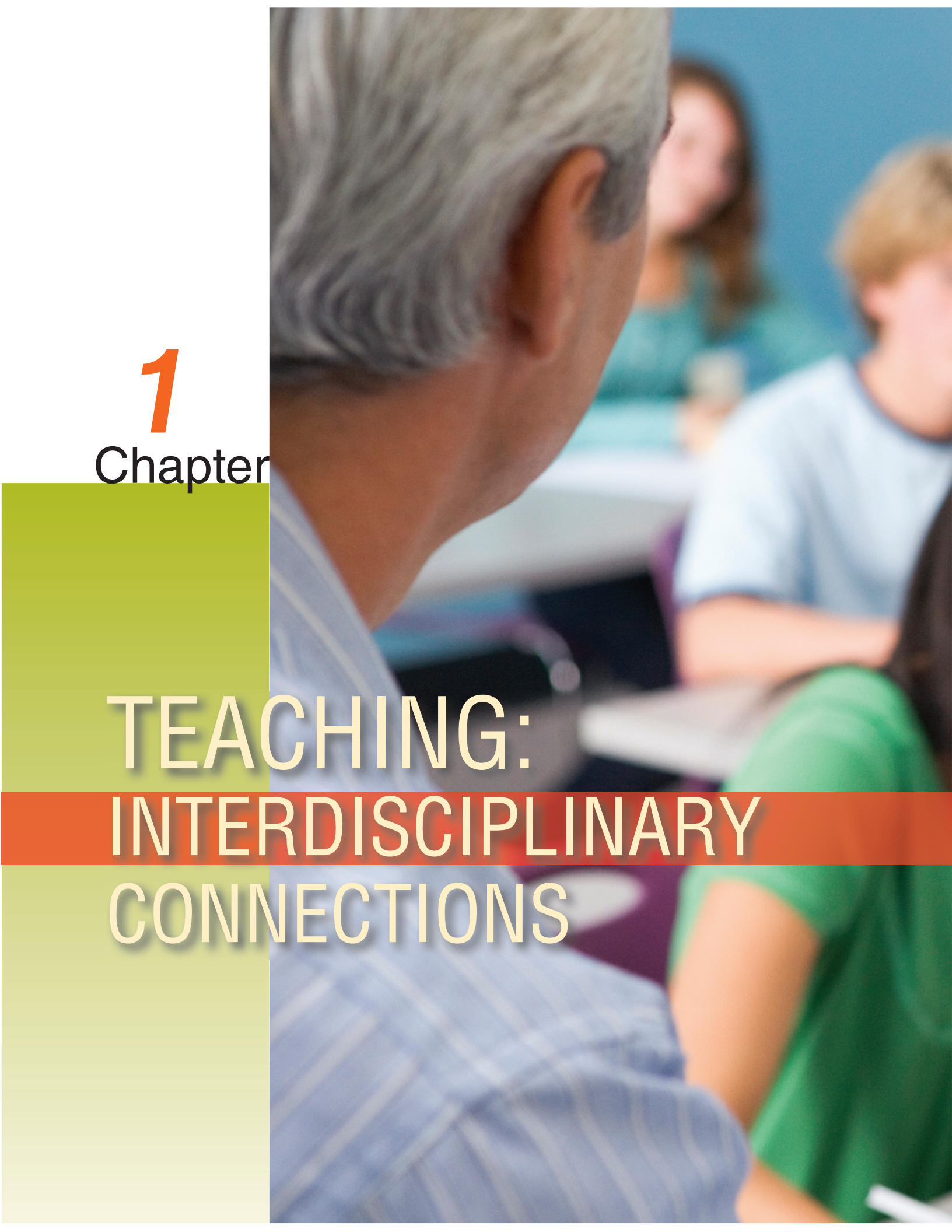


A photograph of a classroom setting. In the foreground, the back of an older man's head and shoulders are visible; he has short, wavy grey hair and is wearing a blue and white striped shirt. He is looking towards the right. In the background, two young students are seated at a desk. One student, a girl with long brown hair, is wearing a teal shirt. The other student, a boy with blonde hair, is wearing a light blue t-shirt. They are both looking towards the right. The background is a solid blue wall. The overall image has a soft, slightly blurred quality.

1

Chapter

TEACHING: INTERDISCIPLINARY CONNECTIONS



What's It All About ...

What is the field of educational psychology?

How do teachers develop expertise?

In what way(s) can collaboration help teachers educate effectively?

Chapter Objectives

- Define the field of educational psychology.
- Explain how educational psychology is important to teachers.
- Describe how educational psychology is building a science-based practice.
- Define action research.
- Understand the role of professional knowledge in instructional excellence.
- Describe the expert teacher prototype.
- Understand the importance of an interdisciplinary collaboration model.
- Learn how to effectively use interdisciplinary and collaborative tools in the classroom.

EXTENDED OUTLINE

Teaching: Interdisciplinary Connections

- I. What's It All About ...
- II. From Today's Headlines
- III. Educational Psychology
 - A. What is educational psychology?
 - B. Why is educational psychology important to teachers?
 - C. Educational psychology: Building a science-based practice
 - 1. Experimental research
 - 2. Single subject experimental research
 - 3. Descriptive research
 - 4. Correlational research
 - D. Discovering action research
 - E. Summarize and reflect
- IV. Becoming an Effective Teacher
 - A. Professional knowledge
 - 1. Subject knowledge
 - 2. General teaching strategies
 - 3. Decision making and knowledge application
 - B. The expert teacher prototype
 - C. Summarize and reflect
- V. Interdisciplinary and Collaborative Education
 - A. Teaching today: The importance of an interdisciplinary foundation
 - 1. The changing American classroom
 - 2. Individualizing education
 - B. Using interdisciplinary and collaborative tools in the classroom
 - 1. What is educational collaboration?
 - 2. Individual assistance models
 - C. Summarize and reflect
- VI. The Chapter in Review
- VIII. Interdisciplinary Case Focus

From Today's Headlines

Vol. I No. I

Teaching World, 2012

WHAT IS TEACHER EXCELLENCE?

You are a new science teacher and this is your first day of instruction. Everyone has arrived, and you are ready to begin your first lesson. You decide to start with a basic question to get the students thinking—What makes objects fall to the earth? Everyone looks at you with an expression of quiet tolerance and responds—GRAVITY! You respond with an expression of awe and wonderment, but suddenly you develop a questioning look and ask—What IS gravity? This time their self-assured looks change as they think about how to describe something so ... obvious.

This situation is even more interesting because it is not really a story about a teacher lecturing to a fifth grade science class—this is author Bill Robertson giving a workshop

understanding of scientific concepts. In other words, he helps them enhance their subject-matter competence.

It seems almost everyone is becoming more concerned about teacher quality. From federal and state governments, to administrators and parents, everyone wants exceptional teachers.

In an effort to raise teacher quality, the most recent legislation for public schools mandates increased standards for teachers. The No Child Left Behind (NCLB) Act requires that new teachers have a bachelor's degree and full state certification.

Additionally, teachers of core academic subjects must meet state requirements for competency in those subject areas.

MAKE THE CONNECTION

Bill Robertson's quest for excellence in teaching science parallels our nation's concerns regarding high quality teachers. Everyone wants teachers that inspire us to learn. We also want knowledgeable teachers who are responsive to our individual learning needs.

In this chapter, we explore these important issues. We will look at teacher expertise, examining research on the nature of teaching excellence. We will also look at the impact of changing societal factors and federal laws on the role of the teacher. Today's classroom is different from the classroom in which we grew up, often resulting in more demanding teaching expectations. Finally, we will discuss interdisciplinary collaboration and how it can help our teachers achieve instructional excellence.



to teachers. Bill has published several books including *Stop Faking It! Finally Understanding Science so You Can Teach It* (2004). He frequently gives seminars to help teachers develop a deeper and more comprehensive

EDUCATIONAL PSYCHOLOGY

Teaching is an exciting and rewarding profession. In almost no other field do you have the opportunity to make such a dramatic impact on others. Think for a minute about all the teachers you have had. Do you have a favorite teacher? What qualities did this teacher possess? How can you develop these skills? The ultimate goal of this book is to assist you on your road to becoming a great teacher by exposing you to the science of teaching and learning. Additionally, it will focus on how today's teachers work collaboratively to produce the best educational experience. Let's begin by taking a look at educational psychology and why it is important to teachers and other professionals associated with education.

What Is Educational Psychology?

Educational psychology is a unique discipline with roots in traditional psychology and education. It is not, however, two separate disciplines working in parallel. Today, educational psychology is a unified discipline that has developed a unique area of inquiry distinct from either psychology or education. **Educational psychology** is defined as a discipline concerned with the development, evaluation, and application of our understanding of human learning and behavior in an educational setting (Wittrock & Farley, 1989). It emphasizes how an understanding of these areas translates into effective learning and instruction. This is an important definition because it emphasizes a concern with best practices in teaching and a focus on student learning. This may be easiest to understand by visualizing a traditional classroom, with students on one side of the teacher's desk and the teacher on the other. Although we will discuss the merits of using this type of classroom arrangement in a later chapter, it is a good analogy to help remember two key factors impacting a successful learning environment. First, from the teacher's side of the desk, we can think about all the techniques and tools teachers use to promote learning. Teachers need to be concerned with their lesson plans and how they are going to

convey concepts. They need to consider what instructional levels are appropriate for the students in the class. They also need to make decisions about what supports (e.g., technology, activities, materials, etc.) could be used to further the educational objectives for the day. All of these things are important and will have a dramatic impact on the way learning occurs.

