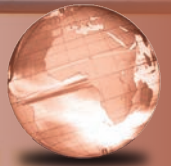


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Practical Research

Planning and Design

TWELFTH EDITION

Paul D. Leedy • Jeanne Ellis Ormrod



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PRACTICAL RESEARCH

PLANNING AND DESIGN

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Preface

NEW TO THE TWELFTH EDITION

Every year brings new strategies for research design, data collection, and data analysis. Accordingly, this twelfth edition of the book has been revised in many ways. Discussions of some topics have been expanded—often with new, illustrative examples—and new topics have been added; meanwhile, sections that few of our readers were finding useful have been either reduced in length or eliminated altogether. Technology-based strategies have been updated to include new software options. And as always, every page has been revisited—every word, in fact—and many minor changes have been made to tighten the prose or enhance its clarity and readability.

Especially noteworthy changes in this edition are (a) a better balance between quantitative and qualitative methods than was true for the eleventh edition; (b) the addition of a new chapter on action research, with room for it being made by the elimination of the chapter on historical research (which reviewers have almost unanimously been telling us they don't assign in their classes); and (c) a reorganization of what were formerly Parts III, IV, and V (Chapters 6 through 12) into a new Part III ("Research Designs," with Chapters 6 through 10) and a new Part IV ("Data Analyses," with Chapters 11 and 12). The last of the changes just listed—the reorganization of chapters—was due in large part to the fact that researchers are increasingly drawing from both quantitative and qualitative traditions in their efforts to address important research problems and questions.

Other significant changes in this twelfth edition are the following:

- **Chapter 1.** Revised discussions of Step 1 and Step 4 in the research cycle, with Figure 1.1 also being revised accordingly; expansion of the section on philosophical assumptions to include *phenomenology* and *action-research* orientations; replacement of the key term *hypothesis* with *research hypothesis* to contrast it with the less formal hypotheses of everyday life; introduction of *purpose statement* as a key term; replacement of the key term *juried* with the term *peer-reviewed*, to reflect more popular terminology.
- **Chapter 2.** Discussion of research problems broadened to include research *questions* (the term more commonly used in qualitative research) and *purpose statements*; updated and expanded discussion of mind-mapping software, with new illustrative example (Figure 2.3); new section on identifying a *theoretical* or *conceptual framework* for a research study, along with (a) a new example and graphic illustrating the nature of a conceptual framework and (b) an additional suggestion to identify or create a theoretical/conceptual framework in the Practical Application feature "Writing the First Section of a Proposal."
- **Chapter 3.** Introduction of key term *open-access journal*; updated and expanded discussion of online databases; movement of what was formerly Table 13.1 ("Commonly Used Styles in Research Reports") to this chapter, where it is now Table 3.3; more specific recommendations for annotating sources during an in-house or online library search; new paragraph regarding the importance of writing an honest, nonbiased literature review; use of excerpts from a more current (2016) doctoral dissertation in the Dissertation Analysis feature.

- **Chapter 4.** Addition of the concept *unit of analysis* as a key term; explicit distinction between the key terms *assessment* and *measurement* (to create a better balance between qualitative and quantitative strategies in this and succeeding chapters); overhaul of the eleventh edition's section "Considering the Validity of Your Method" to give a better balance between qualitative and quantitative approaches, with the new heading "Enhancing the Credibility of Your Findings" (the in-depth discussion of *internal validity* in this section has been moved to Chapter 7); addition of follow-up studies as a strategy for enhancing the credibility of a research project; revision of the eleventh edition's section "External Validity" to offer a better balance between quantitative and qualitative methods, with a new heading "Enhancing the Generalizability of Your Findings"; renaming of the eleventh edition's section "Identifying Measurement Strategies" to "Choosing Appropriate Assessment Strategies," with a reorganization and many revisions to achieve a better quantitative/qualitative balance; new "Examples" column in Table 4.4 ("Contrasting the Four Types of Measurement Scales"); in many instances, replacement of the term *assessment instrument* with the more inclusive term *assessment strategy*; revision of the eleventh edition's section "Validity and Reliability in Measurement" (including revisions of glossary definitions of several key terms) to reflect a better balance between quantitative and qualitative approaches, with a heading change to "Validity and Reliability in Assessment."
- **Chapter 5.** Several minor changes in response to reviewers' concerns regarding (a) possible organizational structures for a research proposal, (b) the need for a reminder about not plagiarizing from other sources, and (c) the distinction between a reference list and a bibliography (in a new footnote).
- **Chapter 6.** Revision of the section on surveys to encompass qualitative as well as quantitative data collection; new section on *experience-sampling methods* (ESMs); in the section "Nonprobability Sampling," a new paragraph regarding the use of social media (e.g., Facebook) as a possible strategy for recruiting participants; significant revision of the eleventh edition's checklist "Analyzing Characteristics of the Population Being Studied" to include nonprobabilistic as well as probabilistic sampling, with the new title "Considering the Nature of the Population When Identifying Your Sampling Procedure"; addition of the *social desirability effect* as a bold-faced key term (with an accompanying hotlinked glossary definition) as a way of increasing its salience within the chapter.
- **Chapter 7.** Addition of a description of double-blind experiments and an in-depth discussion of internal validity (both discussions were previously in Chapter 4); relabeling of Designs 4 and 6 as *control-group pretest–posttest design* and *control-group posttest-only design*, respectively, to make them parallel to the labels for Designs 2 and 8; "down-grade" of term *repeated-measures design* from its previous key-term status (because the term *repeated measures* is increasingly being used in descriptive studies as well, especially in experience-sampling methods); switch from term *single-subject design* to the more contemporary and inclusive term *single-case intervention research*, with a new illustrative example that encompasses collection of data for both a single group and individual members of that group; addition of a reminder to *interpret* one's results regarding their relevance to one's initial research problem.
- **Chapter 8 (formerly Chapter 9).** Expansion of section on ethnographies to include *autoethnographies* and *reflective journals*; expansion of the section on phenomenological studies to include the *three-interview series* strategy for data collection; new section on *narrative inquiry*; expanded discussion of memos to include three types (reflective, methodological, and analytical memos); significant revision of the first Practical Application feature to include the key terms *credibility*, *transferability*, *dependability*, *confirmability*, *member checking*, and *audit trails*, along with the new title "Ensuring That Qualitative Data Collection Yields Credible, Trustworthy Data"; addition of the key terms *theoretical sampling*, *discriminant sampling*, *primary informants* (a.k.a.,

