



**3**  
EDITION

**Introduction to**  
**EDUCATIONAL**  
**RESEARCH**

**CRAIG A. MERTLER**



# INTRODUCTION TO EDUCATIONAL RESEARCH

**Third Edition**

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**Craig A. Mertler**

*Arizona State University*



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Singapore | Washington DC | Melbourne



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# PREFACE

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## PREFACE ... TO THE PREFACE

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Each new edition of a textbook represents change, of some sort. Although it may not appear so to those who are unfamiliar with its “previous iterations,” this text—the second edition of its revitalized form—also represents substantial change from its earlier versions. For seven previous editions, I—along with my coauthor, Dr. Carol M. Charles—produced a textbook by the same name, but with a different publisher. In early 2014, an opportunity arose for SAGE Publications to publish *Introduction to Educational Research*, as a first edition. Having worked on two previous textbook projects with SAGE over the previous 15 years or so, I could not have been more excited and jumped at the opportunity to have the SAGE imprint on this textbook—especially since SAGE is the leading authority when it comes to publishing books on the topic of research methodologies.

This new version of *Introduction to Educational Research* represents a significant revision from its previous rendition. For those adopters who are familiar with the previous editions, I firmly believe that you will find this third edition of the text substantially more beneficial to both you and your students. Content coverage and integrated samples and examples were thoroughly augmented, while the conversational writing style apparent in previous editions was maintained throughout.

## PURPOSE OF THE TEXT

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This book has two main purposes, designed to simultaneously receive attention. The first is to provide knowledge about educational research sufficient for a clear understanding of the following:

- The exact definition of what educational research is and is not
- The nature of research and the scientific process it employs
- The identification of research problems and formulation of research questions and hypotheses
- The ethical responsibilities that must be adhered to by researchers
- The purposes and processes of conducting a review of related literature
- The various types of research methodologies and designs, along with their purposes, characteristics, strengths, and limitations
- The characteristics, sources, and techniques used in the collection of data
- The procedures for analyzing qualitative and quantitative data
- The procedures for writing research proposals and final research reports

The second purpose of this book—a purpose that has been given preeminence in this edition (in keeping with previous versions)—is to help graduate students conduct their own research. Toward that end, specific guidance is provided in the following areas:

- Identifying appropriate topics for research
- Properly framing research questions and hypotheses
- Identifying possible types of research necessitated by various topics
- Preparing a research proposal for an identified research topic
- Conducting a thorough search for related research literature
- Evaluating various types of research appropriate for investigating selected topics
- Identifying necessary data, sources of those data, and the procedures by which data are collected
- Analyzing data appropriately
- Answering research questions and testing hypotheses
- Stating findings and drawing conclusions
- Preparing research reports

## FOCUSED ON THE NEEDS OF EDUCATORS AND GRADUATE STUDENTS

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*Introduction to Educational Research*, the third edition, is designed specifically for educators who are new to research and seeking advanced degrees in graduate studies. Most users will be in-service teachers, administrators, special-education personnel, instructional coaches, and counselors, but the book is also appropriate for graduate students not yet actively teaching. No prior familiarity with the principles, procedures, or terminology of educational research is required to fully benefit from this text.

## TEXT ORGANIZED SEQUENTIALLY, LIKE AN EDUCATIONAL RESEARCH STUDY

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The text is composed of 14 chapters, three appendices, and a glossary. In keeping with the purposes of helping students organize and undertake research while simultaneously acquiring fundamental knowledge about research, the text is organized into four parts, as follows:

### Part I: Initial Research Considerations

Chapter 1: What Is Educational Research?

Chapter 2: Overview of the Educational Research Process

Chapter 3: Identifying a Research Problem

Chapter 4: Ethics in Educational Research

Chapter 5: Reviewing Related Research Literature

Part I clarifies the nature of educational research, explains its characteristics, provides an overview of the entire process of conducting educational research, discusses mechanisms for identifying appropriate research topics or problems, and provides strategies for reviewing related research literature.