Second, it is also just as important to consider the students' side of the desk. From their perspective, what factors impact learning? Things like motivation, organization, intellectual ability, and individual background influence educational progress. Teachers who are knowledgeable about how both "sides of the desk" factor into the educational equation will create successful educational environments.

Educational psychology encompasses both of these perspectives. It centers on how we teach *and* how we learn. This focus is realized through two mutually dependent channels: research and practice. That is, success in the classroom depends on scientific

research into educational best practices and how this research translates into everyday teaching. Ideally, researchers conduct scientific investigations into teaching practices and learning issues resulting in a sound knowledge base. Teachers then use this knowledge to practice meaningful and effective education. In reality, the process is far more complex. Education is happening today in classrooms all over the world. Are teachers in these classrooms creating the best learning environment possible? The answer is really yes and no. Today is a particular place in history, and teachers are using available tools to do the best possible job. However, that does not mean future research will not give us insights into new and innovative educational techniques.

The interplay between research and actual practice is an important part of how we educate, and the field of educational psychology provides critical information on how to create productive exchanges. Students first encountering educational psychology often get a better sense of what it encompasses by looking at some common questions educational psychologists strive to answer (see Table 1.1). As you can see, educational psychologists are interested in a wide variety of questions related to the areas of teaching and learning. Answers to these questions are continuously

Educational psychology

Discipline concerned with the development, evaluation, and application of our understanding of human learning and behavior in an educational setting



From the teacher's side of the desk, we can think about all the techniques and tools teachers use to promote learning.

changing as we learn about how to create stimulating and productive learning environments.

Why Is Educational Psychology Important to Teachers?

One way to think about why educational psychology is important to teachers is to consider the products from both the research and practice sides of the field. As research informs and the practice of teaching and practice raises new questions to research, the educational psychologists generate a body of knowledge or tools to help teachers produce better learning outcomes. Many factors impact effective teaching—such as knowing basic learning principles and developmental processes, understanding the characteristics of individual learners, and having knowledge of a variety of teaching methods. In this book, we will cover research and theory regarding each of these factors, providing you with the foundation necessary to develop into an effective teacher.

Table 1.1 What Is Educational Psychology?

Common Questions Educational Psychologists Investigate

- What motivates students?
- Why are some people better students than others?
- How should reading, writing, or arithmetic be taught?
- Is it better to study alone or in a group?
- What makes a good teacher?
- How can technology be used to support learning?
- Are tests really fair?
- What are good ways to study?

SOURCE: Modified from Educational Psychology Q&A prepared by the Division of Educational Psychology of the American Psychological Association, 1993.

Educational Psychology: Building a Science-Based Practice

As mentioned in the preceding section, the interaction between educational research and actual educational practice is critical. Important research discoveries are of little use if they do not make their way into classroom practice. Similarly, if classroom practitioners do not communicate effectively with researchers, scientific investigations may move in directions having little relevance to real life educational settings. This issue is becoming increasingly important in today's political and social climate as parents and teachers across the nation demand higher standards and greater accountability in education. The hope is that by using scientific research to develop best teaching practices, we will foster greater academic achievement. The need to move toward a science-based educational practice is supported by evidence indicating little academic progress over the last few decades (Figures 1.1 and 1.2).

Federal and state offices have committed significant resources to raise academic achievement over the years. Despite these efforts, achievement has not dramatically increased over the last thirty-five years (Rampey, Dion, & Donahue, 2009). As these graphs show, reading and math scores have failed to positively respond to our nation's attempts to increase overall achievement. Current research from the Department of Education (2002) indicates that part of the issue may be a lack of studies using appropriate research methodologies. In particular,

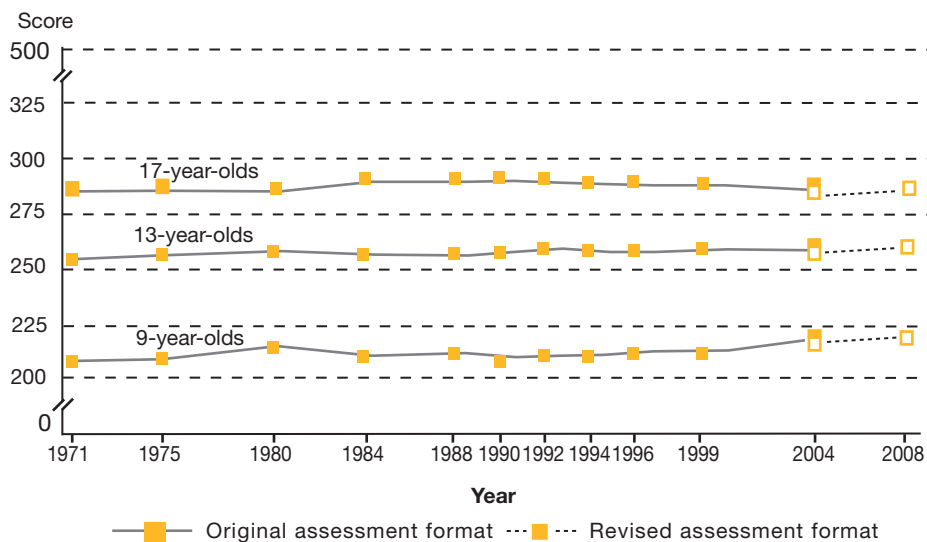
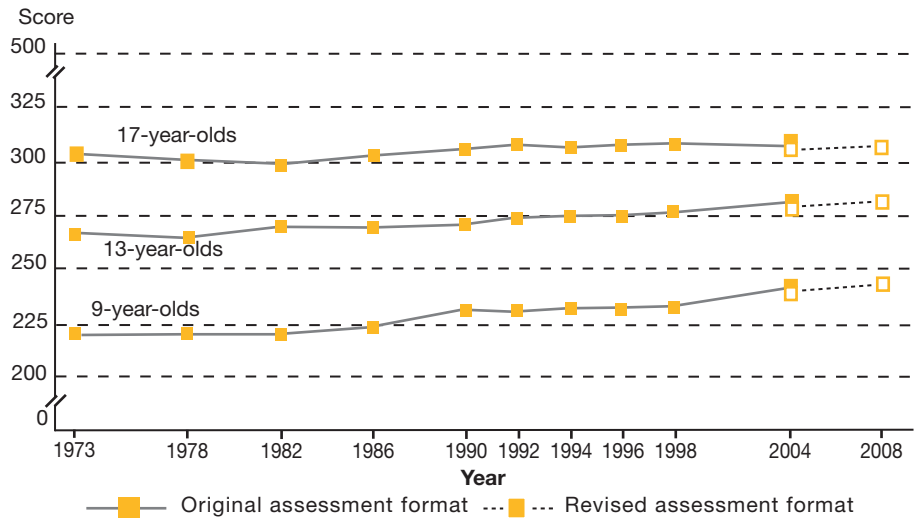


Figure 1.1

Average Reading Scale Scores on the Long-Term Trend National Assessment of Educational Progress (NAEP), by Age: Various Years, 1971 through 2008

Figure 1.2

Average Mathematics Scale Scores on the Long-Term Trend National Assessment of Educational Progress (NAEP), by Age: Various Years, 1973 through 2009



NOTE: Includes public and private schools. NAEP scores range from 0 to 500. Scores for the revised assessment format reflect the inclusion of and accommodations for students with disabilities and English language learners. For more information on NAEP, see supplemental note 4.

SOURCE: Rampey, B. D., Dion, G. S., and Donahue, P. L. (2009). *NAEP 2008 Trends in Academic Progress in Reading and Mathematics* (NCES 2009-479). National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education, Washington, DC.

studies using randomized trial designs are infrequently used in educational research. Randomized trial designs are important because they directly link a particular educational practice with the resulting educational outcome. Not all research designs are used in this way. We will review randomized trial designs, along with other research approaches, in the next section. Steps are currently being taken at the national level to encourage more randomized study designs and, hopefully, more academic progress.

No Child Left Behind

Act signed into law on January 8, 2002, not only reauthorizing public funding for primary and secondary education, but also introducing a number of research-focused educational reforms

Empirical

Based on observation or experience

The most significant driving force for educational change comes from the **No Child Left Behind** (NCLB) Act, which was signed into law on January 8, 2002. This legislation not only reauthorized public funding for primary and secondary education but also introduced a number of research-focused educational reforms. One of the most important of these was the specification that education reforms be evidence-based. This means that educational practices must meet more rigorous validation standards for effectiveness—before they are implemented as reform efforts. Up until now, educational practices have not been held to any methodological standard. In fact, many educational practices have extremely limited **empirical** (based on observation or experience) research support. To address this issue, NCLB encourages rigorous methodological standards for educational research. This not only establishes standards for educational researchers, it also creates a need for all teachers to become knowledgeable about research methods. As the ultimate users of the educational practices established by research,

teachers are in a unique position to comment on the reality of their usefulness and effectiveness.