key informants), *extreme case sampling*, *convenience sampling*, and *snowball sampling* in the Practical Application feature “Selecting an Appropriate Sample for a Qualitative Study”; addition of *interview guide* as a key term in the guidelines for “Conducting a Productive Interview.”

- **Chapter 9 (formerly Chapter 12).** New section on *longitudinal mixed-methods designs*; elimination of embedded designs as a category distinct from convergent designs (in line with Creswell’s recent revisions of design categories); additional illustrative examples of mixed-methods research; expansion of Conceptual Analysis exercise “Identifying Mixed-Methods Research Designs” to include an example of a longitudinal mixed-methods design; movement of sections on “Analyzing and Interpreting Mixed-Methods Data” and “Systematic Reviews of Qualitative and Mixed-Methods Studies” to Chapter 12.
- **Chapter 10 (new chapter).** In-depth discussion of *action research* and *participatory designs*, which includes *teacher research*, *design-based research* (DBR), *participatory action research* (PAR), *youth participatory action research* (YPAR), and three distinct forms of *community-based research* (CBR); new Conceptual Analysis feature “Choosing an Action-Oriented Design”; new Practical Application feature “Deciding Whether to Use an Action Research and/or Participatory Design”; new sections “Data Collection and Analysis in Action Research” and “Disseminating the Findings of Action Research Projects”; new Practical Application feature “Using Community Forums as a Means of Disseminating the Results of Action Research and Participatory Research Projects”; new hypothetical sample research report, with the usual side commentary.
- **Chapter 11 (formerly Chapter 8).** Simplification of Figure 11.10 (formerly Figure 8.10) to enhance its readability; addition of using a repeated-measures variable as a strategy for enhancing the power of statistical analyses; new paragraph regarding *data dredging* (a.k.a. *p-hacking*) as a generally inappropriate and potentially unethical practice; updated list of popular statistical software programs.
- **Chapter 12 (formerly Chapter 11).** Chapter title now “Analyzing Qualitative and Mixed-Methods Data”; substantially updated and expanded discussion of qualitative data analysis strategies; new example illustrating data analysis in an ethnographic study; addition and revision of sections “Analyzing and Interpreting Mixed-Methods Data,” “Using Computer Software to Facilitate Mixed-Methods Data Analysis,” and “Systematic Reviews of Qualitative and Mixed-Methods Studies” (all of which were previously in the chapter on mixed-methods research).
- **Chapter 13.** Movement of Table 13.1 (regarding style manuals) to Chapter 3 (where it is now Table 3.3); substantial revision of the checklist “Criteria for Critiquing a Research Report” so that it more even-handedly addresses important qualities of qualitative and mixed-methods research as well as those of quantitative research.
- **Appendix A.** Update that describes the use of Microsoft Excel 2016 for Macintosh (rather than the 2008 version used in the eleventh edition of the book); update of Figure A.1 to include more recent literature sources.
- **Application Exercises.** Included at the end of each chapter, these exercises help readers implement their understanding of various research tasks essential to conducting research.

