program (MSPAP; Maryland State Department of Education, 1995, 2000). The study was part of a larger research project (S. Lane, C. S. Parke, & C. A. Stone, 1999) that focused on the overall impact of MSPAP on schools, teachers, and students. The authors collected 3,948 instruction, assessment, and test-preparation activities from a statewide stratified random sample of 250 teachers in the tested grades (3, 5, and 8) and nontested grades (2, 4, and 7). The authors describe the methods used to collect, code, and analyze teachers’ classroom activities concerning 7 components: (a) mathematics process outcomes; (b) mathematics content outcomes; (c) student response types; (d) interpretation of charts, tables, and graphs; (e) use of manipulatives and calculators; (f) integration with other subject areas; and (g) overall similarity to MSPAP. They also highlight results for overall degree of alignment as well as differences in alignment across grade levels and type of activity (instruction vs. assessment). Most classroom activities aligned with aspects of state assessment and standards. Only minimal differences occurred across grades. However, degree of alignment was higher for instruction than assessment activities. This research approach can be useful to other educators and researchers interested in studying alignment among standards, assessment, and instruction.

**ABSTRACT** Alignment has been defined as the extent to which curricular expectations and assessments are in agreement and work together to provide guidance for educators’ efforts to facilitate students’ progress toward desired academic outcomes. The Council of Chief State School Officers has identified three preferred models as frameworks for evaluating alignment: Webb’s alignment model, the Surveys of Enacted Curriculum model, and the Achieve model. Each model consists of a series of indices that summarize or describe the general match or coherence between state standards, large-scale assessments, and, in some cases, classroom instruction. This article provides an overview of these frameworks for evaluating alignment and their applications in educational practice and the research literature. After providing an introduction to the use of alignment to evaluate large-scale accountability systems, the article presents potential extensions of alignment for use with vulnerable populations (e.g., students with disabilities, preschoolees), individual students, and classroom teachers. These proposed applications can provide information for facilitating efforts to improve teachers’ classroom instruction and students’ educational achievement.

**C. Building on Previous Research**
Previous research has found promising evidence that alignment of curriculum with instruction and test content improves students’ academic achievement (e.g., Paik et al., 2011, cited above). Also, some research studies have examined the existing degree of alignment among curriculum, instruction, and tests in schools (e.g., Parke & Lane, 2008, cited above). However, we could find no studies that examined the process used by schools to improve these alignments.

Our proposed study extends previous research by examining the alignment process.

**D. Contribution to Educational Research and Practice**
Research on other school improvement initiatives demonstrates that the reform process often is beset with problems and that educators’ success in solving these problems affects how well the initiative is institutionalized and how much it benefits students. By examining the process of curriculum alignment at selected school sites, we hope to identify factors that facilitate or hinder the process.

Identification of these factors might help other schools plan their alignment process in ways that increase their likelihood of success in improving students’ academic achievement.

The proposed study, once completed and reported, might stimulate other researchers to conduct additional studies on this particular approach to school improvement to identify how best to plan and conduct it.

**2. Research Questions, Hypotheses, Variables, and Case Delineation**

**A. Research Questions**
We have three research questions:

1. What percentage of schools in the state have engaged in professional development to improve their curriculum alignment?
2. For schools that have engaged in curriculum alignment, how many hours of professional development have teachers received?
3. What problems do professional development groups encounter as they engage in planning and conducting the alignment process?
4. What solutions do these groups attempt as they cope with problems in planning and conducting the alignment process?

**B. Hypotheses**

Not relevant to this study.

**C. Variables**
The questionnaire described in section 6.A below includes items asking about a school’s involvement in a curriculum-instruction-test alignment process during the previous two years and about problems and solutions during the process. For now, we will assume that the items include three problems (A, B, C) and their corresponding solutions (A, B, C).

In this scenario, there are a total of 11 variables:

1. The presence or absence of a professional development program for a school’s teachers to improve curriculum alignment.
2. For schools having a professional development program, how many hours did it involve for each participating teacher?
3. Occurrence of problem A (a yes-no scale)
4. Occurrence of problem B (a yes-no scale)
5. Occurrence of problem C (a yes-no scale)
6. Occurrence of solution A (a yes-no scale)
7. Occurrence of solution B (a yes-no scale)
8. Occurrence of solution C (a yes-no scale)
9. Usefulness of solution A (a 7-point scale)
10. Usefulness of solution B (a 7-point scale)
11. Usefulness of solution C (a 7-point scale)
In addition, we will include two open-ended items: (1) Did you encounter any other problems and (2) what solutions, if any, did you try in order to solve the problems? Each problem and solution mentioned by the participants will constitute an additional variable.