To help teachers develop the skills necessary to use and understand research, teacher education programs are making stronger efforts to ensure teachers are trained to read and interpret scientific studies. In the following sections, we will examine experimental research methods. As you will see, experimental designs typically make use of randomized trials as emphasized in the NCLB legislation. We will also discuss descriptive, correlational, and single-participant research designs. These designs have traditionally had a strong presence in educational research. We will highlight appropriate uses for each type of research. We will also explore the application of research in the classroom—discussing the importance of critically





evaluating research, being able to conduct one's own research in the classroom, and using science to guide teaching practice. Before we begin our discussion of research, however, consider one real-life example of science-based education. Started in the 1970s, the Sesame Workshop sought to develop ways to integrate the vast amount of information coming from researchers with actual teaching practices. They brought together individuals from many disciplines including research, teaching, psychology, medicine, artists, musicians, actors, and others. What they came up with is the remarkably successful public television program *Sesame Street*. This program continues to achieve what we all hope for in our everyday teaching. That is, creation of engaging and meaningful learning experiences firmly grounded in scientific practice. Their approach has broadened over the last thirty years with programming targeted to science, literacy, math, and basic preschool preparation. They continue to create these programs with the close collaboration of scientists and educators. In addition, they actively monitor their effectiveness and remain strong advocates for accountability.

Their success story is an example of how educational professionals can partner with researchers to produce positive and effective learning environments.

Experimental Research

Experimental research describes a set of procedures used in science to infer that one event leads to or causes another. This means an experimental research study can support the assertion that a particular intervention is the cause of a particular outcome. For this reason, experimental procedures are extremely valuable when evaluating educational practices. The following section reviews basic experimental methodology and identifies key methodological features emphasized by the U.S. Department of Education as important in the scientific evaluation of educational practices.

The basic approach in experimental research simply involves changing some aspect of the environment and recording the resulting changes. Using this method, a researcher establishes whether there is a causal relation between the change made by the researcher and the subsequent outcome. **Manipulation** refers to changes the researcher makes to the environment. At the most basic level, an experiment consists of manipulating a variable in one group of people compared to another group not receiving the manipulation. For example, your educational psychology professor might want to investigate the effects of using a study guide on test performance. To investigate this effect, the professor obtains a small grant to buy several study guides. She intends to give the study guides to some students and compare their test performance to students who do not receive the study guide. The study guide is referred to as the treatment or **independent variable**, and this is the variable being manipulated by the experimenter. The **experimental group** of students will receive the study guide, and the students who do not will serve as a comparison, or **control group**. The researcher is interested in whether student test performance depends on their access to the study guide. This is why student test performance is considered a *dependent* variable in this study. The value or score of the **dependent variable** depends on the treatment manipulation (e.g., study guide). It is what is measured in the study.

Although the purpose of the experiment may seem simple, the application of the treatment must be carefully arranged. One important aspect of applying the treatment is **random assignment**. Random assignment is the process of assigning study participants to groups (e.g., study guide group vs. no study guide group) in a random fashion. A simple way to conceptualize this process is to put twenty names in a hat and then blindly pull out names, alternating the placement of the individuals into the two groups. Researchers actually use more sophisticated methods for random assignment, but the same basic idea applies. The importance of conducting a study trial using random assignment of participants cannot be overemphasized. Consider the study guide example. What if the researcher assigned students to the study guide group by selecting students on the left side of the room? It is entirely possible these students are sitting together because they have certain traits in common. Perhaps they are all members of the honor society in education and sit together because of that common experience. This would effectively load the treatment group (e.g., study guide) with the most academically talented students. Differences between experimental and control groups at the end of the study would be difficult to interpret because higher grades in the study guide group could be attributed to *either* the study guide

Experimental research

Set of procedures used in science to infer that one event leads to or causes another

Manipulation

Change the researcher makes to the environment

Independent variable

Variable being manipulated by the experimenter

Experimental group

Group that receives the experimental manipulation

Control group

Group that serves as a comparison group

Dependent variable

What is measured in the study, depending on the treatment manipulation

Random assignment

Process of assigning study participants to groups in a random fashion



- ▶ Random assignment is the process of assigning study participants to groups in a random fashion.

Comparable groups

Groups that are typically formed using random assignment to conditions

Randomized trials

Experimental studies that employ random assignment to groups

Generalization

Referring to the appropriateness of applying research results to settings that differ from the research setting

Single-participant research

Research that uses an experimental design to investigate the effect of a treatment on a single person

or the greater academic skill inherent in the group. Random assignment increases the probability of starting the experiment with **comparable groups**. That is, the group receiving the treatment (study guide) and the comparison group (no study guide) are likely to be equal on any given characteristic. Using random assignment, rather than seating arrangements, to establish groups would make it highly unlikely that all the academically talented students were placed in one group.

Randomized trials (research designs using random assignment) are one of the primary research components emphasized by the U.S. Department of Education Rigorous Evidence Checklist. (see Table 1.2). Randomized trials provide a *quality* baseline for experimental research because causal inferences can only be made using a properly designed experimental study.

The U.S. Department of Education also emphasizes that educational practices should demonstrate effectiveness

in more than one study. This means a single study is typically not sufficient to support the use of a given intervention. U.S. Department of Education guidelines indicate that research on educational practices should be conducted in more than one implementation site, implemented in typical school or community *environments*, and implemented in settings similar to the setting in which it is to be used (U.S. Department of Education, 2003). The purpose of these guidelines is to ensure a *quantity* of evidence is present before a particular practice is considered appropriate for general use. This focus on the quantity of evidence necessary to establish effectiveness also addresses the problem of whether the results of a study can be generalized. **Generalization** refers to the appropriateness of applying research results to settings that differ from the research setting. For example, can research conducted in urban public schools in Pennsylvania be applied to students in rural California? A similar issue also plagues laboratory based research since the artificial environment of the experimental lab does not always capture the complexity of a natural school environment. Only when an educational practice is validated in many experimental studies, across many settings, can results be generalized to a larger school population.

To help educators identify research studies meeting rigorous evidence standards, the Department of Education supported the development of the *What Works Clearinghouse* (WWC). This organization assesses the strength of research support for educational interventions. Using research experts from many disciplines—including educators, psychologists, economists, sociologists, and experts in communication—they produce easily accessible information on educational research. The clearinghouse provides a variety of reports including study, intervention, and topic reports. *Study reports* contain information on a specific scientific study. The report gives information on experimental factors such as type of participants, experimental setting, intervention description, type of comparison group, primary outcomes and measurements, and teacher training. *Intervention reports* provide an assessment of the research support for a given educational intervention. For example, an intervention report would detail the research support for the Cognitive Tutor® program to help students learn algebra. *Topic reports* provide information on the availability of strong research support for interventions in a particular topic area (e.g., dropout prevention or middle school math).

Single Subject Experimental Research

The large group randomized trial designs discussed in the preceding section are only one type of research using an experimental approach. **Single-participant research** uses an experimental design to investigate the effect of a treatment on a single person. Often, it is difficult to implement a given treatment to a large group of participants, so researchers elect to use single-participant methodology. The main difference between the experimental approach and a single-participant research study is the focus on an individual rather than the average performance of a group of people. For example, imagine you are a researcher who is interested in how a particular type of reading approach works with children who have different learning needs. Your goal is not only to determine whether the reading approach will produce positive results but also to assess the interaction between the approach and the individual. In this case, you

TABLE 1.2 U.S. Department of Education Rigorous Evidence Checklist

Step	Criteria
Step 1—Is the intervention supported by “strong” evidence of effectiveness?	A. The quality of evidence needed by “strong” evidence, randomized controlled trials that are well-designed and implemented: • The study should clearly describe the intervention. • Be alert to any indication that the random assignment process may have been compromised. • The study should provide data showing that there are no systematic differences between the intervention and control groups prior to the intervention. • The study should use outcome measures that are “valid.” • The percent of study participants that the study has lost track of when collecting outcome data should be small, and should not differ between the intervention and control groups. • The study should collect and report outcome data even for those members of the intervention group who do not participate in or complete the intervention. • The study should preferably obtain data on long-term outcomes of the intervention. • If the study makes a claim that the intervention is effective, it should report (i) the size of the effect and (ii) statistical tests showing the effect is unlikely to be the result of chance. • A study’s claim that the intervention’s effect on a subgroup (e.g., Hispanic students) is different than its effect on the overall population in the study should be treated with caution. • The study should report the intervention’s effects on all the outcomes that the study measures, not just those for which there is a positive effect. B. Quantity of evidence needed to establish “strong” evidence of effectiveness: • The intervention should be demonstrated effective through well-designed randomized controlled trials in more than one site of implementation. • These sites should be typical school or community settings. • The trials should demonstrate the intervention’s effectiveness in school settings similar to yours.
Step 2—If the intervention is not supported by “strong” evidence, is it nevertheless supported by “possible” evidence of effectiveness?	A. Circumstances in which a comparison-group study can constitute “possible” evidence: • The study’s intervention and comparison groups should be very closely matched. • The comparison group should not be comprised of individuals who had the option to participate in the intervention but declined. • The study should preferably choose the intervention/comparison groups and outcome measure “prospectively.” • The study should meet the checklist items listed above for a well-designed, randomized controlled trial. B. Studies that do <i>not</i> meet the threshold for “possible” evidence of effectiveness include: • Pre-post studies • Comparison-group studies in which the intervention and comparison groups are not well-matched • “Meta-analyses” that combine the results of individual studies which do not themselves meet the threshold for “possible” evidence

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance: December 2003.



▶ A single participant research study focuses on an individual rather than the average performance of a group of people.