MyLab FOR EDUCATION

One of the most visible changes in the new edition, also one of the most significant, is the expansion of the digital learning and assessment resources embedded in the etext and the inclusion of *MyLab* in the text. *MyLab for Education* is an online homework, tutorial, and assessment program designed to work with the text to engage learners and to improve

learning. Within its structured environment, learners apply what they learn, test their understanding, and receive feedback to guide their learning and to ensure their mastery of key learning outcomes. The *MyLab* portion of the new edition of *Practical Research* is designed to help learners (1) understand the basic vocabulary of educational research and (2) get guided practice in planning and developing a research proposal and in collecting and analyzing research data. The resources in *MyLab for Education with Practical Research* include:

- *Self-Check* assessments with feedback throughout the eText help readers assess how well they have mastered content.
- *Application Exercises* allow the reader to practice research tasks from selecting and refining a topic, doing a literature review, collecting and analyzing research data, through writing up a proposal.
- *StatPak*, an easy to use statistical tool, enables students to enter sets of data and calculate common statistics automatically.

THE PURPOSE OF THIS BOOK

Practical Research: Planning and Design is a broad-spectrum, cross-disciplinary book suitable for a wide variety of courses in research methodology. Many basic concepts and strategies in research transcend the boundaries of specific academic areas, and such concepts and strategies are at the heart of this book. To some degree, certainly, research methods do vary from one subject area to another: A biologist might gather data by looking at specimens through a microscope, a psychologist by administering certain tests or systematically observing people's behavior, and an anthropologist by examining artifacts from a particular cultural group and perhaps from an earlier time period. Otherwise, the basic approach to research is the same. Regardless of the discipline, the researcher identifies a problem or question in need of a solution, collects data potentially relevant to the solution, analyzes and interprets the data, and draws conclusions that the data seem to warrant.

Students in the social sciences, the natural sciences, education, medicine, business administration, landscape architecture, and other academic disciplines have used this text as a guide to the successful completion of their research projects. *Practical Research* guides students from problem selection to completed research report with many concrete examples and practical, how-to suggestions. Students come to understand that research needs planning and design, and they discover how they can effectively and professionally conduct their own research projects. Essentially, this is a do-it-yourself, understand-it-yourself manual. From that standpoint, it can be a guide for students who are left largely to their own resources in carrying out their research projects. The book, supplemented by occasional counseling by an academic advisor, can guide the student to the completion of a successful research project.

LEARNING ABOUT THE RESEARCH PROCESS IS AN ESSENTIAL COMPONENT OF ACADEMIC TRAINING

All too often, students mistakenly believe that conducting research involves nothing more than amassing a large number of facts and incorporating them into a lengthy, footnoted paper. They reach the threshold of a master's thesis or doctoral dissertation only to learn that simply assembling previously known information is insufficient and unacceptable. Instead, they must do something radically different: They must try to answer a question that has never been answered before and, in the process, must discover something that no one else has ever discovered.

Research has one end: the discovery of some sort of "truth." Its purpose is to learn what has never before been known; to ask a significant question for which no conclusive answer

has previously been found; and, by collecting and interpreting relevant data, to find an answer to that question.

Learning about and doing research are of value far beyond that of merely satisfying a program requirement. Research methods and their application to real-world problems are skills that will serve you for the rest of your life. The world is full of problems that beg for solutions; consequently, it is full of research activity! The media continually bring us news of previously unknown biological and physical phenomena, life-saving medical interventions, and ground-breaking technological innovations—all the outcomes of research. Research is not an academic banality; it is a vital and dynamic force that is indispensable to the health and well-being of planet Earth and its human and nonhuman inhabitants.

More immediate, however, is the need to apply research methodology to those lesser daily problems that nonetheless demand a thoughtful resolution. Those who have learned how to analyze problems systematically and dispassionately will live with greater confidence and success than those who have shortsightedly dismissed research as nothing more than a necessary hurdle on the way to a university degree.

Many students have found *Practical Research* quite helpful in their efforts both to understand the nature of the research process and to complete their research projects. Its simplification of research concepts and its readability make it especially suitable for those undergraduate and graduate students who are introduced, perhaps for the first time, to genuine research methodology.

We hope we have convinced you that a course on research methodology is not a temporary hurdle on the way to a degree but, instead, an unparalleled opportunity to learn how you might better tackle any problem for which you do not have a ready solution. In a few years you will undoubtedly look back on your research methods course as one of the most rewarding and practical courses in your entire educational experience.

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Those who have had a part in the making of this book, known and unknown, friends and colleagues, gentle critics and able editors—all—are far too many to salute individually. But some individuals have especially stood out. First and foremost, I must thank Laura Ruth Johnson (Northern Illinois University), whose particular expertise in qualitative and mixed-methods research has enhanced the content of the two qualitative chapters (Chapters 8 and 12) in ways I could not possibly have done myself; Laura has also written most of the new chapter on action research (Chapter 10). Furthermore, Laura offered many helpful suggestions for how I might give a better quantitative-qualitative balance to Chapters 1 through 5. And she has either created or revised each of the hotlinked Self-Check quizzes and Application Exercises that appear in the book—and done so under very tight time constraints. Laura’s contributions to this edition have been substantial enough that I have rightly credited her with a “with” status on the book’s title page.