D. Case Delineation
Not relevant to this study.

3. Literature Search

A. Search Engines and Indexes
The ERIC search engine will be sufficient for our research purposes.

B. Keywords and Descriptors
Our preliminary use of ERIC suggests that the keywords “alignment” and “curriculum alignment” by themselves or combined with the ERIC descriptors “achievement gains” and “academic achievement” will identify studies relevant to our research purpose.

C. Published Literature Review
The following literature review appears pertinent to our research studies. It is an article in a journal’s theme issue about how educators have developed and studied methodological procedures involved in curriculum alignment over the past decade.


4. Research Design

A. Type of Design
The research questions call for a descriptive research design using quantitative methodology. The first question requires us to determine the percentage of schools having a certain characteristic, namely, involvement in curriculum alignment. The other three questions require us to determine the frequency of use of various alignment procedures, the frequency of various problems that occur during the alignment process, and the frequency of various solutions to these problems.

B. Threats to Internal Validity
Not relevant to this study.

C. Threats to Generalizability
The study will include a random sample of schools drawn from one state. The results should generalize at least to other schools in this state and possibly to other states having similar characteristics.

D. Criteria for Judging Credibility and Trustworthiness of Results
Not relevant to this study.

5. Sampling

A. Population Characteristics
All school systems in the United States are experiencing the need to improve student learning because of the No Child Left Behind Act. Our resources do not enable us to study all 50 states and U.S. territories. Therefore, we will focus on the state in which we reside. In the future, we or other researchers can replicate our study in other states.

B. Cases and Phenomena
Not relevant to this study.

C. Sampling Procedure
We will obtain a list of all schools in our selected state from the state department of education. We then will draw three random samples of schools from this list. Specifically, we will draw a random sample of elementary schools, a random sample of middle schools, and a random sample of high schools. There will be an equal number of schools in each of these samples.

Our sampling unit is schools. The sampling procedure is stratified random sampling, because we are drawing random samples from three different types of schools.

D. Sample Size
We do not have sufficient resources to study every school in the state. However, we wish to be able to make reasonably accurate generalizations from our sample to the population (i.e., all schools in the state). We will consult with a statistician to determine a sample size that will yield an acceptable margin of error for our statistics.

E. Sampling Subgroups
As we stated in section 5.C above, the sample will include three subgroups: elementary schools, middle schools, and high schools.

F. Use of Volunteers
We hope to obtain the participation of all schools included in our random sample. If a school does not wish to participate, we will randomly draw another school of the same type (elementary, middle, high) from the list of all schools in the state.

We will keep track of the number of schools in the original sample that decline participation in the sample. We realize that each declining school creates a risk for the generalizability of our findings to the target population (i.e., all schools in the selected state).

6. Methods of Data Collection

A. Measures
We will use a questionnaire as our data-collection instrument. It will be mailed to the principal of each school unless
the principal has been in this position at the school for less than two years. If that is the case, we will not include the school in the sample but will randomly draw another school from the list of all schools in the state.

The questionnaire will include a scale on which the principal will rate his school's involvement in a curriculum-instruction-test alignment process. The lowest point on the scale indicates no involvement in this type of process. The highest point indicates a major change in the school's curriculum and instructional/testing practices as a result of an alignment process.

The questionnaire also will include a list of problems (e.g., school staff members who question the need for an alignment process) and solutions (e.g., recruiting an external consultant) that are commonly found in the literature on school improvement. The questionnaire will ask the principal to rate each problem on a scale from 0 (it did not occur) to 7 (it was a major stumbling block for the process). It also will ask the principal to indicate whether the solution was used and, if it was used, to rate its effectiveness on a scale from 0 (it was not useful) to 7 (it was a substantial aid in moving the alignment process forward).

The questionnaire also will include space for the principal to indicate problems and solutions not on the list and also to make comments about the alignment process.