Baseline

Participant responses that are recorded during the absence of a treatment

A-B-A-B single-participant design

Using an alternating presentation of the intervention with the recording of a baseline

might want to use a single-participant design. Focusing on one person’s response to the treatment clarifies how the treatment affects a particular person. A single person’s response might be overlooked when focusing on the average response of a large group of research participants. This does not mean that single-participant research is always better (or worse) than studies employing large numbers of participants; it really depends on the nature of the variables and the question the research is striving to answer.

A single-participant research design can take many forms, but there is a basic idea inherent in the approach. The goal is to alternate recording behavior while a participant is receiving a treatment with a recording of the same behavior at a separate time when the treatment is not present. **Baseline** refers to the time when participant responses are recorded in the absence of a treatment. One typical approach is shown in Figure 1.3.

As Figure 1.3 indicates, the **A-B-A-B single-participant design** begins with recording a baseline. This baseline is a record of the behavior of interest in the natural ongoing environment. After recording the baseline, the researcher introduces the treatment and again records the behavior of interest. The goal is to see if the treatment changes the behavior of interest. Does the behavior increase, decrease, or remain the same after the introduction of the treatment? After recording behavior during the treatment phase, the process repeats. The researcher removes the treatment and records a second baseline, followed by the reintroduction of the treatment.

A study conducted in 2003 by Scott Methe and John Hintze is a good example of an A-B-A-B design. They were interested in examining the effect of teacher modeling of sustained silent reading (SSR). SSR is a reading technique designed to enhance a student’s independent reading. Students participating in SSR are required to stop everything at predetermine points during the day, choose a book, and begin reading silently. This study was conducted to determine if the teacher’s modeling of this behavior would increase the amount of student on-task behavior. To investigate the potential for teacher modeling to facilitate SSR, they used an A-B-A-B single-participant design. Each study participant was first observed and the amount of on-task reading behavior recorded. Then the treatment was introduced (teacher modeling of the desired behavior). Student behavior was also recorded during the treatment. This was followed by a withdrawal of the treatment and a second baseline recording. The final step was the reintroduction of the teacher modeling. The results of the study are presented in Figure 1.4.

Looking at Figure 1.4 it is clear that the percentage of on-task behavior increased during the treatment phases of the study. This provides evidence that the treatment, the teacher modeling, was the critical variable responsible for increases in on-task reading behavior.

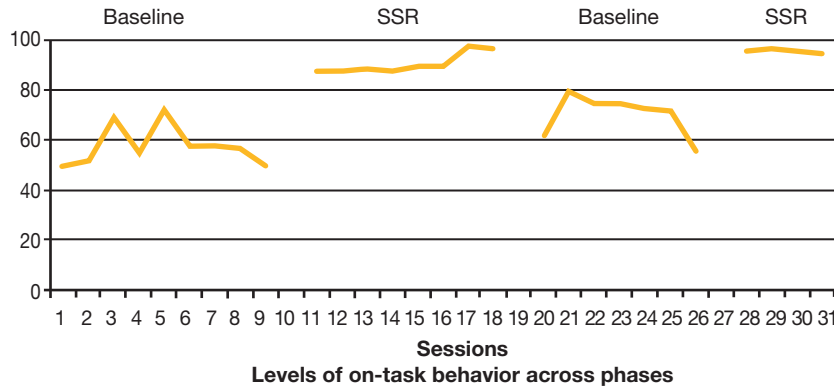
The A-B-A-B design is sometimes abbreviated to a single reversal phase know as an A-B-A design. Similarly, additional reversal phases can be added to further support the effectiveness of a treatment (e.g., A-B-A-B-A-B). The goal is to alternate the introduction of the treatment with baseline recordings to show how changes in behavior relate to the treatment.

Figure 1.3
A-B-A-B Single-Participant Experimental Design

A	B	A	B
Baseline Measure	Treatment Condition	Baseline Measure	Treatment Condition

Descriptive Research

Experimental research regarding effective educational practice is clearly needed, yet it is often difficult to apply in educational settings. For example, classrooms are not created using random assignment, and treatments are often difficult to implement for only some of the students within a classroom. Additionally, single-participant reversal designs are not always possible. Once a task is learned, it may be impossible to return to a pre-learning state in order to record a second baseline. These limitations often lead educational researchers to turn to descrip-

**Figure 1.4**

Results of A-B-A-B Single-Participant Design Study

SOURCE: Methe, S. A. and Hintze, J. M. (2003). Evaluating teacher modeling as a strategy to increase student reading behavior. *School Psychology Review*, 32(4), 617–623.

tive methods. **Descriptive research methods** accurately describe a behavior or environmental condition of interest. An important distinction between experimental and descriptive research is that descriptive research does not support the formation of causal inferences. It does, however, provide detailed information about students, teaching, and learning within a given context. To demonstrate a descriptive approach, let's go back to the study guide example presented above. Instead of attempting to control the assignment of study guides, a researcher or teacher using a descriptive research method would simply examine the natural use of the study guides among students. For example, the researcher might ask her educational psychology students to keep a "study diary" for the semester. She provides students guidelines for documenting their study efforts and makes the study guide available to all students if they wish to use it. She clarifies that the goal in collecting this information is to only document how students study, not to dictate a particular approach. This way she is more likely to capture naturally occurring behavior. After test one, she examines the diaries, recording the amount of time students used their study guides and comparing it to their scores on the test. She finds that students who use the study guide generally do better on the test. This conclusion does not necessarily mean that study guide use is causing better grades, just that the two appear related. Again, to determine if a causal relation exists, an experimental methodology must be used. Since our researcher did not randomly assign students to groups, the students' grades may be higher due to another naturally occurring phenomenon, which she did not measure. What if, for example, the more conscientious students used their study guides more frequently? These students also came to class more consistently, took better notes, and studied for more hours than the less conscientious students. These students might have done better on the test regardless of whether or not they used the study guide. While we can't make causal inferences with descriptive research, it does allow us to see trends and natural associations between variables. Descriptive studies help define the inter-workings of the behavior of interest and often serve as a source of information for later experimental research.

One additional note to make regarding descriptive research: often the purpose of a descriptive study is to focus on describing the behavior of a single individual. This type of descriptive study is called a case study. A **case study** is the intensive description of a single individual. Case studies are important sources of information and often raise questions that are further investigated using experimental methodologies. For example, a case study of a successful teacher with major depression might uncover an extremely difficult childhood. The teacher was able to move past his difficult childhood to reach professional success but still struggles with interpersonal problems, which lead to his ongoing difficulties with depression. A closer examination of his childhood reveals that despite difficulties at home, he was fortunate to have ongoing support from an aunt who lived nearby. The teacher attributed much of his professional success to his aunt's support. This hypothetical case

Descriptive research method

Research method that accurately describes a behavior or environmental condition of interest

Case study

The intensive description of a single individual or unified cohort



► Conscientious students use their study guides more frequently. These students also attend classes more consistently, take better notes, and study more than the less conscientious students.

study raises some interesting questions. Does consistent support during childhood help children with exceptionally difficult upbringings achieve greater professional success? The answer to this question cannot be found with the data from the case study, but raising the question gives researchers important ideas for experimental studies. Like descriptive studies in general, case studies often serve this purpose—providing needed background information and raising important research questions.

One often cited descriptive case study involved a girl named *Genie*. (This was not her real name, but the name used in research reports.) Genie was a young girl discovered at the age of thirteen. She was the victim of long standing abuse from her parents. Her father suffered from mental and emotional problems, and her mother (twenty years younger than her father) was partially blind from cataracts and a detached retina. Believing Genie was retarded, her father decided to keep her confined in a small room with very little human contact. She was physically abused whenever she would speak and typically was restrained to prevent even the most basic movements. Her mother was also the victim of her husband's abuse and did little to oppose him.

The story of Genie made national headlines when she was discovered in 1970. After receiving treatment for malnutrition, Genie became the subject of intense scientific scrutiny. History has documented few children who were raised with little human intervention. Scientists call these children *feral children*. After stabilizing Genie's health, scientists began an in-depth case study of her life and abilities. One question scientists raised was whether Genie could learn language (Curtiss, 1977). At the time of her discovery, she did little more than make unintelligible sounds. Scientists have theorized that language must be acquired during a specific time of our lives—a *critical period*—if language is to develop normally. Immediately, scientists and therapists began to work with Genie to see if she could learn the fundamentals of language after the age of thirteen. Ultimately, Genie was unable master a full understanding of linguistic structure. Scientists speculated on whether there was indeed a critical period for language development or whether Genie was intellectually limited or permanently damaged from her abuse. Scientists never agreed on the nature of her language difficulties. Establishing the *cause* of her difficulties proved elusive. In fact, the scientific community began to raise serious questions about the scientific conduct of the Genie research. The incredible story of this exceptional girl, however, and the questions she raises about the fundamental acquisition of language continue to educate and inspire scientists and students alike. This captivating look at a whole person is one of the advantages of the case study approach. Genie currently lives in an adult foster home in southern California.

Correlational Research

Correlational studies

Studies that not only describe events but also establish how events relate to each other.