## **Part II: Designing a Research Study**

Chapter 6: Qualitative Research Methods

Chapter 7: Quantitative Research Methods

Chapter 8: Mixed-Methods Research

Chapter 9: Action Research

Chapter 10: Writing a Research Proposal

Part II provides detailed descriptions of qualitative research methodologies and quantitative research designs, mixed-methods research designs, the process of conducting action research, and strategies for developing a written research proposal.

## **Part III: Collecting and Analyzing Data**

Chapter 11: Qualitative Data Collection and Analysis

Chapter 12: Quantitative Data Collection

Chapter 13: Quantitative Data Analysis

Part III provides detailed descriptions and examples of data collection and analysis procedures for both qualitative and quantitative research studies.

## **Part IV: The Research Report**

Chapter 14: Writing a Final Research Report

Part IV discusses various aspects of writing a final research report, including the importance of identifying the audience, conventions of academic-style writing and format, and practical guidelines for writing.

## **Back Matter**

The back matter of the text consists of three appendices (i.e., A, B, and C) and the glossary. Appendix A contains a report of a survey research study written by the author of the textbook that has been published in an academic journal. This study is also referred to and provides examples in chapters throughout the text. Appendix B contains a research report resulting from a qualitative research study. Finally, Appendix C contains a report resulting from a quantitative research study. Each of the three research reports was published in a refereed journal and appears in its entirety. The glossary of important terms includes well over 350 terms related to various aspects of educational research.

## PEDAGOGICAL FEATURES AND BENEFITS FOR STUDENTS

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In keeping with the main purpose of helping users clearly understand and apply research concepts, several pedagogical features are included in the book. Each chapter contains the following features:

- **Student Learning Objectives (or SLOs)**—The SLOs serve several pedagogical purposes. They provide a preview for each chapter, list the four to eight major targeted learning objectives for that chapter, and may also be used as a review on completing study of the chapter.
- **Developmental Activities**—Each chapter includes five developmental activities, located at the end of the chapter. These developmental activities are designed to provide opportunities, at a variety of levels of depth and breadth, for students to apply concepts and skills they have learned throughout the chapter. These may be used effectively as course assignments, in-class activities, or as a basis for class discussions on topics addressed in the chapter.
- **Chapter Summaries**—Thorough and detailed summaries of key concepts, listed in bullet-point format, are included at the end of each chapter and provide focused reviews of chapter contents.

Other pedagogical features include the following:

- **Reprinted Research Reports**—The three appendices contain complete published research articles of different types, including survey research, qualitative research, and quantitative research. Additionally, these have been annotated. These articles can serve as opportunities for students to engage in critiques of published articles, as well as to see different formats and writing styles appropriate for academic journals.
- **Glossary**—A glossary of more than 350 terms important in educational research has been provided for easy student reference. The terms are highlighted in boldface on their first appearance in the text. This is one of the most comprehensive glossaries presented in any educational research textbook.

## NEW FEATURES IN THE THIRD EDITION

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There are several new features and/or additions in the third edition of *Introduction to Educational Research*:

- Revised discussion of the scientific method to include qualitative approaches (Chapter 1).
- Expanded coverage of stating and refining research questions (Chapter 2).
- A discussion of features and qualities of good research questions was added (Chapter 3).
- Brief discussion of the history of research ethics involving human research participants was added (Chapter 4).

