What Is Research?

In virtually every subject area, our knowledge is incomplete and problems are waiting to be solved. We can address the holes in our knowledge and those unresolved problems by asking relevant questions and then seeking answers through systematic research.

The word *research* is used in everyday speech to cover a broad spectrum of meanings, which makes it a decidedly confusing term for students—especially graduate students—who must learn to use the word in its specialized denotation. Much that students have learned they must suddenly unlearn; many of the false concepts they had previously learned they must discard.

Unfortunately, many students have been taught misconceptions about the nature of research. From elementary school to college, they have heard the word *research* used loosely to refer to a variety of activities. In some situations, the word connotes finding an item of information or making notes and then writing a documented paper. In other situations, the term is used to refer to the act of informing oneself about what one does not know, perhaps by rummaging through available sources to retrieve a bit of information. Merchandisers sometimes use the word to suggest the discovery of a revolutionary product when, in reality, an existing product has been slightly modified to enhance the product’s sales appeal. All these activities have been called research but are more appropriately called other names: information gathering, library skills, documentation, self-enlightenment, or an attention-getting sales pitch.

The word *research* has a certain mystique about it. To many people, it suggests an activity that is somehow exclusive and removed from everyday life. Researchers are sometimes regarded as aloof individuals who seclude themselves in laboratories, scholarly libraries, or the ivory towers of large universities. The public is often unaware of what researchers do on a day-to-day basis or of how their work contributes to people’s overall quality of life and general welfare.

The purpose of this chapter is to dispel such myths and misconceptions about research. In the next few pages, we describe what research is not and then what it is.

**WHAT RESEARCH IS NOT**

We have suggested that the word *research* has been so loosely employed in everyday speech that few people have any idea of its real meaning. Following are a few statements that describe what research is not. Accompanying each statement is an illustration depicting the popular belief often held about research.

1. *Research is not mere information gathering.* A fourth-grade child comes home from school with this announcement: “Mom, the teacher sent us to the library today to do research, and I learned a lot about Columbus.” This child has been given the idea that research means going to the library to get information or to glean a few facts. This may be information discovery; it may be learning reference skills; but it certainly is not, as the teacher so termed it, research.
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2. Research is not mere transportation of facts from one location to another. A student completes a "research paper" on the Dark Lady in the sonnets of William Shakespeare. Although the student did, indeed, go through certain activities associated with formal research—collecting data, assembling a bibliography, referencing statements properly—these activities still do not add up to a true "research" paper. The student missed the essence of research: the interpretation of data. Nowhere in the paper did the student say, in effect, "These facts that I have gathered seem to indicate this about the Dark Lady." Nowhere did the student draw conclusions or interpret the facts themselves. This student is approaching genuine research; however, the mere compilation of facts, presented with reference citations and arranged in a series—no matter how appealingly—misses genuine research by a hair. A little farther, and 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 a transference of information and genuine research—a distinction that is important to understand.

Unfortunately, many students think that looking up a few facts and transferring them written paper with benefit of references constitutes research. Such activity is, of course, realistically called fact discovery, fact transportation, and/or fact transcription.

3. Research is not merely rummaging for information. The house across the street is for sale. You consider buying it, and so you call your realtor to find out how much your present home will sell for. "I'll have to do some research to find the fair market value of your property," the realtor tells you. What the realtor calls "doing some research" means, of course, going through information about recent sales of properties comparable to yours to see what they have sold for; will give the realtor an estimate to report to you. Such an activity involves little more than rummaging through files to discover what the realtor previously did not know. Rummaging through one's personal records or at the public or college library, is not research. It is more accurately called an exercise in self-enlightenment.

4. Research is not a catchword used to get attention. The morning mail arrives. You open an envelope and pull out its contents. A statement in boldface type commands attention:

   Years of Research Have Produced a New Car Wash!

   Give Your Car a Miracle Shine With Soapy Suds!

The phrase "years of research" catches your attention. The product must be good, you reason, because "years of research" have been spent on developing it. You order the product, and what you get? Dishwashing detergent! No research, merely the clever use of a catchword that, in the end, fulfilled its purpose: to catch your attention. "Years of research"—what an attention-getting phrase, yet how misleading!

As we define the term, research is entirely different from any of the above activities. We define its essential nature and characteristics in the following section.

What Research Is

Research is the systematic process of collecting and analyzing information (data) in order to increase our understanding of the phenomenon about which we are concerned or interested. People often use a systematic approach when they collect and interpret information to solve the 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.