Correlation

Statistical technique used to establish the nature of the relation between variables

Correlational coefficient

The numerical product resulting from the correlation formula

Strength

The tendency for values of one variable to co-occur with values of another variable

The goal of a **correlational study** is not only to describe events but also to establish how events relate to each other. For example, a purely descriptive study might document how many times a teacher smiles and how many questions the students ask. The answers to these questions help describe classroom dynamics. A correlational study goes beyond description, however, actually specifying how events relate. In the above example, it may be that more frequent smiling by the teacher is associated with more questions from the student. Alternatively, the two may have no relation to each other. The teacher smiling is not related to any particular amount of questioning from the students. Correlational studies use a statistical technique called correlation to help make sense of the data collected. In the study guide example from the previous section, the researcher probably used a **correlation** to help understand the relation between study guide use and test performance. The **correlation coefficient** is a single number derived from a statistical formula that quantifies the nature of the relation between two variables. The number can range between a negative one and a positive one, including the endpoints. Let's say that the correlation coefficient in our study guide example (between test grades and amount of study guide use) was a positive .89. This single value tells us two important things about the relation between our variables. First, it tells us about the strength of the relation. **Strength** is the tendency for values of one variable to co-occur with values of another variable. The closer to 1 the correlation coefficient is, the greater the strength between the study variables. Our correlation of .89 in the study guide example indicates that the relation between study guide use and test grades is strong. Higher scores on the test corresponded with increased study guide use for many, but not all, of the students. If higher scores corresponded with study guide use for *all* students, we would have a perfect relation. Perfect relations are represented with a value of one. Thus, strength is represented numerically by how far the correlation value is from zero. A weak

relation between variables will yield a correlation close to zero, moderate relations about .5, and strong correlations closer to 1.0. For the purposes of determining strength, the sign (positive or negative) of the number is irrelevant. For example, a correlation of a negative .98 is actually stronger than a positive correlation of .90.

Whether the correlation coefficient is positive or negative is, however, an important piece of information. **Direction** provides an indication of how two variables change in relation to each other. For example, do high scores on one variable tend to associate with low scores on the other variable? The sign of the number, positive or negative, represents the direction of the correlation value. A positive sign indicates the variables tend to rise or fall together (as the value of one goes up so does the other *or* if the value of one goes down, so does the other). A negative sign indicates the variables tend to change opposite each other (as one variable goes up in value, the other goes down). The fact that the correlation coefficient .89 in our study guide example is positive indicates that frequent use of the study guide corresponded with high grades on the test. If the number were negative, high study guide use would have corresponded with lower test grades. Figure 1.5 provides a graphical depiction of both strength and direction of a correlation.

Correlations help us describe relations between variables in a correlational study. It is tempting, however, to infer, incorrectly, causation from a correlational study. What if the researcher in the study guide example told her class that she conducted a research study that showed frequent use of the study guide was associated with higher grades? While this statement was true in the example and clearly designed to encourage more study guide use, should you rush out and buy the study guide? A critical evaluation of the research allows us to consider the possibility that the study guide might or might not increase performance. In fact, other variables, such as total study time or student conscientiousness, might have caused the increased test scores.

Even though cause and effect cannot be determined using descriptive methods, their contribution to science is no less than other methodologies. Descriptive methods are, in fact, critical for highlighting important relations. If we fail to describe our variables of interest in a rich and comprehensive way, we may miss important factors influencing student learning. In the final analysis, it is clear that both descriptive and experimental methodologies positively affect the practice of science within the field of education.

Discovering Action Research

While there is clearly a trend toward focusing on the science-based practice of education, our schools are not simply on hold, waiting for a scientifically validated and comprehensive body of knowledge regarding effective teaching practices to evolve. Teachers are in the classroom every day, using our current tools and knowledge to guide their practice. A wealth of research data exists regarding effective teaching, and the literature can be quite overwhelming. Different studies sometimes show different results, even though they cover the same topic. How, then, can teachers determine the validity of a given research study or make informed judgments

Direction

Provides an indication of how *two* variables change in relation to each other

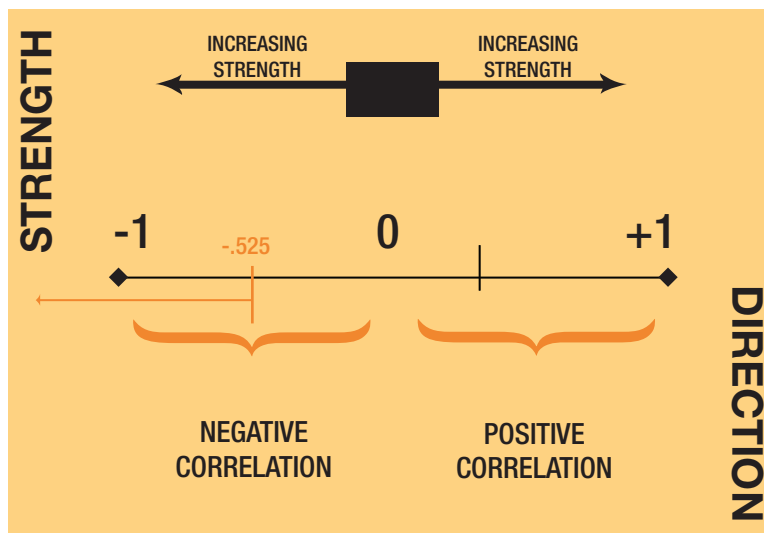


Figure 1.5

Graphical Depiction of Both Strength and Direction of a Correlation

FOR EXAMPLE: A negative correlation ($-.525$) was found between college students who missed four or more educational methods classes and their semester grade.

Strength—The size of the correlation indicates moderate strength.

Direction—The sign of the correlation (negative) indicates that the more classes a student missed the lower their overall grade in the course (high values corresponding to low values).



► In general, the process of critically evaluating one's own teaching is known as reflective teaching.

Action research

Research that involves a teacher applying both descriptive and experimental research methods to assess the effectiveness of certain educational approaches or to solve everyday problems

Reflective teaching

The process in which a teacher critically evaluates his/her own teaching

about what information to apply in their classrooms? A first step is to evaluate the study according to the Rigorous Evidence Checklist developed by the U.S. Office of Education and presented earlier in Table 1.2. While these standards are a good place to start, and they are indeed rigorous, relatively few studies will make the grade. For this reason, teachers must be able to think critically about research and how to use scientific information to inform their teaching.

Teachers who have a solid understanding of research methods are not only able to critically evaluate research—they are also able to use action research in their classrooms. **Action research** involves a teacher applying both descriptive and experimental research methods to assess the effectiveness of certain educational approaches or to solve certain problems (Arhar, Holly, & Kasten, 2001; Hansen & Brady, 2011). As action researchers, teachers conduct investigations in their own classrooms, systematically observing outcomes, collecting and analyzing data, and drawing conclusions. By using action research, teachers can better evaluate the effectiveness of their own teaching while still benefiting from information derived from the scientific community. Additionally, action research deepens a sense of professional community among faculty, increases teacher perceptions regarding accountability, and nurtures a sustainable desire for professional growth (Gilles, Wilson, & Elias, 2010).

In general, the process of critically evaluating your own teaching is known as **reflective teaching** (Schon, 1983; Cruickshank, 1987; Minott, 2011). Many teachers spend a great deal of time not only planning and carrying out instructional activities but also evaluating their success. In other words, they are constantly analyzing their own teaching and using their reflections to improve learning. Some researchers suggest that excellence in teaching is based in this insightful, reflective quality (Schon, 1983; Wolfensberger, Piniel, Canella, & Kyburz-Graber, 2010) and that teachers can benefit from purposeful instruction in reflective techniques (Kennedy, Long, & Camins, 2009). Additionally, others believe teachers need to be able to think artistically and creatively when evaluating research results (Gage & Berliner, 1989). In fact, some researchers argue that teaching is more of an art form than it is a science (Dawe, 1984; Flinders, 1989). As the field of education moves toward establishing more science-based standards, it is important to remember that these scientifically derived standards are important guidelines; however, they do not negate the importance of reflective judgment, creativity, and skilled decision making on the part of our nation's teachers.

In The Classroom

APPLYING THEORY

Action Research

THEORY BASICS

Using *action research* is often difficult for teachers. Developing lesson plans, grading assignments, and solving everyday problems takes time and effort, leaving teachers with little time to reflect on their instructional practices. The benefits, however, are usually worth the effort. Action research is the term used to describe the application of research principles by teachers in their everyday instructional practice. Some of the basic steps involved in action research are listed below.

Basic Steps to Successful Action Research

- Analyze what aspect of your teaching needs improvement.
- Use the observations of others (e.g., colleagues, student interns) as a source of ideas.
- Decide whether you will be working collaboratively or on your own.
- Determine how you want to assess your progress.

(continues)

- Think about how you will interpret your results.
- Reflect upon your success and make plans for future action research projects.

CLASSROOM EXAMPLE

Ms. Carolyn Neilson is a fifth grade teacher. Every year she sponsors a student intern and enjoys working collaboratively to develop educational goals. One day during a planning meeting, the intern mentioned he was concerned about transitions between classes. He felt students were disruptive and often agitated at the beginning of the next lesson. Ms. Neilson decided to conduct an action research project to test alternative transitioning approaches. Initially, with the help of her intern, she recorded student behavior in a daily log prior to making any changes. After two weeks of observation, she introduced a new transition protocol to the students. She informed the students they would be using transition leaders to help students move from one lesson to the next. Every day a team of five students would be selected at random to be the transition leaders. They would have a morning meeting with Ms. Neilson, during which she would give instructions on how to handle the day's transitions. When a given lesson ended, the team went to the front of the room and handled the transition. Ms. Neilson and her intern recorded student behavior for a period of two weeks during these transitional times. An additional two-week period followed, where the traditional teacher mediated transition was re-implemented.