- Tips for completing IRB applications were added (Chapter 4).
- An additional example of a “literature review map” (using the study included in Appendix A) was added (Chapter 5).
- References to collecting qualitative data as part of survey research were added (Chapter 6).
- The integration of qualitative and quantitative methods in mixed-methods research was stressed (Chapter 8).
- Discussions of problems of practice in action research, and using action research as a means to pursue organizational change were added (Chapter 9).
- Discussion of the role of focus statements in qualitative research was added (Chapter 10).
- Presentation of qualitative analysis methods and tools was revised (Chapter 11).
- Discussion of “scales of measurement” was changed to “levels of measurement,” to decrease any confusion caused by the use of that terminology (Chapter 12).
- Presentation of statistical analysis packages and software was revised and updated (Chapter 13).
- Discussions of advanced statistical analysis procedures were removed (due to coverage beyond the scope of this textbook), and this is reflected in the decision-making tree included (Chapter 13).
- The discussion of the APA Manual was updated to the new 7th edition (Chapter 14).
- References to Purdue University’s Online Writing Lab (OWL) were added (Chapter 14).
- Appendix A was replaced with a more recent publication by the author, and two additional research reports were added as Appendices B and C. All three research articles have been annotated.
- Hyperlinks throughout the book were verified or revised in order to ensure accuracy (at the time of printing).

## TEACHING RESOURCES

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This text includes an array of instructor teaching materials designed to save you time and to help you keep students engaged. To learn more, visit [sagepub.com](http://sagepub.com) or contact your SAGE representative at [sagepub.com/findmyrep](http://sagepub.com/findmyrep).





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First and foremost, I would like to acknowledge and sincerely thank everyone at SAGE for wholeheartedly and excitedly agreeing to take on this “new” project when it began its “second life” several years ago. I am approaching 20 years of working with SAGE Publishing, and I have been more than thrilled with my working relationships with everyone at SAGE. I also want to graciously thank Leah Fargotstein (acquisitions editor for education). I would also like to thank the following individuals who contributed to the production of this text: Chelsea Neve (content development editor), Elizabeth Cruz (editorial assistant), and Jillian Ragusa (marketing).

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*Craig A Mertler*

## ABOUT THE AUTHOR

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**Craig A. Mertler** is currently an Associate Professor at Arizona State University. He began his career as a high school biology teacher. He has been an educator for 35 years—25 of those in higher education at Bowling Green State University, the University of West Georgia, Lynn University, and Arizona State University, and 12 years as an administrator (department chair, doctoral program director, and education dean). Over his career, he has taught courses focused on the application of action research to promote educator empowerment, school improvement, and job-embedded professional development, as well as classroom assessment, research methods, and statistical analyses. He has served as the research methodology expert on more than 100 doctoral dissertations and master’s theses. He is the author of 26 books, 9 invited book chapters, 23 refereed journal articles, and three novels. He has also presented more than 35 research papers at professional meetings around the country, as well as internationally. He conducts workshops for in-service educational professionals (at all levels) on classroom-based action research and on the topics of classroom assessment and assessment literacy, as well as data-driven educational decision-making. His primary research and consulting interests include classroom-based action research, data-driven educational decision-making, professional learning communities, and classroom teachers’ assessment literacy. In his leisure time, he enjoys traveling with his family to the beach and writing fiction. Dr. Mertler can be reached at [craig.mertler@gmail.com](mailto:craig.mertler@gmail.com) for consulting, professional development, and speaking engagements. Additionally, you can visit his website at [www.craigmertler.com](http://www.craigmertler.com).



# INITIAL RESEARCH CONSIDERATIONS



# 1

## WHAT IS EDUCATIONAL RESEARCH?

### STUDENT LEARNING OBJECTIVES

After studying Chapter 1, students will be able to do the following:

1. Name and describe four methods that can be used to seek out answers to important questions
2. Describe the scientific method and how it can be applied to educational research topics
3. Summarize characteristics that define what educational research is and is not
4. Identify and define key terms associated with educational research
5. Identify various methods for conducting educational research
6. List and describe the major steps of the educational research process
7. Articulate the importance of exploring research in your specific discipline
8. Evaluate the perceived importance of educators' conducting their own research

Whether we realize it or not, research is—and should always be—central to how we function as a successful and productive society. Whether we consider history, medicine, social group dynamics, or psychology, regardless of our areas of study or interest, research is the key to answering our questions, solving our problems, and fostering creativity, innovations, and advancements. Research in the broad field of education is certainly no exception to this fact.