B. Validity and Reliability

We will ask a small sample of principals not involved in the study to evaluate the questionnaire items for clarity and relevance to the alignment process. We will make changes to the questionnaire based on their feedback.

We will select a small group of principals in the research sample for a reliability check. We will ask each of these principals to nominate another educator in the school (e.g., a teacher or assistant principal) who is knowledgeable about the school's activities over the past year.

We will ask each of these nominated individuals to complete the same questionnaire. If the questionnaire is reliable, we should find a high level of agreement between the principal's responses and the other individual's responses.

C. Emic and Etic Perspective

Not relevant to this study.

7. Data-Analysis Procedures

A. Statistical Analysis

We will compute the percentage of schools that reported one of the three problems or three solutions listed in the questionnaire. Also, we will report the mean and standard deviation for each of the seven rating scales. We will do these analyses separately for each of the three subgroups: elementary, middle, and high schools.

We will do an analysis of variance for each of the rating scale scores to determine whether there is a significant difference in the ratings of the elementary, middle, and high schools. Also, we will do a chi-square analysis to determine whether the percentage of each of the problems and solutions differs significantly at each of these levels of schooling.

We will do a content analysis of the principal's comments about problems and solutions not included in our list. We will identify each problem and solution that was mentioned and then count the frequency with which each one was mentioned by each subgroup of principals (elementary, middle, and high school).

B. Qualitative Analysis

Not relevant to this study.

8. Ethics and Human Relations

A. Ethical Risks

Principals might feel that they are at risk if their ratings of the alignment process were revealed to school staff and other administrators. Therefore, we will state the procedures that we will use to ensure that their identities will be concealed in the data analyses and final report.

We will report demographic data about the schools included in the sample, but in a manner that makes it impossible to link demographic data about a particular school with the ratings of that school's principal.

B. Approval by an Institutional Review Board

The study will need to be reviewed by an institutional review board, especially because it poses risks for some participants. We will identify the appropriate board and follow its designated procedures.

C. Gaining Entry and Cooperation

We think that the proposed study will be of great interest to state departments of education that are concerned about improving student achievement because of federal and state legislative mandates. We will try to ask an official at the selected state department of education to write a letter endorsing our study and encouraging principals to complete the questionnaire. We propose to include the letter with the questionnaire.

9. Timeline

We would like to mail the questionnaire several months after the school year begins. Although principals are always busy, they are likely to be less busy at this time than at the start of the school year.

By mailing the questionnaire early rather than late in the school year, we will have sufficient time for several follow-up mailings in order to increase the response rate to the questionnaire.
Sample Outline of a Qualitative Research Proposal

The following proposal outline is for a qualitative research study. If you are planning to do a qualitative study using one of the research designs presented in Part Four, this example will be helpful.

1. Purpose

A. Purpose Statement
The purpose of this study is to learn how educators go about aligning curriculum content with instruction and test content under conditions involving a federal or state mandate to improve students’ learning.

B. Relevant Previous Research
Among the studies identified in our literature review, three studies are particularly relevant to our research purpose.


ABSTRACT “The most important school-level influence on student performance, as measured by credit accrual, was the quality of instructional systems, including measures of the perceived alignment of instruction with Regents standards... Case studies in the 2005-06 school year and earlier evaluation findings illuminated the influence on student outcomes of conditions that were fairly uniform across NCHS schools. Influential factors included: (1) Small enrollments; (2) Close student-teacher relationships and adult mentoring of youth; (3) Extension of student learning outside the regular school setting and school day; and (4) Use of data to track student performance.”


ABSTRACT “This monograph presents the results of qualitative interviews of seven selected principals [in remote Appalachian schools]... The principals’ responses revealed six categories... [The second category is] Strategies: Two strategies were used by most schools: curriculum alignment and individualization.”


ABSTRACT “This research investigated the extent to which science laboratory experiences encountered by Utah high school students aligned with reform efforts outlined in national standards documents. Through both quantitative and qualitative methods the findings revealed that while there were instances of alignment found between science laboratory experiences and national standards documents when considering scientific content emphasis, this same alignment was not found when considering whether the experiences emphasized scientific processes.”

C. Building on Previous Research
Previous research has found promising evidence that aligning of curriculum with instruction and test content improves students’ academic achievement. However, we could find no studies that examined the actual alignment process. Our proposed study extends previous research by looking at this process in depth.