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Paul and I have had many hands guiding our pens plus many minds adding richness and depth to our thoughts. For that, I offer my humble and hearty thanks.

Jeanne Ellis Ormrod

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Chapter 1

The Nature and Tools of Research

In virtually every subject area, our collective knowledge about the world is incomplete: Certain questions remain unanswered, and certain problems remain unsolved. Systematic research provides many powerful tools—not only physical tools but also mental and social tools—that can help us discover possible answers and identify possible solutions.

Learning Outcomes

- 1.1 Distinguish between (a) common uses of the term *research* that reflect misconceptions about what research involves and (b) the true nature of research in academic settings.
- 1.2 Describe the iterative, cyclical nature of research, including the steps that a genuine research project involves.
- 1.3 Distinguish among positivism, postpositivism, constructivism, and pragmatism/realism as philosophical underpinnings of a research project.
- 1.4 Identify examples of how six general research tools can play significant roles in a research project: (a) the library and its resources, (b) computer technology, (c) measurement, (d) statistics, (e) language, and (f) the human mind.
- 1.5 Describe steps you might take to explore research in your field.

In everyday speech, the word *research* is often used loosely to refer to a variety of activities. In some situations the word connotes simply finding a piece of information or taking notes and then writing a so-called “research paper.” In other situations it refers to the act of informing oneself about what one does not know, perhaps by rummaging through available sources to locate a few tidbits of information. Such uses of the term can create considerable confusion for university students, who must learn to use it in a narrower, more precise sense.

Yet when used in its true sense—as a systematic process that leads to new knowledge and understandings—the word *research* can suggest a mystical activity that is somehow removed from everyday life. Many people imagine researchers to be aloof individuals who seclude themselves in laboratories, scholarly libraries, or the ivory towers of large universities. In fact, research is often a practical enterprise that—given appropriate tools—*any* rational, conscientious individual can conduct. In this chapter we lay out the nature of true research and describe general tools that make it possible.

WHAT RESEARCH IS NOT

Following are three statements that describe what research is not. Accompanying each statement is an example that illustrates a common misconception about research.

1. *Research is not merely gathering information.* A sixth-grader comes home from school and tells her parents, “The teacher sent us to the library today to do research,

and I learned a lot about black holes.” For this student, research means going to the library to find a few facts. This might be *information discovery*, or it might be learning *reference skills*. But it certainly is not, as the teacher labeled it, research.

2. **Research is not merely rummaging around for hard-to-locate information.** The house across the street is for sale. You consider buying it and call your realtor to find out how much someone else might pay you for your current home. “I’ll have to do some research to determine the fair market value of your property,” the realtor tells you. What the realtor calls doing “some research” means, of course, reviewing information about recent sales of properties comparable to yours; this information will help the realtor zero in on a reasonable asking price for your own home. Such an activity involves little more than searching through various files or websites to discover what the realtor previously did not know. Rummaging—whether through records in one’s own office, at a library, or on the Internet—is not research. It is more accurately called an *exercise in self-enlightenment*.

3. **Research is not merely transporting facts from one location to another.** A college student reads several articles about the mysterious Dark Lady in William Shakespeare’s sonnets and then writes a “research paper” describing various scholars’ suggestions of who the lady might have been. Although the student does, indeed, go through certain activities associated with formal research—such as collecting information, organizing it in a certain way for presentation to others, supporting statements with documentation, and referencing statements properly—these activities do not add up to true research. The student has missed the essence of research: the *interpretation* of data. Nowhere in the paper does the student say, in effect, “These facts I have gathered seem to indicate such-and-such about the Dark Lady.” Nowhere does the student interpret and draw conclusions from the facts. This student is approaching genuine research; however, the mere compilation of facts, presented with reference citations and arranged in a logical sequence—no matter how polished and appealing the format—misses genuine research by a hair. Such activity might more realistically be called *fact transcription*, *fact documentation*, *fact organization*, or *fact summarization*.

Going a little further, this student would have traveled from one world to another: from the world of mere transportation of facts to the world of interpretation of facts. The difference between the two worlds is the distinction between transference of information and genuine research—a distinction that is critical for novice researchers to understand.