### FINDING ANSWERS TO QUESTIONS

---

The basic goal in nearly all research studies is to find answers to particular questions. These may be questions about students, teachers, curriculum, attendance, graduation rates, extracurricular activities—the list is seemingly endless. Human nature characteristically prompts us to try to find answers to our questions as quickly as possible. As human beings, however, our general method of thinking tends to be flawed. Tom Kida (2006) identified several common mistakes we tend to make in our thinking:

- *We tend to prefer stories to statistics (and research).* Because we are social beings, we like to feel connected to others, and stories tend to facilitate those kinds of connections.



Even if presented with convincing statistics, we tend to gravitate to someone telling a seemingly sincere story—even if it is not accurate—because it “tugs at our heartstrings.”

- *We seek to confirm our ideas, not to question them.* Generally speaking, everyone likes to be right, and few of us like to be wrong. When people search for “evidence” to solve a problem, they tend to focus on information which confirms—not contradicts—their beliefs.
- *We sometimes misperceive the world.* Oftentimes, we see what we want or hope to see, and not that which may actually exist.
- *We tend to oversimplify our thinking.* Our reality—especially as educators—is extremely complex. We constantly need to analyze complex events that we observe in our classrooms and schools. If we do not simplify our observations, we can become overwhelmed trying to make sense of the world around us.
- *Our memories are often inaccurate or distorted.* With all of the factors and variables that we observe on a daily basis, the passage of time reduces our abilities to accurately remember many details of these events.

It follows, then, that the sources we pursue for possible answers are typically those that are most convenient to us. These sources include tradition, authority, and common sense. *Tradition* refers to how we have historically sought answers to our questions. For example, suppose that the Adams School District developed an innovative science curriculum 25 years ago. It was very well received at the time of its inception, both locally and statewide—so much so that several other districts developed similar curricula. However, the topic of revising that curriculum was recently raised in a science committee meeting. During the discussion, several committee members explained how innovative the curriculum was when it was originally developed and so why should they now want to abandon something so innovative. The general consensus of the committee was that the science curriculum was great when it was developed and has been working fine since then—so why change it? This argument may be correct; however, a good deal of time has passed and numerous scientific advances have been made since the curriculum was originally implemented. While it may have been effective for Adams’ students in the past, it may not be appropriately meeting their academic needs now. Relying on the “it worked in the past, so why change now” attitude might lead us to inaccurate answers to our questions about the appropriateness of the curriculum.

If tradition fails to provide us with suitable answers to our questions, we next look to *authority*, by seeking answers and opinions from individuals who have substantial expertise in the field and who, we hope, know what is best for us. This source remains very popular in the broad field of education and can be highly effective. However, its effectiveness in terms of answering our questions is not always a certainty. Consider the numerous “bandwagon” movements that schools have jumped on over the years. When it turns out that these are not effective solutions to our school-based problems, schools jump off of them almost as quickly as they jumped on, usually in search of a different “quick fix.” To work effectively, authoritative answers to our questions must be “customized” to fit the specific needs of the target school, district, or setting. This approach can certainly prove effective, but it does not routinely occur. In many instances, experts simply try to apply their answers to our questions, regardless of our specific situations, conditions, demographic makeup, and so forth. In these cases, authoritative

answers typically prove ineffective. For example, what might prove an effective solution in the Adams School District might not be as effective in the Brighton School District, and could even be a miserable failure in the Crestview School District.

If traditional and authoritative approaches to answering our school-based questions do not prove to be effective, we might decide to take matters into our own hands. After all, who knows the specific needs of our district, and our students, better than we do? Using the *commonsense* approach of human reasoning—sort of figuring things out on our own—can be highly effective. However, common sense can be effective only if the information on which solutions are developed and decisions are based is reliable and accurate. For example, consider all the advances in medicine and technology over the past decade—and the numerous failures that often preceded those successes. (Please note that I am using the term *failures* very loosely because if we learned something that ultimately benefits us in the long run, then it was not a failure, in the literal sense of the word.)