After the entire six-week period, Ms. Neilson qualitatively examined the behavior logs. She noted that during the transition leader phase of the research project, the students were noticeably more positive. She also noticed the professional behavior exhibited by the transition leaders. The only negative observation made during this period was that students were typically louder during the student-mediated transitions. Encouraged by the results, Ms. Neilson made plans for another project. She planned to use the transition leader model with modifications to address the loudness of the students. She also decided to use the students of a colleague in the same grade as a control group.



Teachers should realize that success with teaching is usually equal to the time devoted to its improvement. Great teachers are not born, but are created through hard work. Action research is an excellent tool to help your teaching improve.

Action research can be an important tool to help you develop your teaching expertise. Teachers who regularly use action research report they like the approach because it is practical, inexpensive, and often requires little additional time. It empowers teachers to take action and solve problems. Even if you do little more than systematically observe your own teaching, you will find that you move closer to the reflective teaching style characteristic of expert teachers.

SUMMARIZE AND REFLECT

1. Educational psychology brings together the fields of psychology and education to understand thinking and behavior as it applies to instruction and learning.
2. One reason educational psychology is important for teachers is that it provides teachers with research-based tools for improving teaching and learning.
3. Scientific researchers work in tandem with classroom teachers to build an effective and useful body of instructional and learning knowledge.
4. Basic research methodology includes experimental research methodologies and more descriptive procedures.
5. Some research designs focus on a single participant and still maintain the qualities of an experiment. These single-participant designs are typically called ABA designs.
6. Teachers can act as researchers themselves, applying research methodologies to everyday educational problems. This is called action research.

INFORMED APPLICATION

1. Develop a list of what an educational psychologist might be able to tell you regarding a student that is failing to pick up basic reading skills.
2. Imagine you want to try a new mathematics instruction program for a student struggling with long division. What would be an appropriate research methodology to help you determine if the program is successful?
3. Explain how an emphasis on action research can help teachers provide instruction that is more effective.

BECOMING AN EFFECTIVE TEACHER

The second part of this chapter is about becoming an effective teacher. As we just learned in the proceeding section, today's teachers are striving to become more science-based. This is an important step toward more effective education, but we must also pay close attention to a teacher's professional development. Productive learning environments will not work, even if

we have proven instructional strategies, if we do not have high quality teachers to implement those strategies. In an attempt to determine critical teacher qualities, educational psychology researchers investigate commonalities among teaching experts. The next section looks at this research, emphasizing its relevance to a teacher's professional growth.



Psychologists have long studied the differences between experts and novices in a variety of domains such as playing chess or solving physics problems.

Professional Knowledge

Psychologists have long studied the differences between experts and novices in a variety of domains such as playing chess or solving physics problems (Anderson, 1995). We know that expert chess players, for example, seem to choose their moves with little effort, basing their choices on memories of previous games. Novice chess players, on the other hand, must think about each move, requiring more cognitive resources to play the game. In the same way, expert teachers can effortlessly handle daily situations requiring more thought on the part of novice teachers. Research shows that effective teachers are able to more quickly access both subject matter and classroom management information than novice teachers (Berliner, 1986). This allows them to plan instruction more efficiently and implement instructional plans more effectively. It also allows them to improvise in situations requiring a deviation from the planned lesson when necessary and to adapt instruction to meet the needs of individual learners

Research shows that effective teachers are able to more quickly access both subject matter and classroom management information than novice teachers (Berliner, 1986). This allows them to plan instruction more efficiently and implement instructional plans more effectively. It also allows them to improvise in situations requiring a deviation from the planned lesson when necessary and to adapt instruction to meet the needs of individual learners

Subject Knowledge

So, how does one learn to be an expert teacher? This is a difficult question since research indicates effective teachers possess a set of often hard-to-define skills. Likely, you can think of more than one great teacher you have had over the course of your educational career. Were they great in the same way? Some may have been great mentors with a dynamic personality. Others may have demonstrated their expertise through an exceptional ability to present new material and make it engaging. Often, expert teachers vary considerably from subject to subject and use very different methods. Shulman (1987) proposed that expert teachers need a combination of different factors to achieve expertise. One of these factors is subject knowledge. This may seem obvious, but teachers vary considerably in their experience and comfort level with the subject they teach. Perhaps you are a math teacher at a high school, and you primarily teach algebra. Certainly, high school algebra teachers should know the math they are teaching, but experts go beyond a basic understanding of the facts (Rongjin, Yeping, & Xiaoya, 2010). Their knowledge of the subject includes a well-developed understanding of how learning the subject progresses. They also have a good sense of the difficulties students are likely to encounter and how to provide appropriate guidance. This more complete understanding of the subject allows expert teachers to guide learning in a way that is unavailable to the novice teacher.

General Teaching Strategies

Another characteristic expert teachers have in common is an awareness of general teaching strategies (Hardré, Nanny, Refai, Chen, & Slater, 2010). This is sometimes referred to as pedagogical knowledge. This typically includes things like basic classroom organization, behavioral management techniques, motivational approaches, and techniques for evaluation. Expert teachers are proficient with these strategies and have the experience and judgment to use them appropriately. These topics are covered in detail later in the book.

Decision Making and Knowledge Application

Expert teachers have an extensive knowledge of how to apply particular techniques in the teaching of their subject matter (Ghasemi, Momeni, Jafarzadehpur, Rezaee, & Taheri, 2011). This includes knowing specific characteristics of their students that require unique tailoring of instruction, such as their cultural background, family situation, emotional development, or intellectual ability level. This kind of pedagogical content knowledge also allows them to meet the learning needs of a wider range of students. In other words, it is not enough for teachers to simply know their subject, nor can they simply be knowledgeable about different methods of instruction or learning settings; expert teachers must know how to effectively *use* different lessons to teach their subject to a *specific* type of student. The hands-on, small-group-based methods that the science teacher uses in class, for example, may not be appropriate for use by an English teacher. Expert teachers must be able to problem solve learning issues and make appropriate decisions about how to adjust the learning path to bring about the most effective learning environment for each student. As you can see, the professional knowledge necessary for expertise in teaching is quite complicated. For this reason, expert teachers may use very different teaching methods and still show expertise in teaching.

The Expert Teacher Prototype

Sternberg and Horvath (1995) further developed the idea that there are multiple qualities potentially leading to an expertise in teaching. They propose that instead of teaching expertise being reached through a definitive set of criteria, expert teaching is a “fuzzy,” or difficult to define, category. They conceptualize expert teaching using a prototype model, where similarities between expert teachers fall into three general categories: knowledge, efficiency, and insight (Figure 1.6). The prototype model defines expert teaching as a set of broad areas, which may be developed to a different degree in different teachers. This differs from the preceding section suggesting expert teachers have the same knowledge and skills. According to the prototype expert teacher model, one teacher might be considered expert because of her unrivaled content knowledge in her field, while another might be considered expert because of his insightful and creative problem-solving abilities. These teachers both show similarity to the overall expert prototype, yet both reveal very different strengths. Of course, other elements of the prototype must also be met to a sufficient degree for the person with unrivaled knowledge to be considered an expert teacher. Consider, for example, a history professor who has written several successful books on the development of civil rights, yet has no knowledge of pedagogy (teaching techniques). He would not be considered an expert teacher. Throughout this book, we will explore expert teaching from a number of perspectives, focusing on the ways in which these prototypical qualities of expert teachers may manifest in the classroom. The next section will elaborate on this topic by exploring the collaborative role teachers have with other professionals and how this enables teachers to expand their educational tools to help children learn and grow.

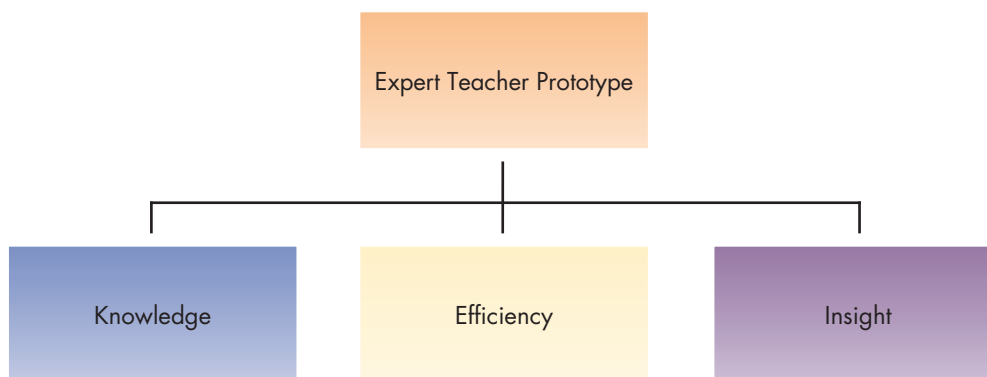


Figure 1.6

Prototype Expert Teacher Model

SUMMARIZE AND REFLECT

1. Expert teachers contribute to our understanding of instructional excellence by providing real-life role models.
2. Expert teachers have many traits in common including a thorough knowledge of the subject matter, general teaching strategies, and excellent decision-making skills.
3. Expert teachers also demonstrate remarkable judgment in applying their knowledge.
4. The expert teaching prototype model moves away from detailing specific expert teacher characteristics, in favor of general categories of knowledge and behavior experts possess. These “fuzzy” or less specific categories include knowledge, efficiency, and insight.