Although research projects vary in complexity and duration, research typically has distinctive characteristics:

1. Research originates with a question or problem.
2. Research requires a clear articulation of a goal.
3. Research follows a specific plan of procedure.
4. Research usually divides the principal problem into more manageable subproblems.
5. Research is guided by the specific research problem, question, or hypothesis.
6. Research accepts certain critical assumptions.
7. Research requires the collection and interpretation of data in an attempt to resolve the problem that initiated the research.
8. Research is, by its nature, cyclical or, more exactly, helical.

Each of these characteristics is discussed in turn so that you can appreciate more fully the nature of formal research.

1. **Research originates with a question or problem.** The world is filled with unanswered questions, unresolved problems. Everywhere we look, we see things that cause us to wonder, to speculate, to ask questions. And by asking questions, we strike the first spark igniting a chain reaction that terminates in the research process. An inquisitive mind is the beginning of research; as one popular tabloid puts it, "Inquiring minds want to know!"

   Look around you. Consider the unresolved situations that evoke these questions: What is such-and-such situation like? Why does such-and-such phenomenon occur? What does it all mean? These are everyday questions. With questions like these, research begins.

   In Chapter 3, we will discuss the research problem at greater length. The problem and its statement are important because they are the point of origin of formal research.

2. **Research requires a clear articulation of a goal.** A clear, unambiguous statement of the problem is critical. This statement is an exercise in intellectual honesty: It must set forth clearly and in a grammatically complete sentence exactly what the ultimate goal of the research is. The statement answers the question, "What problem do you intend to solve?" It is essential for the success of any research undertaking; without it, the research is on shaky ground indeed.

3. **Research follows a specific plan of procedure.** Research is not a blind excursion into the unknown, with the hope that the data necessary to answer the question at hand will somehow fortuitously turn up. It is, instead, a carefully planned attack, a search-and-discover mission mapped out in advance. Consider the title of this text: Practical Research: Planning and Design. The last three words are the important ones. The overall research effort must be explicitly planned and logically designed. 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. Depending on the specific research question, different designs and methods will be more or less appropriate.

   So in addition to identifying the specific goal of your research, you must also identify how you propose to reach your goal. You cannot wait until you're chin deep in the project to plan and design your strategy. In the formative stages of the research project, much can be decided: Where are the data? Do any existing data address themselves to the research problem? If the data exist, are you likely to have access to them? And if you have access to the data, what will you do with them after they are in your possession? We might go on and on. These questions merely hint at the fact that planning and design cannot be postponed. Each of the questions just listed must have an answer early in the research process.

4. **Research usually 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, will 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 get from your town to a town 50 miles 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 is the most direct route?
     2. How far do I travel on the highway?
     3. Which exit should I take to leave the highway?

   What seems like a single question can be divided into at least three smaller questions that must be addressed before the principal question can be resolved.
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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 researchers don’t take the time or trouble to isolate the lesser problems within the major problem, their research projects may become cumbersome and unwieldy.

5. Research is guided by the specific research problem, question, or hypothesis. Having stated the problem and its attendant subproblems, the researcher typically forms one or more hypotheses about what he or she may discover. A hypothesis is a logical supposition, a reasonable guess, an educated conjecture. 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, in the process, the principal research problem.

Hypotheses are not unique to research. They are constant, recurring features of everyday life. They represent the natural working of the human mind. Something happens. Immediately you attempt to account for the cause of the event by constructing a series of reasonable guesses. In so doing, you are hypothesizing.

Let’s take a commonplace occurrence: You come home after dark, open the front door, and reach inside for the switch that turns on a nearby table lamp. Your fingers find the switch. You turn it. No light. At this point, you begin to construct a series of reasonable guesses—hypotheses—to explain the lamp failure:

1. The bulb has burned out.
2. The lamp is not plugged into the wall outlet.
3. A late afternoon thunderstorm interrupted the electrical service.
4. The wire from the lamp to the wall outlet is defective.
5. You forgot to pay your electric bill.

Each of these hypotheses provides a direction for exploration to locate the information that may resolve the problem of the malfunctioning lamp. Now you go in search of information to determine which hypothesis may be correct. In other words, you look for data that will support one of your hypotheses and enable you to reject others.

1. You go out to your car, get a flashlight, find a new bulb, and insert the new bulb. The lamp fails to light. (Hypothesis 1 is rejected.)
2. You glance down at the wall outlet and see that the lamp is plugged into it. (Hypothesis 2 is rejected.)
3. You look at your neighbors’ homes. Everyone has electrical power. (Hypothesis 3 is rejected.)
4. You go back into your house and lift the cord connecting the lamp to the wall outlet. The lamp lights briefly and then goes out. You lift the cord again. Again, the lamp lights briefly. The connecting cord is defective. (Hypothesis 4 is supported.)
5. Fortunately, hypothesis 4 solved the problem, and by repairing or replacing the cord, you can count on adequate light to study by in the near future.