In actuality, both tradition and authority can provide additional information and guidance, should we decide to use a commonsense approach to answer our questions. Personal experiences and expertise provide great insight to help us answer our questions, but those sources of information may be biased or incomplete; they are simply not enough. We still need information—reliable and accurate information—to help guide our approach to seeking out answers to our educational questions. Where do we find this reliable and accurate information that can serve as a basis for answering our questions? This type of information must come from a process that is both systematic and objective—and that reflects a greater level of critical thinking—thus providing us with information that is accurate and meaningful, and not distorted or biased (to the extent possible). This approach is best accomplished through the application and use of the *scientific method*.

## THE SCIENTIFIC METHOD

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The **scientific method** is a specific strategy used to answer questions and resolve problems. It is very likely that you remember the scientific method from a junior or senior high school science course when you were required to complete some sort of research study in the form of a science fair project. The origins of the scientific method date back to 1938, when American philosopher John Dewey described the process as a procedure for thinking more objectively (meaning that the results or answers are not influenced by personal feelings or opinions when considering and representing facts). The scientific method consists of a systematic, step-by-step set of procedures that are employed to objectively investigate some sort of phenomenon and then to answer specific questions about it. Dewey presented the process in the following steps:

1. Clarify the main question inherent in the problem.
2. State a hypothesis (i.e., a prediction of a possible answer to the question), OR develop an inductive focus (i.e., to help better understand a social problem).
3. Collect, analyze, and interpret information related to the question, such that it allows you to provide an answer to that question.
4. Form conclusions derived from the interpretations of your analyses.
5. Use your conclusions to verify or reject your original hypothesis.

The scientific method is essentially the process used in conducting a vast majority of research studies. However, it is important to realize that this is a “generic” set of steps and that all research studies may not follow these steps to the letter, or necessarily in this order. This is often the case for many types of qualitative research studies. In situations where research studies do not follow the steps exactly, they still share a couple of important concepts in common. First, all research studies clearly specify a research question that serves to guide the conduct of the study, although some studies do not have those questions developed until after the study has begun. Second, all research studies include the collection, analysis, and interpretation of information. Applying the scientific approach to this second set of activities is what enables us to answer our questions more objectively and/or more accurately.

How, then, is the scientific method related to research in the broad field of education? In actuality, there is a great deal of overlap between the two. Simply put, **educational research** involves the application of the scientific method to educational topics, phenomena, or questions. The generic steps in the process of conducting educational research are as follows:

1. Specify the topic where a concern exists.
2. Clarify the specific problem to focus the research.
3. Formulate research questions and/or hypotheses concerning the specific problem or topic.
4. Review existing literature related to the topic or problem.
5. Conduct procedures by which data (a more appropriate term for “information”) are collected, analyzed, and interpreted.
6. State the findings that are generated as a result of the analysis of data.
7. Draw conclusions related to the original research questions and/or hypotheses.

Note the similarities between Dewey’s steps of the scientific method and the steps involved in conducting educational research. The major, integral components are common to both lists. However, to reiterate, these steps do not always occur in practice as they are presented here, nor do they always follow this particular sequence—especially with respect to specific types of educational research, namely those that use qualitative methods.

## EDUCATIONAL RESEARCH—WHAT IT IS AND WHAT IT IS NOT

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Although educational research can be a fairly straightforward process, some educators have preconceptions—or, perhaps more appropriately, misconceptions—about exactly what constitutes educational research. To fully appreciate the potential benefits of educational research—both as a researcher and a consumer—it is critical to have a foundational understanding of it. The following list—partially adapted from Leedy and Ormrod (2013)—is an attempt to describe what educational research *is* and what it *is not*.

