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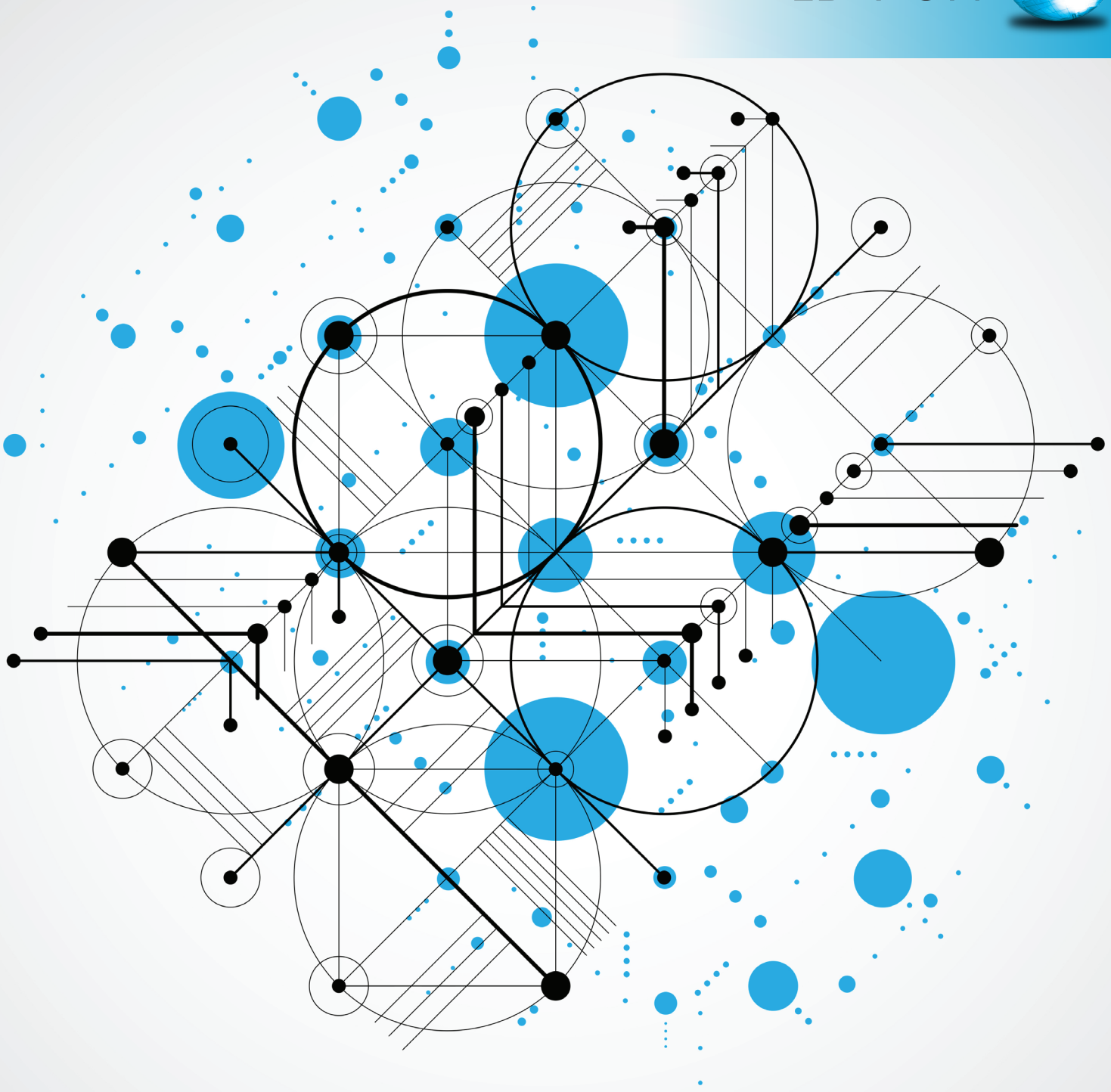

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Practical Research

Design and Process

Jeanne Ellis Ormrod

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PRACTICAL RESEARCH

DESIGN AND PROCESS

Jeanne Ellis Ormrod
University of Northern Colorado (Emerita)