In research, hypotheses are never proved or disproved; they are either supported or not supported by the data. When the data run contrary to a particular hypothesis, the researcher rejects that hypothesis and turns to others as being more likely explanations of the phenomenon in question.

Over time, as particular hypotheses are supported by a growing body of data, they evolve into theories. A theory is an organized body of concepts and principles intended to explain a particular phenomenon. Like hypotheses, theories are tentative explanations that new data either support or do not support; to the extent that new data contradict a particular theory, a researcher will either modify it to account better for the data or reject the theory altogether in favor of an alternative explanation.

One common way of testing a theory is to make a prediction (hypothesis) about what should occur if the theory is a viable explanation of the phenomenon under study. As an example, let’s consider Albert Einstein’s theory of relativity, first proposed in 1915. Within the context of his theory, Einstein hypothesized that light passes through space as protons—minute masses of spectral energy.
If light has mass, Einstein reasoned, then it should be subject to the pull of a gravitational field. A year later, Karl Schwarzschild produced the first exact solution of the field equations with respect to the gravitational field of the sun. According to the Einstein-Schwarzschild hypothesis, rays of light should be deflected twice the amount that Isaac Newton had predicted many years earlier.

In May 1919, a group of London astronomers traveled to Brazil and North Africa to observe how the sun's gravity distorted the light of a distant star, now visible due to an eclipse of the sun. After the data were analyzed and interpreted, the results clearly supported the Einstein-Schwarzschild hypothesis and, thus, Einstein's theory of relativity.

6. Research accepts certain critical assumptions. In research, assumptions are equivalent to axioms in geometry—self-evident truths, the sine qua non of research. The assumptions must be valid or else the research is meaningless. For this reason, careful researchers—certainly those conducting research in an academic environment—set forth a statement of their assumptions as the bedrock upon which their study must rest. In your own research, it is essential that others know what you assume with respect to your project. If one is to judge the quality of your study, then the knowledge of what you assume as basic to the very existence of your study is vitally important.

An example may clarify the point. Suppose 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, the researcher 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 could recognize and learn to distinguish between them.

Whereas a hypothesis involves a prediction that may or may not be borne out in the data, an assumption is a condition that is taken for granted, without which the research project would be pointless. In the Einstein example presented earlier, we assume that the astronomers who went to observe the star's light were competent to do so and that their instruments were sensitive enough to measure the slight aberration caused by the sun's gravitational pull.

Assumptions are usually so self-evident that a researcher may consider it unnecessary to mention them. For instance, two assumptions underlie almost all research:

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

Yet aside from such basic ideas as these, careful researchers do state their assumptions, so that others inspecting the research project may evaluate it in accordance with their own assumptions. For the beginning researcher, it is better to be overexplicit than to take too much for granted.

7. Research requires the collection and interpretation of data in an attempt to resolve the problem that initiated the research. After a researcher has isolated the problem, divided it into appropriate subproblems, posited reasonable questions or hypotheses, and recognized the assumptions that are basic to the entire effort, the next step is to collect whatever data seem appropriate and to organize them in meaningful ways so that they can be interpreted.

Data, events, and observations are, in and of themselves, only data, events, and observations—nothing more. The significance of the data depends on how the researcher extracts meaning from them. In research, data uninterpreted by the human mind are worthless.

Someone once defined an "education" as notes that pass from the notebook of the instructor to the notebook of the student without going through the head of either. Research data can never travel on such an expeditious highway! For unless research data pass through the human mind and are processed there, they can never help us answer the questions we have posed.
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Consider the myriad of books that have been written on the assassination of President John F. Kennedy. Different historians have studied the same events: One may interpret them one way, and another may arrive at an entirely 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 frequently see different meanings in the same set of facts. This is an axiom of interpretation that all researchers must recognize.

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 came relativity, and time and space became locked into one concept: the time-space continuum. What is the difference between the old perspective and the new perspective? The way we think about—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, no formula, will lead the researcher unerringly to a correct interpretation. Interpretation is subjective: It depends entirely on the hypotheses, assumptions, and logical reasoning processes of the researcher. In later chapters, we will present a number of potentially useful methods of organizing and interpreting data.

Now think about how we began this chapter. We outlined certain activities and suggested that none of them could be accurately called research. At this point, you can understand why. None of them demands that the researcher draw any conclusions or make any interpretation of the data.