- *Educational research is scientific.* As a process, educational research is a scientific endeavor. As we previously discussed, educational research closely parallels the scientific method; however, labeling it a “scientific process” goes even further. To say that educational research is scientific is to say that it is characterized by the principles

and methods of science and that it is systematic and methodical. As you see later in this list, educational research is objective and open-minded about the topic being studied. The overall process, when followed appropriately, involves a step-by-step methodology that ensures this high level of systemization and objectivity.

- *Educational research begins with a question or problem that serves as the purpose or goal of a study.* Schools abound with problems that need solving and questions that need answering—just ask any teacher or administrator. The logical starting point for any research study in education is to clearly articulate the question you ultimately want to answer or the problem you ultimately want to address. In turn, this provides a clear direction for the study—everything that follows, in terms of the development of your study, logically relates directly back to the question or problem. Furthermore, by brainstorming various questions and problems to address, we typically identify even more concerns that require our scientific attention. Clearly stating these questions and/or problems is the first formal step to conducting educational research.
- *Educational research requires the formulation of a specific plan for conducting the research.* Once the inherent question or problem has been specified and clarified, one must develop a plan for just how to conduct this research. The data necessary for answering the question or addressing the problem do not miraculously emerge out of thin air for the educational researcher to take and run with. The entire study must be well planned and carefully thought out, prior to its inception. These are the types of decisions and plans that must be made in advance:
  - Who will you study?
  - How many individuals will you need—or do you want—to study?
  - What information will you collect from them?
  - How will you collect those data?
  - When will you collect those data?
  - What will you do with (i.e., how will you analyze) those data once you have them?
  - How do you plan to interpret the results of those analyses?

All these methodological issues must be addressed at the outset of any research study. For reasons we discuss later in this book, these types of decisions simply cannot be made “on the fly,” in the midst of the research process.

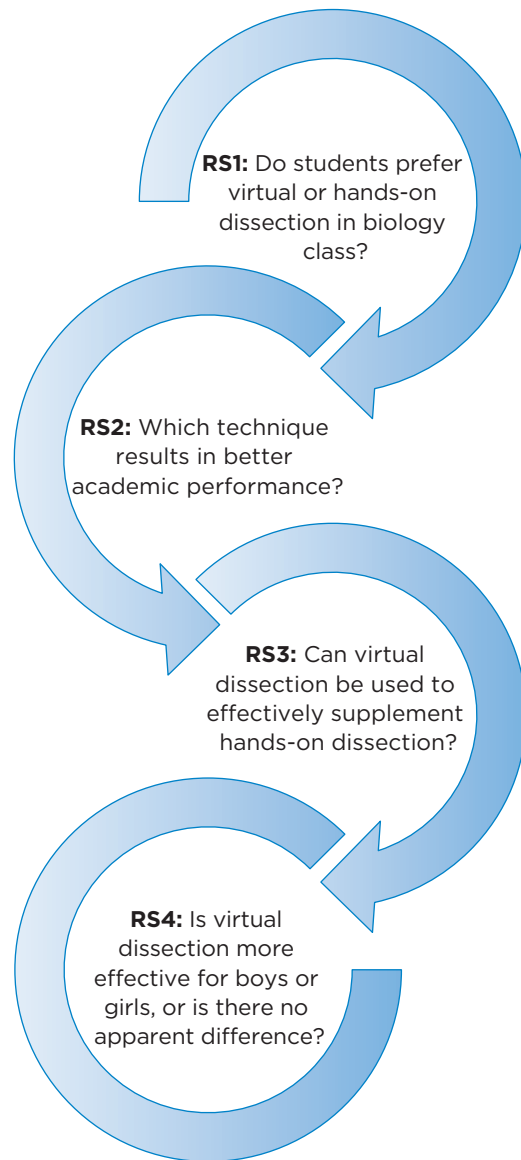
- *Educational research requires the collection, analysis, and interpretation of data as a means of answering the inherent question or problem under investigation.* For many novice researchers, this part of the process of doing educational research—collecting, analyzing, and interpreting data—often proves to be the most daunting. However, the more attention paid to these steps of the educational research process, the better the quality of the research study’s ultimate outcome. In some cases, research studies involve the collection of existing data (e.g., school attendance records or standardized test scores), but they most often require the collection of original, new data (e.g., surveys, interviews, or pre- and posttests) specific to the research questions the study is addressing. Regardless of the source of the data, it still needs to be analyzed (with the perspective of the research question or problem in mind) and interpreted appropriately. This is a commonality across all educational research studies.