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About the Author

Jeanne Ellis Ormrod received her A.B. in psychology from Brown University and her M.S. and Ph.D. in educational psychology from The Pennsylvania State University. She was Professor of Educational Psychology at the University of Northern Colorado for 22 years, where she taught courses in research methods and assessment as well as in her academic discipline; she is currently Professor Emerita of Psychological Sciences there. Subsequently, she has also taught research methods at the University of New Hampshire. She has published and presented extensively on cognition and memory, cognitive development, instruction, and related topics but is probably best known for this book and several others: *How We Think and Learn, Human Learning, Child Development and Education* (co-authored with Teresa McDevitt), *Educational Psychology* (ninth and tenth editions co-authored with Eric Anderman and Lynley Anderman), and *Essentials of Educational Psychology* (fifth and sixth editions co-authored with Brett Jones). She now lives in New Hampshire with her husband Richard, with one of her three children and her three grandchildren living nearby.

About This Book

Practical Research 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 those 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 identification to completed research report with many concrete examples and practical, how-to suggestions. Students come to understand that research requires advance planning and some degree of systematic rigor, 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.

NEW TO THIS EDITION

This thirteenth edition of the book has been revised in many ways. Perhaps most obvious is the change in the book's subtitle, which is now *Design and Process* to better reflect researchers' many technological tools in current decades. Also, the book now has only one author. Paul D. Leedy, late of American University, was the sole author of the first five editions; I (Jeanne Ellis Ormrod) took over revisions beginning with the seventh edition. Even now, with only my name on the cover of the book, I have continually aimed to maintain as much of Paul's original voice as possible, as I have always believed it to be more engaging and reader-friendly than other research methods books in the field. And many of Paul's words and suggestions remain in the book; they capture countless key elements of good research.

As has been true for previous editions, 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. And 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.

Following are especially noteworthy changes in this edition:

- A greater focus on the *ethics* of research and *biases* that might adversely affect the quality of a research proposal and/or research project, with these topics being introduced

in Chapter 1 and issues related to ethics and/or bias further discussed in Chapters 4, 6, 7, 8, 9, 10, 11, 12, and 13.
- New discussions of *open science* practices in Chapters 5 and 13.
- Discussion of action research and participatory designs significantly reorganized and greatly expanded in Chapter 10.
- Many new illustrative examples of particular research methodologies in Chapters 6, 7, 8, 9, and 10.
- Updates of technology-based strategies to include new software options, with the assumption that novice researchers are now more technology-literate than they have been in previous years.
- Five additional Conceptual Analysis features (in Chapters 1, 6, 11, and 12), as well as two new pedagogical features in every chapter: (a) repetitions of a chapter's learning objectives at the beginnings of relevant sections of the chapter and (b) end-of-chapter summaries.
- All new Learning Objective Quizzes and Application Exercises to accompany the digital versions of the book. I have created them myself this time, carefully writing each one with the explicit goals of (a) enhancing readability and (b) focusing on application and other higher-order thinking skills.

KEY CONTENT UPDATES BY CHAPTER

Significant changes in specific chapters and appendices are the following:

- **Chapter 1:** New chapter title "The Nature, Tools, and Ethics of Research"; new section "Ethical Issues in Research" (revision of material previously in Chapter 4, with a new topic "Concern for the Greater Good"); two new Conceptual Analysis exercises, "Identifying Philosophical Perspectives Underlying Research Questions" and "Identifying Potential Ethical Problems in Research Studies"; addition of *transformativism* and *open science* as key terms.
- **Chapter 2:** Addition of *evaluation research* as a third major category of research; new "Analysis of a Student Research Report" feature.
- **Chapter 3:** Addition of details regarding APA style for reference lists (moved from Chapter 13).
- **Chapter 4:** Revision of the section "Comparing Quantitative and Qualitative Approaches" to better communicate the fact that this distinction reflects a "more-or-less" continuum rather than an "either-or" dichotomy; new section "Using Strategies That Can Enhance the Value of Your Final Research Project," with subsections "Scrutinizing Your Proposed Research Methodology for Possible Biases," "Enhancing the Credibility of Your Findings," and "Enhancing the Generalizability of Your Findings"; addition of *measurement error, assessment bias, researcher bias, outlier*, and *research ethics board* as key terms.
- **Chapter 5:** New discussion of *inclusive language* and *affirmative language*; new section "Preregistering a Proposed Research Project," with *preregistration* added as a key term.
- **Chapter 6:** Reorganization of the chapter, with overviews of various research designs coming first, followed by a larger section on approaches to data collection (e.g., checklists, rating scales, rubrics, interviews, questionnaires); new section on *social network analysis*; new subsections illustrating each research design with in-depth examples; new Conceptual Analysis exercise "Identifying Descriptive Research Designs Suitable for Various Research Questions"; addition of *introspection* as a key term.
- **Chapter 7:** New in-depth example of a double-blind experiment; addition of a new design ("Design 7: Two-Treatment-Group Posttest-Only Design"); expanded discussion