8. Research is, by its nature, cyclical or, more exactly, helical. The research process follows a cycle and begins simply. It follows a logical, developmental steps:
   a. A questioning mind observes a particular situation and asks, Why? What caused that? How come? (This is the subjective origin of research.)
   b. One question becomes formally stated as a problem. (This is the overt beginning of research.)
   c. Data are gathered that appear to bear on the problem.
   d. The data seem to point to a tentative solution of the problem. A guess is made; a hypothesis or guiding question is formed.
   e. The quest for more data continues.
   f. The body of data is processed and interpreted.
   g. A discovery is made; a conclusion is reached.
   h. The tentative hypothesis is either supported by the data or is not supported; the question is answered (partially or completely) or not answered.
   i. The cycle is complete.

The resolution of the problem or the tentative answer to the question completes the cycle, as is shown in Figure 1.1. Such is the format of all research. Different academic disciplines merely use different routes to arrive at the same destination.

But the neatly closed circle of Figure 1.1 is deceptive. Research is rarely conclusive. In a truer sense, the research cycle might be more accurately conceived of as a helix, or spiral, of research. In exploring an area, one comes across additional problems that need resolving. 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 act that is static, self-contained, an end in itself. Here we see another difference between true research and the nonexamples of research with which this chapter opened. Every researcher soon learns that genuine research yields as many problems as it resolves. Such is the nature of the discovery of knowledge.

Underlying and unifying any research project is its methodology. It is not enough to follow research procedures without an intimate understanding that research methodology directs the whole endeavor. The methodology controls the study, dictates how the data are acquired, arranges them in logical relationships, sets up an approach for refining and synthesizing the raw data, constructs an approach so that the meanings that lie below the surface of those data become manifest,
and finally yields a conclusion or series of conclusions that leads to an expansion of knowledge.

Thus, research methodology has two primary functions:

1. To control and dictate the acquisition of data
2. To corral the data after their acquisition and extract meaning from them

This is what we mean by the phrase interpretation of the data.

DISCOVERING THE DISCIPLINE OF RESEARCH

Earlier in the chapter, we mentioned that academic research is popularly seen as an activity far removed from everyday living. Even graduate students working on theses or dissertations may consider their tasks to be mere academic busywork that has little or no relevance to the world beyond the university campus. This is simply not true. Conducting the research required to produce an acceptable thesis or dissertation is one of the most valuable educational experiences a person can have. Furthermore, it adds to our knowledge about the world in general and so
can ultimately promote the welfare and comfort of us all. Great discoveries that advance the frontiers of knowledge and enhance our well-being are commonplace announcements in the contemporary media.

As a way of getting your feet wet in the world of research, take some time to read articles in research journals in your own academic discipline. You can do so by spending an hour or two in your local college or university library; you may also be able to find some relevant journals on the Internet.

**BROWSING THE PERIODICALS SECTION OF THE LIBRARY**

The library of almost any college or university houses numerous journals that describe a wide range of research studies in virtually any field of study. To find research studies related to a particular topic, you might begin with the paper and CD-ROM indexes in the reference section of the library (more about such resources in Chapter 4). The research journals themselves are typically kept in a "periodicals" section of the library. Here are some examples of what you might find there:

- *American Journal of Distance Education*
- *Child Development*
- *Communications Research*
- *CUPA Journal (College and University Personnel Association)*
- *Early Childhood Research Quarterly*
- *Educational Technology, Research and Development*
- *Environmental Research*
- *Hispanic Journal of Behavioral Science*
- *Journal of Anthropological Research*
- *Journal of Black Studies*
- *Journal of Business Research*
- *Journal of Educational Computing Research*
- *Journal of Educational Psychology*
- *Journal of Experimental Psychology*
- *Journal of Management*
- *Journal of Physical Education, Recreation, and Dance*
- *Journal of Research in Crime and Delinquency*
- *Journal of Speech, Language and Hearing Research*
- *Nursing Research*
- *Organizational Dynamics*
- *Professional Geographer*
- *Research in Consumer Behavior*
- *Research in Nursing and Health*
- *Research in Social Problems and Public Policy*
- *Sex Roles*
- *Sociological Methods and Research*
- *Sociology and Social Research*
- *Training and Development*

Your professors should have suggestions as to what journals are especially relevant to your academic discipline. Reference librarians can be helpful as well. In addition, especially if you are shy about asking other people for advice, you can get insights about important journals by scanning the reference lists in textbooks in your discipline.

Browse in the journals related to your field just to get acquainted with them. Go first to those that pique your interest, and skim a few studies that relate to particularly intriguing topics. Then, get acquainted with as many of the journals in your discipline as you can. Competent researchers should have general knowledge of the resources available in their field.