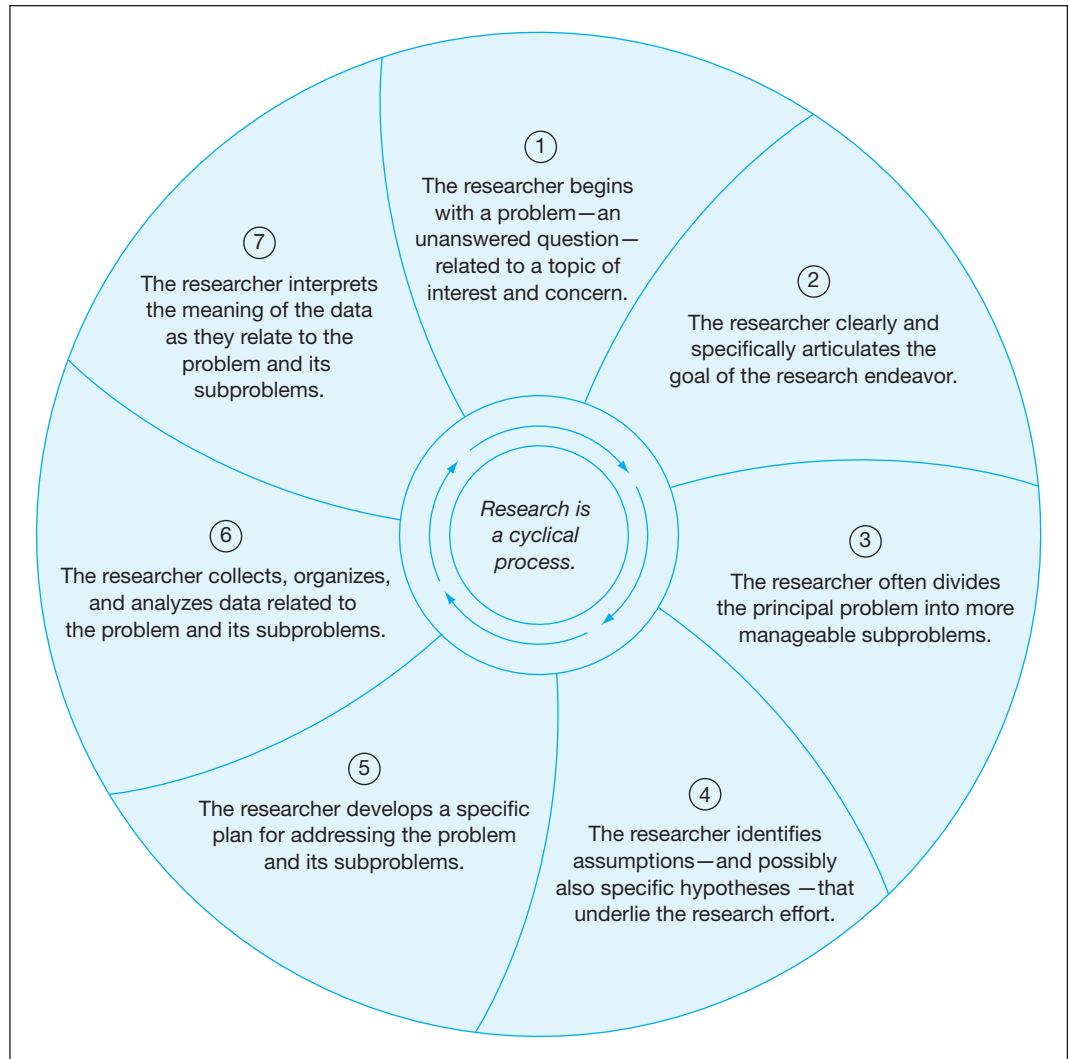
MyLab Education Self-Check 1.1

WHAT RESEARCH IS

Research is a systematic process of collecting, analyzing, and interpreting information—*data*—in order to increase our understanding of a phenomenon about which we are interested or concerned.¹ People often use a systematic approach when they collect and interpret information to solve the small problems of daily living. Here, however, we focus on *formal*

¹Some people in academia use the term *research* more broadly to include deriving new equations or abstract principles from existing equations or principles through a sequence of mathematically logical and valid steps. Such an activity can be quite intellectually challenging, of course, and is often at the heart of doctoral dissertations and scholarly journal articles in mathematics, physics, and related disciplines. In this book, however, we use the term *research* more narrowly to refer to *empirical* research—research that involves the collection and analysis of new data.

FIGURE 1.1 ■ The Research Cycle



research, research in which we intentionally set out to enhance our understanding of a phenomenon and expect to communicate what we discover to the larger scientific community.

Although research projects vary in complexity and duration, research generally involves seven distinct steps, shown in Figure 1.1. We now look at each of these steps more closely.

1. *The researcher begins with a problem—an unanswered question—related to a topic of interest and concern.* The impetus for all good research is a desire to acquire new information that advances our collective understandings of physical, biological, social, or psychological phenomena. At a minimum, good researchers are *curious* researchers: They genuinely want to learn more about a particular topic. Many of them are also motivated to identify possible solutions to local, regional, or global problems—solutions that might either directly or indirectly enhance the well-being of humankind or of the physical, biological, and social environments in which we live.

As you think about your topic of interest, consider these questions: What is such-and-such a situation like? Why does such-and-such a phenomenon occur? Might such-and-such an intervention alter the current state of affairs? What does it all mean? With questions like these, research begins.

2. *The researcher clearly and specifically articulates the goal of the research endeavor.* A critical next step is to pin down the issue or question—which we will refer to as the **research problem**—that the researcher will address. The ultimate goal of the research must be set forth in a grammatically complete sentence that specifically and precisely identifies the question the researcher will try to answer. When you describe your objective in clear, concrete terms, you have a good idea of what you need to accomplish and can direct your efforts accordingly.