of potential limitations of experimental approaches in a section now titled "Common Sources of Bias in, as Well as Other Limitations of, Experimental and Related Designs," with subsections "Factors That Can Adversely Affect Internal Validity," "Biases and Other Factors That Can Adversely Affect External Validity," and "Maximizing the Value of Experimental, Quasi-Experimental, and Ex Post Facto Studies"; new "Analysis of a Student Research Report" feature (to replace the much older one in the previous edition).

- **Chapter 8:** Addition of *discourse analysis* as a qualitative design; new subsections illustrating each research design with in-depth examples; new section "Common Sources of Bias in Qualitative Studies.
- **Chapter 9:** New subsections illustrating each research design with in-depth examples.
- **Chapter 10:** Reorganization and significant expansion of the chapter's contents; addition of Stringer and Aragón's (2021) "Look–Think–Act" approach; section on teacher research broadened and renamed with the more inclusive term *practitioner action research*; new subsections illustrating each research design with in-depth examples; expanded section on what is now called "Planning and Implementing an Action Research Study," with subsections "Assembling and Sustaining a Productive Research Team," "Identifying Research Questions and Project Goals," "Collecting and Analyzing Data," "Formulating and Implementing an Action Plan," "Successfully Including Young People as Co-researchers," and "Ensuring Adherence to General Ethical Principles"; new Guidelines feature "Ensuring Effective, Equitable Discussions in Research Team Meetings"; expanded discussion of dissemination strategies; addition of *stakeholder, attitude of inquiry*, and *cultural humility* as key terms.
- **Chapter 11:** New section "Considering Whether It Might Be Appropriate to 'Clean up' the Data"; expanded discussion of meta-analyses; new Conceptual Analysis exercise "Identifying Appropriate Statistical Analyses in Quantitative Studies"; expanded section on "Interpreting the Data"; addition of *exploratory hypothesis* and *publication bias* as key terms.
- **Chapter 12:** Reorganization and expansion of the chapter's contents; expanded discussion of qualitative data-analysis strategies in a section now called "Analyzing and Interpreting Qualitative Data"; updated discussion of Creswell's data analysis spiral to reflect his more recent portrayals of this spiral; new section "One Possible Approach to Data Analysis in a Participatory Action Research Study"; new Conceptual Analysis feature "Recognizing Various Qualitative Data-Analysis Strategies"; expanded discussion of systematic reviews; addition of *preliminary exploratory analysis* and *axial coding* as key terms.
- **Chapter 13:** Reorganization of chapter content, with discussions of front matter and end matter moved to an early section now called "Important Components of a Research Report"; deletion of the two lengthy examples of possible outlines for doctoral dissertations (these have been moved to a new Appendix B); new section "Considering Principles and Practices of Open Science"; new Figure 13.1 depicting three "badges" sometimes used to identify research projects that have adhered to one or more open science practices; new sections on "Online Postings" and "Community Events" as possible dissemination strategies; addition of *academic integrity, results-blind reviewing, registered report*, and *open access* as key terms.
- **Appendix A:** Significant update that describes the use of Microsoft Excel 2016 for the Mac (rather than the 2008 version used in the previous edition of the book); deletion of the sections "Using Excel to Keep Track of Literature Resources" and "Reorganizing Data in Excel" (both of which were deemed unnecessary, given many current students' familiarity with the use of electronic spreadsheets).
- **Appendix B:** New appendix for the two lengthy examples of possible outlines for doctoral dissertations that were removed from Chapter 13.