- *In most cases, educational research tends to be cyclical or helical, as opposed to linear.* When we look at the specific process of performing educational research in Chapter 2, it appears as if it is a linear process. In other words, Step 1 is followed by Step 2, which is followed by Step 3, and so on until the research concludes. While this is accurate (to a degree), research seldom, if ever, stops at the end of this process. Often, conducting educational research in an effort to answer one or two pressing questions results in the generation of new, additional research questions—and typically a greater number than you started with. Therefore, it is probably best to view educational research as *cyclical* (i.e., with cycles of research studies that explore the same basic topic in subsequent years or classrooms) or even *helical* (i.e., with a spiraling effect, where the original research study spawns additional, follow-up, or extended studies addressing different aspects of the same broad topic). This is, perhaps, one of the most unique aspects of educational research—that it is never truly done and that one can continually investigate educational phenomena.

Figure 1.1 presents a scenario where a science department might want to investigate the benefits of a virtual dissection (e.g., using an iPad app) versus the more traditional, hands-on method. In Research Study 1 (RS1), the question focuses on the students' preferences for the two types of laboratory activities. The next study (RS2) focuses not on opinion or preference but, rather, on academic performance. RS3 investigates the use of the virtual dissection as a means only to supplement, not replace, the hands-on activity. In RS4, the department might now want to know if there is a difference—in terms of both preference and academic performance—between boys and girls in their use of virtual and hands-on dissections. In this scenario, notice (1) how the same broad topic is being investigated in all four studies, but also (2) that different aspects of that topic serve as the focus (i.e., the guiding research question) for each subsequent study.

- *Educational research is, by its very nature, inquisitive, objective, and original.* Because educational research is scientific, it must be approached from the perspective of objectivity. The goal of any research study (regardless of the field of study) is the generation of new knowledge, the gaining of a better understanding of some issue or phenomenon, or the development of some sort of innovation. This simply cannot be accomplished if the researcher is biased or approaches a research study with some degree of subjectivity. That being said, it is critical to note that, as human beings, we all possess certain biases—for example, with respect to our view of the world, toward certain people, and even in our perspective on research. Human nature dictates that we always have some sort of preconceived idea (i.e., *bias*) about what we may find as the result of any given research endeavor; however, the goal when conducting research in education is to *make every effort* to avoid the temptation to let those preconceptions guide how we conduct the study or interpret our results. Building on the previous example, I may honestly think that virtual dissection is preferred by students and results in better academic performance; however, I still collect opinion and performance data from students on both virtual *and* hands-on dissection activities. This, in turn, allows me to objectively answer my guiding research question about which learning activity is better.
- *Educational research should be beneficial, meaningful, and significant.* Topics or questions that are trivial in their nature should not be the focus of educational research

FIGURE 1.1 ■ The Cyclical or Helical Nature of Educational Research



studies. Educational research should be conducted so the results prove beneficial to someone, somewhere, somehow, someday. If you want to study something that will not potentially result in one or more of the aforementioned benefits, then I would strongly advise you to rethink your research topic. Educational research should be done to garner new knowledge and to shed light on the human condition and educational phenomena. It should never be conducted as a means of doing harm to individuals or groups, or to denigrate, cast blame, find fault, deny opportunity, or stifle progress. The goal of the educational researcher is always to increase understanding and, whenever possible, to promote opportunity and advancement for the population at large.