3. *The researcher often divides the principal problem into more manageable subproblems.* From a design standpoint, it is often helpful to break a main research problem into several subproblems that, when solved, can possibly resolve the main problem.

Breaking down principal problems into small, easily solvable subproblems is a strategy we use in everyday living. For example, suppose you want to drive from your hometown to a town many miles or kilometers away. Your principal goal is to get from one location to the other as expeditiously as possible. You soon realize, however, that the problem involves several subproblems:

Main problem:	How do I get from Town A to Town B?
Subproblems:	<ol style="list-style-type: none"> 1. What route appears to be the most direct one? 2. Is the most direct one also the quickest one? If not, what route might take the least amount of time? 3. Which is more important to me: minimizing my travel time or minimizing my energy consumption? 4. At what critical junctions in my chosen route must I turn right or left?

Thus, what initially appears to be a single question can be divided into several smaller questions that must be addressed before the principal question can be resolved.

So it is with most research problems. By closely inspecting the principal problem, the researcher often uncovers important subproblems. By addressing each of the subproblems, the researcher can more easily address the main problem. If a researcher doesn't take the time or trouble to isolate the lesser problems within the major problem, the overall research project can become cumbersome and difficult to manage.

Identifying and clearly articulating the problem and its subproblems are the essential starting points for formal research. Accordingly, we discuss these processes in depth in Chapter 2.

4. *The researcher identifies general assumptions—and possibly also specific hypotheses—that underlie the research effort.* An **assumption** is a condition that is taken for granted, without which the research project would be pointless. For example, imagine that your problem is to investigate whether students learn the unique grammatical structures of a language more quickly by studying only one foreign language at a time or by studying two foreign languages concurrently. What assumptions would underlie such a problem? At a minimum, you must assume that

- The teachers used in the study are competent to teach the language or languages in question and have mastered the grammatical structures of the language(s) they are teaching.
- The students taking part in the research are capable of mastering the unique grammatical structures of any language(s) they are studying.
- The languages selected for the study have sufficiently different grammatical structures that students might reasonably learn to distinguish between them.

Aside from such basic ideas as these, however, careful researchers state their assumptions, so that other people inspecting the research project can evaluate it in accordance with *their own* assumptions. For instance, a researcher might assume that

- Participants' responses in a paper-and-pencil questionnaire, face-to-face interview, or online survey are reasonably accurate indicators of their actual behaviors or opinions.
- Behaviors observed in an artificial laboratory environment can effectively reveal how people or other animal species are likely to behave in more natural, real-world settings.
- Certain assessment instruments (e.g., widely used intelligence tests, personality tests, and interest inventories) reflect relatively stable personal characteristics that are unlikely to change very much in the near future. (We examine this issue in detail in the discussion of *validity* of assessment instruments in Chapter 4.)

As you will discover in upcoming chapters, researchers can sometimes support such assumptions by citing past research findings or collecting certain kinds of data within their own research projects.

In addition to stating basic assumptions, many researchers form one or more hypotheses about what they might discover. A *hypothesis* is a logical supposition, a reasonable guess, an educated conjecture. In formal research, it might be more specifically called a **research hypothesis**, in that it provides a tentative explanation for a phenomenon under investigation. It may direct your thinking to possible sources of information that will aid in resolving one or more subproblems and, as a result, may also help you resolve the principal research problem. When one or more research hypotheses are proposed prior to any data collection, they are known as *a priori hypotheses*—a term whose Latin roots mean “from something before.”

Hypotheses are certainly not unique to research. In your everyday life, if something happens, you immediately try to account for its cause by making some reasonable conjectures. For example, imagine that you come home after dark, open your front door, and reach inside for the switch that turns on a nearby table lamp. Your fingers find the switch. You flip it. No light. At this point, you identify several hypotheses regarding the lamp's failure:

Hypothesis 1: A recent storm has disrupted your access to electrical power.

Hypothesis 2: The bulb has burned out.

Hypothesis 3: The lamp isn't securely plugged into the wall outlet.

Hypothesis 4: The wire from the lamp to the wall outlet is defective.

Hypothesis 5: You forgot to pay your electric bill.

Each of these hypotheses hints at a strategy for acquiring information that may resolve the nonfunctioning-lamp problem. For instance, to test Hypothesis 1, you might look outside to see whether your neighbors have lights, and to test Hypothesis 2, you might replace the current light bulb with a new one.

Hypotheses in a research project are as tentative as those for a nonfunctioning table lamp. For example, a biologist might speculate that certain human-made chemical compounds increase the frequency of birth defects in frogs. A psychologist might speculate that certain personality traits lead people to show predominantly liberal or conservative voting patterns. A marketing researcher might speculate that humor in a television commercial will capture viewers' attention and thereby will increase the odds that viewers buy the advertised product. Notice the word *speculate* in all of these examples. Good researchers always begin a project with open minds about what they may—or may *not*—discover in their data.