INFORMED APPLICATION

1. Consider all the teachers you have had over your lifetime. Which teachers stand out as the best? What qualities characterize their teaching?
2. Research has shown that expert teachers have certain qualities in common. Imagine yourself as a teacher. What are your teaching strengths? What qualities may require further development?
3. Research has also suggested that expertise in teaching may be less about developing specific qualities and more about the unique combination of skills the teacher possesses. Consider your own teaching skills. How can you develop a combination of skills that is unique and effective?

INTERDISCIPLINARY AND COLLABORATIVE EDUCATION

So far, we have looked at the field of educational psychology and its importance to teachers. We have also reviewed important teacher qualities established through research on expert teachers. This final section integrates this foundation with the educational climate and practice in today’s classrooms.

Teaching Today: The Importance of an Interdisciplinary Foundation

To achieve a truly productive learning environment, educators must bring together an understanding of proven, science-based, educational practices and an appreciation of important teacher qualities. This process, however, takes place in a real-life context; and this context is rapidly changing. Historically, education has taken place in a very circumscribed environment consisting primarily of a single instructor and a relatively fixed number of students. Over time, though, we have seen dramatic changes to this framework. One of these changes includes the way teachers work collaboratively with each other. Students often have multiple instructors, particularly in the higher grades. Today, more than ever, these teachers are truly collaborating to achieve positive educational outcomes. This movement also extends to colleges where students may participate in learning communities where professors collaborate to integrate material from different courses providing students with a richer learning experience.

The most obvious question is why are these changes taking place? The answer is complex, but it is based on two criteria: 1) the need to teach in more efficient and effective ways coupled with 2) changing student demographics. The first point emphasizes our society’s demand for greater accountability for educational outcomes. We want to see evidence that we are making positive and productive changes in the lives of students. In response to these demands, we are making changes in how we think about traditional teaching, embracing a far more collaborative environment. These changes in educational perspective are also co-occurring with significant changes in the broad range of diversity students bring to today’s classroom. This leads to an ever-increasing body of knowledge necessary to provide effective and sensitive instruction. There are limits to what individual teachers can learn, and those limits push teachers to specialize in their training. This, however, has the potential for decentralizing

GET THE FACTS

2020

The year researchers believe that there will no longer be a majority culture in the American student population.

Pallas, Natriello, and McDill (1989)

our educational focus, as teachers possess greater depth of knowledge in certain areas but lack sufficient breadth. This means that our specialized instructors need to learn to work collaboratively to produce the holistic and individualized educational system that society demands. These inter-related factors are indeed complicated, but we will address them in detail throughout the text. Let's begin our look at these issues by examining exactly how the students we teach are changing the fundamental structure of our classrooms. We will then review how instructor collaboration can help address needs resulting from these changes.

The Changing American Classroom

The U.S. population is becoming progressively more diverse in terms of race/ethnicity, socioeconomic background, and disability status; and these demographic changes are mirrored in the nation's schools (Safran & Safran, 1996). For example, the percentage of non-white students increased from approximately 35.8% in 1996 to 43.5% in 2006 (Figure 1.7, NCES, 2008); and researchers estimate that this number will increase to over 50% by the year 2020 (Pallas, Natriello, & McDill, 1989). This increase is even more pronounced in urban districts. In 1994, non-white students comprised about 72% of the total school enrollment in the twenty-five largest school districts in the U.S., and this percentage is expected to continue to grow (National Center for Education Statistics, 1997).

Not only are classrooms becoming more diverse in terms of race, ethnicity, socioeconomic status, and language, but increasing numbers of students with disabilities are also being included in the regular education classroom. Research from the U.S. Department of Education (2006) shows, for example, between 1995 and 2004, the percentage of students with disabilities educated in regular classes for most of the day increased from 45.3% to 52.1% (see Figure 1.8).

These statistics demonstrate how our nation's classrooms are changing. On a positive note, these changes provide a culturally rich educational environment, which enables educators to better prepare students to be a part of the global community. It also means, however, that today's teachers must be prepared to meet a variety of individual learning needs.

Individualizing Education

Today's teachers are being increasingly challenged to meet the needs of students who show a wide range of individual differences in learning, behavior, and cultural experience (Whitten & Dieker, 1995; Gay, 2006). The traditional educational model of one teacher successfully teaching twenty to thirty students is being challenged more frequently as general education teachers are faced with a greater variety of student learning needs (Safran & Safran, 1996). As noted above, a general education classroom may be comprised of students who have very different backgrounds. Additionally, regular education teachers are spending more time with students with disabilities. While students



▶ The U.S. population is becoming progressively more diverse in terms of race/ethnicity, socioeconomic background, and disability status and these demographic changes are mirrored in the nation's schools.

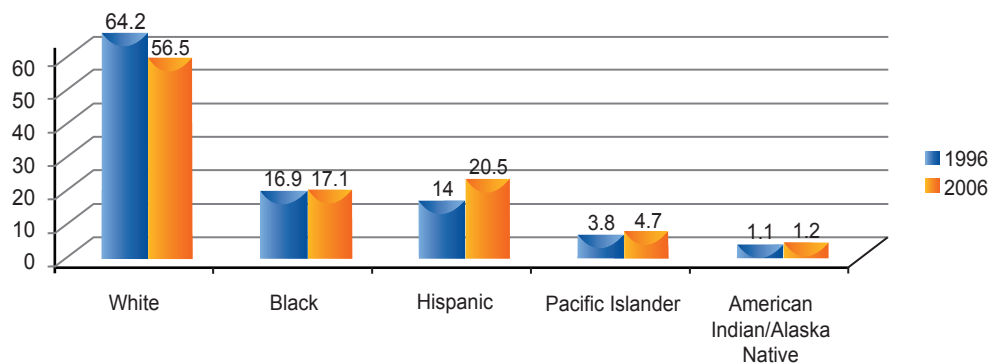


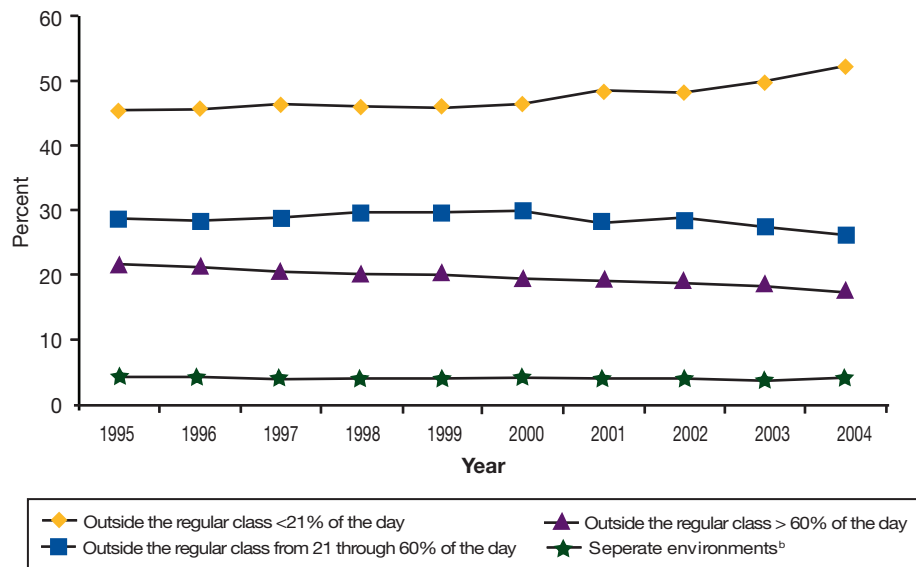
Figure 1.7

The Increase of Diversity in the American Classroom

SOURCE: U.S. Department of Education, National Center for Education Statistics, Current Population Survey, *Digest of Educational Statistics*, 2008.

Figure 1.8

Percentage of Students Ages 6 Through 21 with Disabilities Receiving Special Education and Related Services Under IDEA, Part B, by Educational Environment: Fall 1995 Through 2004



SOURCE: U.S. Department of Education, Office of Special Education Programs, Data Analysis System (DANS), OMB #1820-0517: "Part B, *Individuals with Disabilities Education Act*, Implementation of FAPE Requirements," 1995–2004. Data updated as of July 30, 2005. Also table 2–5 in vol. 2 of this report. These data are for the 50 states, District of Columbia, BIA schools, Puerto Rico, and the four outlying areas.

^a Percentage was calculated by dividing the number of students ages 6 through 21 with disabilities in the educational environment by the number of students ages 6 through 21 with disabilities in all environments. The result was multiplied by 100 to produce a percentage.

^b The category of separate environments includes public and private *residential facilities*, *public and private separate schools* and *homebound/hospital environments*.

with disabilities receive special education support according to federal special education law, the amount of support depends on the learning needs of the individual (IDEIA, 2004). Further, many students who do not meet the criteria for special education may also have significant learning and behavioral needs (Wang, Reynolds, & Walberg, 1994/1995). These students do not qualify for formalized special education support, yet they have specific individual learning needs and are often difficult to teach (Safran & Safran, 1996). These challenges make speaking of the “typical” student increasingly difficult. There are likely to be large individual differences—and wide-ranging learning needs—among students in any given classroom. This led many researchers to focus on how our nation’s teacher training programs are preparing teachers for this new American classroom.