**FINDING JOURNALS ON THE INTERNET**

The Internet is a collection of sprawling computer networks that link millions of computers used by tens of millions of people all over the world. Originally formed to link defense computers and scientists, the Internet has grown well beyond those boundaries. In recent years, it has become a powerful way to access a wide variety of information on an almost limitless number of topics. The Internet connects people for the purpose of sharing information. If you have not yet "traveled" on the Internet, now is a great time to start!
Any exploration of the Internet requires a little "equipment." First, the computer you use should have three features:

- A hook-up to a telephone or cable line
- A modem—a device that allows computer data to be transmitted over telephone or cable lines
- Computer software that allows you to access the Internet (e.g., Netscape Navigator, Microsoft Internet Explorer)

If Internet exploration is new to you, you may also want to have a friend look over your shoulder to guide you as you take your first steps into cyberspace. As you read later chapters of this book, you will discover a wide variety of resources that the Internet can offer both novice and expert researchers. For now, however, we'll limit our discussion to on-line journals—journals that are available in electronic form either instead of or in addition to paper form. As we write this edition of the book, only a small proportion of academic periodicals are completely available on the Internet, but more are going on line all the time. Here are several examples of on-line journals and their Internet addresses:

Sociological Research Online
http://www.socresonline.org.uk/

Online Journal of Issues in Nursing
http://www.nursingworld.org/oijn/

Online Journal of Peace and Conflict Resolution
http://www.trinstitute.org/ojpcr/

### PRACTICAL APPLICATION

**EVALUATING THE RESEARCH OF OTHERS**

Keep in mind that the quality of research you find in your explorations of the library and the Internet may vary considerably. One rough indicator of the quality of a study is whether it has been juried or nonjuried. A juried (or refereed) research report has been judged by respected colleagues in one's field and deemed to be of sufficient quality and importance to warrant publication. For instance, the editors of many academic journals send submitted manuscripts to one or more reviewers who pass judgment on the manuscripts, and only manuscripts that meet certain criteria are published in the journal. A nonjuried (or nonrefereed) report is one that appears in a journal or on the Internet without first being screened by one or more experts. Some nonjuried reports are excellent, but others may not be.

An important skill of a researcher is the ability to review the work of others and evaluate the quality of their methods, results, and conclusions. In some cases, this is quite easily accomplished; in others, it is more difficult. By acquiring the ability to evaluate others' work, you will begin to understand how your own work can be improved. We suggest that you begin to develop your evaluation skills by locating several research articles relevant to your interests. As you read and study the articles, consider the questions in the following checklist.

1. Where did you find the research article? Was it reviewed by experts in the field before it was published?

2. Does the article have a stated research question or problem? That is, can you determine the focus of this author's work?
3. Does the article describe the collection of data, or does it describe and synthesize other studies in which data were collected?

4. Is the article logically organized and easy to follow? What could have been done to improve its organization?

5. Does the article contain a section that outlines and reviews previous studies on this topic? In what ways is this previous work relevant to the research problem?

6. If the author explained procedures that were followed in the study, are these procedures clear enough that you could repeat the work and get similar results? What additional information might be helpful or essential for you to replicate the study?

7. If data were collected, can you describe how they were collected and how they were analyzed? Do you agree with what was done? What additional things would you have done if you had been the researcher?

8. Do you agree with the interpretation of the results? Why or why not?

9. Finally, reflect over the entire article. What is, for you, most important? What do you find most interesting? What do you think are the strengths and weaknesses of this article? Will you remember this article in the future? Why or why not?

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**GUIDELINES Benefiting from Others' Research**

As you begin to evaluate selected articles by using the questions in the checklist, it may be wise to keep three guidelines in mind:

1. *Keep a research journal, writing log, notebook, or annotated bibliography of the articles you read.* Include bibliographic information such as:
   - The author’s name
   - The title of the article
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• The name of the journal, as well as the year, volume and issue numbers, and pages

• Keywords that capture the focus of the article

You may think that you will always be able to recall where you found an article and what you learned from it; however, our own experience tells us that you probably will forget much of what you read.

2. Whenever you review someone else’s work, take time to consider how you can improve your own work because of it. Ask yourself. What have I learned that I would (or would not) want to incorporate into my own research? Perhaps it is a certain way of writing, a specific method of data collection, or a particular approach to data analysis. You should constantly question and reflect on what you read.

3. Finally, don’t just read one or two articles and think that you are done. Get used to reading and evaluating; for a researcher, this is a lifelong endeavor. Always look for additional things you can learn.

FOR FURTHER READING