PEDAGOGICAL FEATURES WITHIN THE BOOK

Practical Research has specifically been written not only to describe various approaches to research but also to *help readers understand and make use of* these approaches. Accordingly, it includes a variety of pedagogical features in most or all chapters:

- Every chapter begins with three to five **Learning Objectives** that give readers specific goals to shoot for as they read the chapter; each of these objectives appears again at the beginning of relevant parts of the chapter.
- The book includes many in-depth illustrative examples of particular research designs and various data-collection and data-analysis strategies; these examples come from diverse academic disciplines.
- Every chapter includes one or more **Practical Application** features; most of these include either concrete **Guidelines** for carrying out certain aspects of a research project or **Checklists** that ask readers to reflectively evaluate either their own or others' work.
- Ten chapters each include one or two **Conceptual Analysis** features in which several short hypothetical scenarios are presented; readers are asked to apply what they have learned in the chapter to explain what is going on or what needs to be done in each scenario. Answers appear at the very ends of the chapters.
- Ten chapters include **Analysis of a Student Research Report** features in which excerpts from actual student dissertations or other research reports are presented along with running commentaries of what the students are doing or saying at various points in the excerpts.
- Every chapter has a chapter **Summary** organized in line with the chapter's Learning Objectives.
- **For Further Reading** sections at the end of each chapter enable readers to pursue certain topics of interest in greater depth.

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Pearson eTextbook

The Pearson eTextbook is a simple-to-use, mobile-optimized, personalized reading experience. It allows you to easily highlight, take notes, and review new concepts all in one place–even when offline. One especially useful feature is its **interactive glossary**: All key terms in the eTextbook are bolded and provide instant access to full glossary definitions, allowing you to quickly build your professional vocabulary as you are reading.

StatPak

The eTextbook includes a link to StatPak, an easy-to-use statistical tool that enables students to enter data sets and automatically perform common statistical analyses.

Instructor's Manual

The Instructor's Manual is provided as a Word document and includes resources to assist professors in planning their course. These resources consist of chapter overviews, learning objectives, guidance for using available PowerPoint® slides to promote concept development, questions for discussion, and learning activities.

PowerPoint® slides are provided for each chapter; they highlight key concepts and summarize the content of the text to help make it more meaningful and memorable for students. Oftentimes these slides also include questions and problems designed to stimulate discussion and to encourage students to elaborate and deepen their understanding of chapter topics.

Note: All instructor resources—assessment bank, instructor's manual, and PowerPoint slides are available for download at www.pearson.com/en-gb.html. Use one of the following methods:

- From the main page, use the search function to look up the lead author (i.e., Ormrod), or the title (i.e., *Practical Research: Design and Process*). Select the desired search result, then access the "Resources" tab to view and download all available resources.
- From the main page, use the search function to look up the ISBN (provided above) of the specific instructor resource you would like to download. When the product page loads, access the "Downloadable Resources" tab.

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 students well for the rest of their lives. 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.

I hope I 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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Another key player has been Brett Jones, Professor of Educational Psychology at Virginia Tech, for his ongoing suggestions on how I might improve the book. Brett and I have partnered on another textbook, *Essentials of Educational Psychology*, and my experiences with him have been so positive that I didn't hesitate to ask him to come on board for this 13th edition. He has consistently been smart, perceptive, conscientious, affable, and punctual in his contributions to our joint efforts. And his primary motive for writing books has always been the same as my own: to help readers effectively learn and understand various topics in ways that will enable them to apply what they've learned to their own professional lives. I consider him not only a top-notch academic but also a good friend.

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Jeanne Ellis Ormrod

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Chapter 1 The Nature, Tools, and Ethics 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 Objectives

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 and other institutional settings.

1.2 Distinguish among different philosophical orientations that might underlie various kinds of research endeavors.

1.3 Identify examples of how five general research tools can play significant roles in a research project: (a) the library and its resources, (b) computer technology, (c) statistics, (d) language, and (e) the human mind.

1.4 Identify key ethical principles that should guide you both when you evaluate other people's research and when you plan your own research projects.

1.5 Describe a few first 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 what many people refer to as a "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. Some 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 resources—*any* rational, conscientious individual can conduct. In this chapter I lay out the nature of true research and describe general tools and practices that make it possible.

WHAT RESEARCH IS NOT

Learning Objective 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 and other institutional settings.