D. Contribution to Educational Research and Practice
Research on other school improvement initiatives demonstrates that the reform process often is beset with problems and that educators’ success in solving these problems affects how well the initiative is institutionalized and how much it benefits students. By examining the process of curriculum alignment at selected school sites, we hope to identify factors that facilitate or hinder the process. Identification of these factors might help other schools plan their alignment process in ways that increase their likelihood of success in improving students’ academic achievement.

The proposed study, once completed and reported, might stimulate other researchers to conduct additional studies on this particular approach to school improvement to identify how best to plan and conduct it.

2. Research Questions, Hypotheses, Variables, and Case Delineation

A. Research Questions
We have three research questions:

1. What procedures do administrators, teachers, and specialists use in planning and conducting a
process to align curriculum content with instruction and test content?

2. What problems do these groups encounter as they engage in planning and conducting the alignment process?

3. What are the solutions that these groups attempt as they cope with problems in planning and conducting the alignment process?

B. Hypotheses
Not relevant to this study.

C. Variables
Not relevant to this study.

D. Case Delineation
We plan to focus on (1) the problems that occur during the process and how those problems get resolved and (2) alignment procedures and products for which there is consensual agreement and those for which consensual agreement could not be reached.

3. Literature Search

A. Search Engines and Indexes
The ERIC website will be sufficient for our research purposes.

B. Keywords and Descriptors
Our preliminary use of ERIC suggests that the keywords “alignment” and “curriculum alignment,” by themselves or combined with the ERIC descriptors “achievement gains” and “academic achievement,” will identify studies relevant to our research purpose.

C. Published Literature Review
We have not yet identified a literature review on curriculum-instruction-test alignment.

4. Research Design

A. Type of Design
The research design is a case study. This choice is based on our desire to produce a thick description of the process of curriculum alignment. We wish to understand in depth the experiences of a few school sites from the perspective of those directly involved in the process, rather than to grasp at a surface level the experiences of many school sites.

B. Threats to Internal Validity
Not relevant to this study.

C. Threats to Generalizability
Our plan to use a volunteer sample might limit the applicability of our findings to other schools undergoing an alignment process. We will provide an intensive description of the school’s characteristics to help readers of our final report decide whether our findings apply to their situation.

D. Criteria for Judging Credibility and Trustworthiness of Results
We will create a chain of evidence by making a record of all data collected in the study, the individuals involved in the data collection, and the dates of data collection. Constructs and themes identified in the data analysis will be related to specific examples of data sources from which they were inferred.

We will write detailed vignettes of critical incidents in the curriculum alignment process so that the process becomes clear and real for readers of the study. We will have several educational practitioners involved in the process read and evaluate the report in terms of its soundness and usefulness to them. Their feedback will be used to revise the report.

The primary methods of data collection will be interviews, direct observations of critical events, and inspection of documents generated as part of the curriculum alignment process. The collected data will be analyzed to determine whether they provide corroborative evidence for constructs and themes that we identify in the curriculum alignment process.

The soundness of data coding will be checked by having several researchers code samples of the data to determine whether they derive similar constructs and themes from the data.

The soundness of the interview data, observational data, and documents selected for analysis will be checked by having selected participants in the study check them for accuracy, bias, and completeness.

To ensure thoroughness of data collection, we will continually check with participants that we have identified all the individuals involved in the curriculum alignment process and that we have identified all relevant events leading up to initiation of the process and the process itself. The check will include a list of the individuals and events we have identified, showing the list to a sample of participants, and asking them whether any person or event is missing from the list.

5. Sampling

A. Population Characteristics
Not relevant to this study.

B. Cases and Phenomena
The phenomenon of interest to us is the process of curriculum alignment as enacted at the school level, although we realize that administrators at the district and state level also might influence it. Therefore, our case will comprise a school involved in this process.
**C. Sampling Procedure**

Because of the intensive data collection required by this study, we will select just one school (the case). The sampling strategy will be to select a typical case, which for us means a school that has a recent history of neither being a district leader in school change nor a reluctant participant.

We believe that this sampling strategy will enable us to identify typical (rather than atypical) problems, solutions, and products that result from a curriculum alignment process. To an extent, sampling also will involve a convenience strategy in that the school will be selected from a district that is near the researchers’ work site. The proximity will permit the researchers to make frequent trips to the school to collect data and make validity checks.