Hypotheses—predictions—are an essential ingredient in certain kinds of research, especially experimental research (see Chapter 7). To a lesser degree, they might guide other forms of research as well, but they are intentionally *not* identified in the early stages of some kinds of qualitative research (e.g., see the discussion of grounded theory studies in Chapter 8).

5. *The researcher develops a specific plan for addressing the problem and its subproblems.* Research is not a blind excursion into the unknown, with the hope that

the data necessary to address the research problem will magically emerge. It is, instead, a carefully planned itinerary of the route you intend to take in order to reach your final destination—your research goal. Consider the title of this text: *Practical Research: Planning and Design*. The last three words—*Planning and Design*—are especially important ones. Researchers plan their overall research design and specific research methods in a purposeful way so that they can acquire data relevant to their research problem and subproblems. Depending on the research question, different designs and methods are more or less appropriate.

In the formative stages of a research project, much can be decided: Are any existing data directly relevant to the research problem? If so, where are they, and are you likely to have access to them? If the needed data *don't* currently exist, how might you generate them? And later, after you have acquired the data you need, what will you do with them? Such questions merely hint at the fact that planning and design cannot be postponed. Each of the questions just listed—and many more—must have an answer early in the research process. In Chapter 4, we discuss several general issues related to research planning. Then, beginning in Chapter 6, we describe strategies related to various research methodologies.

You should note here that we are using the word *data* as a plural noun; for instance, we ask “Where *are* the data?” rather than “Where *is* the data?” Contrary to popular usage of the term as a singular noun, *data* (which has its origins in Latin) refers to two or more pieces of information. A single piece of information is known as a *datum*, or sometimes as a *data point*.

6. The researcher collects, organizes, and analyzes data related to the problem and its subproblems. After a researcher has isolated the problem, divided it into appropriate subproblems, identified assumptions (and possibly also *a priori* hypotheses), and chosen a suitable design and methodology, the next step is to collect whatever data might be relevant to the problem and organize and analyze those data in meaningful ways.

The data collected in research studies take one or both of two general forms. **Quantitative research** involves looking at amounts, or *quantities*, of one or more variables of interest. A quantitative researcher tries to measure variables in some numerical way, perhaps by using commonly accepted measures of the physical world (e.g., rulers, thermometers, oscilloscopes) or carefully designed measures of psychological characteristics or behaviors (e.g., tests, questionnaires, rating scales).

In contrast, **qualitative research** involves looking at characteristics, or *qualities*, that cannot be entirely reduced to numerical values. A qualitative researcher typically aims to examine the many nuances and complexities of a particular phenomenon. You are most likely to see qualitative research in studies of complex human situations (e.g., people’s in-depth perspectives about a particular issue, the behaviors and values of a particular cultural group) or complex human creations (e.g., television commercials, works of art). Qualitative research isn’t limited to research problems involving human beings, however. For instance, some biologists study, in a distinctly qualitative manner, the complex social behaviors of other animal species; Dian Fossey’s work with gorillas and Jane Goodall’s studies of chimpanzees are two well-known examples (e.g., see Fossey, 1983; Goodall, 1986).

The two kinds of data—quantitative and qualitative—often require distinctly different research methods and data analysis strategies. Accordingly, three of the book’s subsequent chapters focus predominantly on quantitative techniques (see Chapters 6, 7, and 11), and two others focus almost exclusively on qualitative techniques (see Chapters 8 and 12). Nevertheless, we urge you *not* to think of the quantitative–qualitative distinction as a mutually exclusive, *it-has-to-be-one-thing-or-the-other* dichotomy. Many researchers collect both quantitative and qualitative data in a single research project—an approach sometimes known as **mixed-methods research** (see Chapter 9). And in **action research**, one or more researchers—who are often practitioners in a particular helping profession (e.g., education, counseling, social work, medicine)—might use both quantitative and qualitative methods in an effort to improve current practices and desired outcomes (see Chapter 10). Good researchers tend to

be *eclectic* researchers who draw from diverse methodologies and data sources in order to best address their research problems and questions (e.g., see Gorard, 2010; Lather, 2006; Onwuegbuzie & Leech, 2005).

7. *The researcher interprets the meaning of the data as they relate to the problem and its subproblems.* Quantitative and qualitative data are, in and of themselves, *only* data—nothing more. The significance of the data depends on how the researcher extracts *meaning* from them. In research, uninterpreted data are worthless: They can never help us answer the questions we have posed.

Yet researchers must recognize and come to terms with the subjective and dynamic nature of interpretation. Consider, for example, the many books written on the assassination of U.S. President John F. Kennedy. Different historians have studied the same events: One may interpret them one way, and another may arrive at a very different conclusion. Which one is right? Perhaps they both are; perhaps neither is. Both may have merely posed new problems for other historians to try to resolve. Different minds often find different meanings in the same set of facts.