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 a local realtor to find out how much someone else might pay you for your current residence. "I'll have to do some research to determine the fair market value of your home," 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 present 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 regarding who the woman 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.*

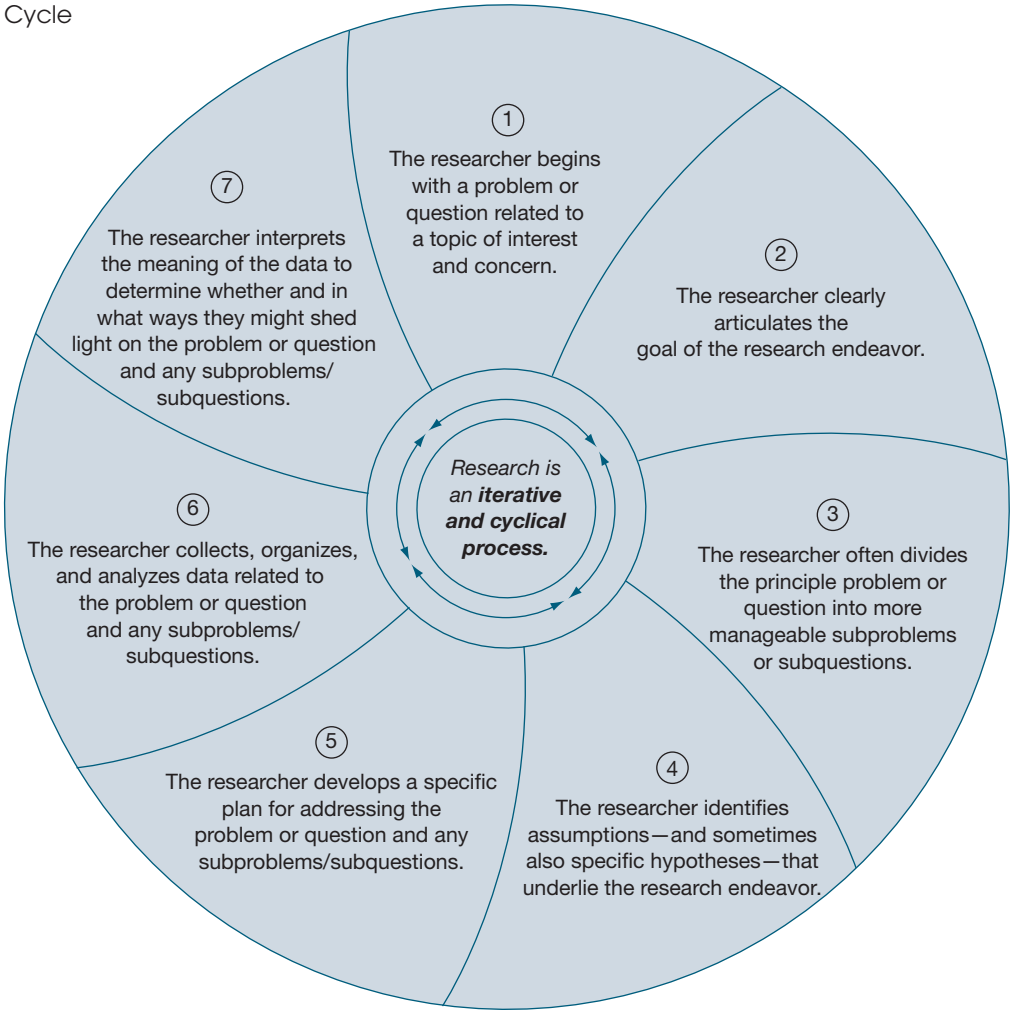
Going a little further, this student would have traveled from one world to another: from the world of mere collection of facts to the world of interpretation of facts. The difference between the two worlds is the distinction between transference of information and genuine research—a distinction that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

WHAT RESEARCH IS

Research is a relatively systematic process of collecting, analyzing, and interpreting information—*data*—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

[1]Some scholars 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



interpret information to solve the small problems of daily living. Here, however, we focus on *formal 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 and possibly also to the public at large.

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 or 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 change the current state of affairs? What does it all mean? With questions like these, research begins.

2. ***The researcher clearly articulates the goal of the research endeavor.*** A critical next step is to pin down the issue or question—which I will often refer to simply as the **research problem** or **research question**—that the researcher will address. The ultimate goal of the research must be set forth in a grammatically complete sentence that specifically 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 or question into more manageable subproblems or subquestions.*** From a design standpoint, it is often helpful to break a main research problem into several subproblems or subquestions that, when solved, can possibly resolve the main problem or question.

Breaking down principal problems or questions into small, easily solvable subproblems or subquestions 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:	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 consumption of fuel? 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 and questions. By closely inspecting the principal problem or question, the researcher often uncovers important subproblems (or subquestions). By addressing each of the subproblems, the researcher can more easily address the main problem or question.

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

4. ***The researcher identifies general assumptions—and in some cases 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 you want to find out 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.