**D. Sample Size**

We will select just one school for the case study. However, the sample will include anyone in the school, community, school district, or other agency who has an involvement in the alignment process within this school.

**E. Sampling Subgroups**

Participants in the study will be selected to represent all the stakeholders in the curriculum alignment process. The known stakeholders include district-level specialists, the principal, teachers on the alignment team, and teachers not on the team but affected by the alignment outcomes.

If additional stakeholders are identified as the study progresses, they will be invited to participate in the study. If the number of individuals in a stakeholder group is large, a purposeful sample of these individuals will be selected.

**F. Use of Volunteers**

We will need to identify a school that has a mandate to engage in a curriculum-instruction-test alignment process but has not yet started it. We will attempt to identify several schools that are near our work site and inquire about their willingness to volunteer as study participants.

The volunteer nature of the sample might limit its applicability to other schools undergoing an alignment process. We will provide an intensive description of the school’s characteristics to help readers of our final report decide whether our findings apply to their situation.

**6. Methods of Data Collection**

A. Measures

The case study is exploratory, so we will use measures that capture a wide range of data.

We will observe and take notes on significant events in the process. These notes will provide the basis for interviewing event participants about their perceptions of specific incidents that occurred during an event.

If an upcoming event seems particularly significant, efforts will be made to videotape it. We will watch the video with the event participants to obtain their perceptions as the event unfolds.

Furthermore, we will interview stakeholders who were not directly involved in the event but who will be affected by it. We also will collect significant documents prepared by stakeholders during the alignment process.

**B. Validity and Reliability**

One researcher will be the primary observer and interviewer. However, another researcher occasionally will observe the same event as a check on inter-observer reliability. Also, another interviewer will interview research participants who have the same perspective (e.g., two teachers at the same grade level) to determine whether both interviewers ask designated questions and collect similar kinds of data.

**C. Emic and Etic Perspective**

The procedures for data collection will focus on an emic perspective, that is, the perspective of the stakeholders as they experience the curriculum alignment process.

The researchers who collect data will not participate in the alignment process. They will maintain a supportive perspective but will act primarily as observers. If asked their opinion or advice, they will defer from offering it.

**7. Data-Analysis Procedures**

A. Statistical Analysis

We do not anticipate that we will collect quantitative data.

We likely will report school-level results for standardized tests mandated by the school district or state. Those results would have been statistically analyzed by the agency.

B. Qualitative Analysis

An interpretational approach to data analysis will be used. The interview and observational data will be entered into computer files and analyzed using the software program Ethnograph to analyze qualitative data. We will focus on identifying constructs, themes, and patterns relating to problems and problem-resolution processes and also on alignment procedures and products.

**8. Ethics and Human Relations**

A. Ethical Risks

Some participants in the alignment process might feel that they will incur the displeasure of colleagues and administrators if they criticize the alignment process during the research interviews.

Another risk is that the presence of a researcher during meetings associated with the alignment process might influence what participants say and do.

We will try to minimize these risks by assuring participants that the identity of all participants will be
concealed in the final report. Also, we will assure participants that any comment they make to us will not be passed on to anyone, except to researchers directly involved in the study.

**B. Approval by an Institutional Review Board**
The study will need to be reviewed by an institutional review board, especially because it poses risks for the participants. We will identify the appropriate board and follow its designated procedures.

**C. Gaining Entry and Cooperation**
We will meet initially with the school board, local school administrators, and representatives of the local teachers association. If they appreciate the benefits of the study and of the safeguards we describe to minimize risks to participants, their endorsement should help us gain the cooperation of teachers and others who are directly involved in the study.

Also, we will tell the participants that they can express concerns about data collection or other research matters at any time. We will inform them that we will make appropriate adjustments to the research design to the extent that doing so will not compromise the integrity and overall purpose of the study.

**9. Timeline**
We are particularly interested in the initial stages of a curriculum alignment process. The process generally occurs in the summer with workshops and meetings of planning groups. Therefore, we will need to have obtained all necessary permissions and specified our data-collection procedures prior to the summer.

Depending on our resources, we might need to limit data collection to the summer months. If resources permit, we will continue data collection into the start of the new school year until the winter break.