Once we believed that clocks measured time and that yardsticks measured space. In one sense, they still do. We further assumed that time and space were two different entities. Then along came Einstein's theory of relativity, and time and space became locked into one concept: the time–space continuum. What's the difference between the old perspective and the new one? It's the way we think about, or interpret, the same information. The realities of time and space have not changed; the way we interpret them has.

Data demand interpretation. But no rule, formula, or algorithm can lead the researcher unerringly to a correct interpretation. Interpretation is inevitably a somewhat subjective process that depends on the researcher's assumptions, hypotheses, and logical reasoning processes.

Now think about how we began this chapter. We suggested that certain activities cannot accurately be called research. At this point you can understand why. None of those activities demands that the researcher draw any conclusions or make any interpretations of the data.

We must emphasize two important points related to the seven-step process just described. First, *the process is iterative*: A researcher sometimes needs to move back and forth between two or more steps along the way. For example, while developing a specific plan for a project (Step 5), a researcher might realize that a genuine resolution of the research problem requires addressing a subproblem not previously identified (Step 3). And while interpreting the collected data (Step 7), a researcher may decide that additional data are needed to fully resolve the problem (Step 6).

Second, *the process is cyclical*. The final step in the process depicted in Figure 1.1—interpretation of the data—is not *really* the final step at all. Only rarely is a research project a one-shot effort that completely resolves a problem; more often, it is likely to unearth new questions related to the issue at hand. And if specific hypotheses have been put forth, either *a priori* or after data have been collected and analyzed, those hypotheses are rarely proved or disproved beyond a shadow of a doubt. Instead, they are either *supported* or *not supported* by the data. If the data are consistent with a particular hypothesis, the researcher can make a case that the hypothesis probably has some merit and should be taken seriously. In contrast, if the data run contrary to a hypothesis, the researcher *rejects* the hypothesis and might turn to other hypotheses as being more likely explanations of the phenomenon in question. In any of these situations, one or more additional, follow-up studies are called for.

Ultimately, then, most research studies don't bring total closure to a research problem. There is no obvious end point—no point at which a researcher can say “*Voila!* I've completely answered the question about which I'm concerned.” Instead, research typically

involves a cycle—or more accurately, a *helix* (spiral)—in which one study spawns additional, follow-up studies. In exploring a topic, one comes across additional problems that need resolving, and so the process must begin anew. Research begets more research.

To view research in this way is to invest it with a dynamic quality that is its true nature—a far cry from the conventional view, which sees research as a one-time undertaking that is static, self-contained, an end in itself. Here we see another difference between true research and the nonexamples of research presented earlier in the chapter. Every researcher soon learns that genuine research is likely to yield as many problems as it resolves. Such is the nature of the acquisition of knowledge.

MyLab Education Self-Check 1.2

MyLab Education Application Exercise 1.1: Identifying Hypotheses and Assumptions

PHILOSOPHICAL ASSUMPTIONS UNDERLYING RESEARCH METHODOLOGIES

Let's return to Step 4 in the research process: *The researcher identifies assumptions—and possibly also hypotheses—that underlie the research effort.* The assumptions underlying a research project are sometimes so seemingly self-evident that a researcher may think it unnecessary to mention them. In fact, the researcher may not even be consciously aware of them. For example, two general assumptions underlie many research studies:

- The phenomenon under investigation is somewhat lawful and predictable; it is *not* comprised of completely random events.
- Cause-and-effect relationships can account for certain patterns observed in the phenomenon.

But are such assumptions justified? Is the world a lawful place, with some things definitely causing or influencing others? Or are definitive laws and cause-and-effect relationships nothing more than figments of our fertile human imaginations?

As we consider such questions, it is helpful to distinguish among different philosophical orientations that point researchers in somewhat different directions in their quests to make sense of our physical, biological, social, and psychological worlds.² Historically, a good deal of research in the natural sciences has been driven by a perspective known as **positivism**. Positivists believe that, with appropriate measurement tools, scientists can objectively uncover absolute, undeniable *truths* about cause-and-effect relationships within the physical world and human experience.

In the social sciences, many researchers are—and most others *should* be—less self-assured and more tentative about their assumptions. Some social scientists take a perspective known as **postpositivism**, believing that true objectivity in seeking absolute truths can be an elusive goal. Although researchers might strive for objectivity in their collection and interpretation of data, they inevitably bring certain *biases* to their investigations—perhaps biases regarding the best ways to measure certain variables or the most logical inferences to draw from patterns within the data. From a postpositivist perspective, progress toward genuine understandings of physical, social, and psychological phenomena tends to be gradual and probabilistic. For example, recall the earlier discussion of hypotheses being either *supported* or *not supported* by data. Postpositivists don't say, "I've just proven such-and-such." Rather, they're more likely to say, "This increases the probability that such-and-such is true."

²Some writers use terms such as *worldviews*, *epistemologies*, or *paradigms* instead of the term *philosophical orientations*.