Banks (1991) proposes that teacher education programs embrace a multicultural education focus, so they can “receive the knowledge, skills, and attitudes needed to work effectively with students from diverse racial, ethnic, and social class groups.” Safran and Safran (1996) assert that in order to effectively meet the needs of all students, teachers must receive knowledgeable training which includes “(a) the atypical student, (b) ways to manage and actually teach a classroom with a vast range of individual differences, (c) changing attitudes and skills about professional collaboration, and (d) resources beyond the public schools.” In short, today’s teachers are faced with the challenge of teaching students who may need more than standard programming, and these teachers need an avenue for developing the professional knowledge necessary to effectively teach these students. As a result, interdisciplinary knowledge and collaboration among teachers and supporting personnel has become increasingly important. Tapping the training and experience of multiple educational professionals brings a comprehensive set of skills to the educational environment. In the next section, we will discuss the merits of interdisciplinary collaboration. While no textbook can provide you with all the information you need to teach successfully, the goal of this book is to give you an interdisciplinary foundation for becoming an expert teacher in the twenty-first century.

Using Interdisciplinary and Collaborative Tools in the Classroom

As we have been discussing, the long-held view that one teacher is able to effectively teach every student in his or her classroom does not match the reality of education today. In many ways, developing expertise in teaching in the twenty-first century requires more extensive profes-

sional knowledge than ever before. Recall our discussion of expert teaching. Expert teachers show knowledge of subject matter, knowledge of teaching methods, and knowledge of how to use these methods when teaching a particular subject. They also show knowledge about how to *adapt* their teaching for students with different learning needs. In this era of increasing individual difference in the classroom, this aspect of expertise may be the most difficult to achieve. Professional collaboration can help teachers move beyond their own knowledge to produce creative solutions for meeting individualized learning needs. **Interdisciplinary collaboration** involves the collaboration of educational professionals from a variety of disciplines (e.g., education, psychology, social work, medicine, behavior management, etc.) to produce learning environments sensitive to individual learning needs.

Through collaborative and interdisciplinary interactions, teachers increase the professional knowledge they bring to the education of students. Additionally, through ongoing collaboration, teachers continue to learn and develop professionally. This increase in the scope of professional skill will better enable teachers to serve future students (Brown, Gable, Hendrickson, & Algozzine, 1991; Nelson, Houston, Hoffman, & Bradham, 2011; Bloodworth & Peterson, 2011).

What Is Educational Collaboration?

Research indicates that general education teachers are better able to meet the individual learning needs of students when supported by colleagues with specialized knowledge (Graden, 1989; Pugach & Johnson, 1989; Sulkowski, Wingfield, Jones, & Coulter, 2011). As mentioned in the previous section, student body diversification in terms of race/ethnicity, language, socioeconomic status, and other factors makes it difficult for a single teacher to meet the needs of all students.

In addition to these cultural factors, addressing the unique needs of students with disabilities requires specialized knowledge and training. In fact, some researchers assert that part of the reason for the continuing increases in the number of students referred for special education may be based in the inadequacies of support systems available for teachers (Reschly, 1988; Nelson, Smith, Taylor, Dodd, & Reavis, 1991; Ajayi, 2011). In other words, when general education teachers are faced with these students, they may not have the knowledge necessary to intervene effectively. This may result in some children being referred for special education who could have their learning needs met by the general education teacher—if appropriate supports were available. For this reason, many schools have adopted pre-referral intervention or collaborative assistance models to support general education teachers in meeting the needs of a diverse student body (Whitten & Dieker, 1995; Safran & Safran, 1996).

Pre-referral means that students, who would normally be referred for special education services, receive intervention prior to the referral. The hope is that effective intervention can take place in the regular education classroom through a collaborative relationship between the general education teacher and other professionals. This eases the burden on special education by making better use of existing educational expertise. Federal legislation actually encourages states to use 15% of special education funds for pre-referral approaches (IDEIA, 2004). Pre-referral (or individual assistance models) provides teachers with guidelines and support for using collaborative relationships.

Individual Assistance Models

Fuchs, Fuchs, and Bahr (1990) describe pre-referral intervention as accommodating the learning needs of students with more specialized needs through modified instruction or classroom management. The general education teacher undertakes these interventions, with assistance via consultation or collaboration with other



► Research indicates that general education teachers are better able to meet the individual learning needs of students when supported by colleagues with specialized knowledge.

Interdisciplinary collaboration

The collaboration of educational professionals from a variety of disciplines to produce learning environments sensitive to individual learning needs

F.A.Q.

Bev Reynolds—“The idea of interdisciplinary collaboration is a little confusing. Is this like when we talked about Educational Psychology having roots in the disciplines of Education and Psychology?”

Professor Walberg—“Actually there is an important distinction here. Educational Psychology isn’t really interdisciplinary because it isn’t a field that involves the collaboration of two distinct fields. It is its own field. Here we are talking about interdisciplinary in the sense that schools are increasingly using collaboration between educational professionals from different disciplines to help support student learning.”

professionals who contribute their knowledge and problem solving skills (Fuchs, Fuchs, Bahr, Fernstrom, & Stecker, 1990). While many teachers informally seek support from colleagues (Whitten & Dieker, 1995), some schools have initiated a formal approach for this type of collaboration. These support programs have many different names, such as individual assistance, pre-referral intervention, or mainstream assistance teams (Safran & Safran, 1996). These approaches provide teachers with a formalized avenue for interacting with other education professionals when trying to meet the individualized learning needs of students; they can reduce the stress teachers face when dealing with learning issues (Lhospital & Gregory, 2009). Through these interdisciplinary collaborations, effective interventions take advantage of the multiple perspectives and levels of expertise of the team members (Bay & O'Connor, 1994). There are, however, team needs that must be met for successful collaboration to occur—such as sufficient staff training in team procedures, adequate number of staff members, and sufficient time for collaboration to occur (Yetter & Doll, 2007). For example, consider Mr. Armani who is a fourth grade teacher. He has been working with his students on subtracting multiple digit numbers involving regrouping. The class is doing well, but three students are significantly behind. Two of these students are in special education and have a history of difficulty with mathematics. The third student, Sarah, has typically done well in math and has no difficulty with her other subjects. Mr. Armani is concerned about her progress and would like to implement an intervention before Sarah falls so far behind that she needs a referral for a special education assessment. Mr. Armani begins by speaking with his school's pre-referral intervention team. The team suggests an initial interview with her parents to determine if there are any issues at home contributing to her difficulties. It turns out that her parents are in the process of separating, and Sarah is having difficulty adjusting to that news. Her normally neat room is disorganized, and she fails to clean it properly when asked. She does not return home from the neighbor's house at a pre-agreed upon time. She also appears distracted during homework. All of these issues began when her parents told her about the impending separation. Mr. Armani begins to reexamine Sarah's classroom work in light of this new information. He noticed that her problem is not with mechanics but with her ability to follow a step-by-step process required to solve the problems. She appears to skip steps, rushing to get to a solution.

Mr. Armani discusses the situation with her parents and the pre-referral intervention team at the school. They decide to ask for assistance from the school social worker. The social worker is at Sarah's school on Thursdays and has time to see her for thirty minutes at the end of her regularly scheduled appointments. The social worker's goal is to assess Sarah's perception of her parent's separation and to work on her adjustment to the situation. The intervention team also arranges for Sarah to spend time with a sixth grade student twice a week to help her work on problems in a careful step-by-step manner. Finally, Mr. Armani sets up a meeting with Mr. Krauss who teaches Sarah's brother. He hopes to determine if her brother is experiencing similar difficulties.

This example illustrates the benefit of using a pre-referral team to help provide programming for at-risk students. Often schools are able to use existing resources to help support students who are experiencing difficulty. The team model also helps school professionals and parents use the broader range of services available to an intervention team, compared to the services of any single team member. The collaborative work of professionals does not always circumvent a student's need for special education; it does, however, provide a framework for educational professionals to work as a team to provide all students with the best learning environment.

Research on pre-referral interventions suggests a positive influence on student learning and behavior. Most studies have not focused on student outcomes (Rock & Zigmond, 2001) but on reduction in special education placements. University led collaborative programs clearly show that this approach results in decreases in the number of students identified for special education (Chalfant & Pysh, 1989; Graden, Casey, & Bronstrom, 1985; Fuchs, Fuchs, & Bahr, 1990; Hoover, 2010). A number of different intervention approaches are being implemented in the field, however; and some research suggests that intervention quality may have a significant impact on whether numbers of students identified for special education actually decrease (Flugum & Reschly, 1994). For example, quality programs specifically address such issues as keeping the lines of communication open among professionals, making time for appropriate and consistent consultation, and providing needed educational materials. Another line of research on intervention assistance models has focused on the attitudes and beliefs of teachers. While studies show mixed results regarding teachers' belief in intervention assistance programs (Rock & Zigmond, 2001), they do report decreased feelings of helplessness and frustration (Ingalls & Hammond, 1996).

SUMMARIZE AND REFLECT

1. Changes in today's classrooms have led to a greater emphasis on how collaborative teaching models can help address evolving student needs.
2. The American student population is changing with respect to socioeconomic status, ethnicity, and ability level. Such changes have underscored the need to tailor education to the individual needs of students.
3. Teachers do not need to work in isolation to educate. Instead they can work in collaboration with others, building on the strengths of colleagues.
4. Working in an interdisciplinary environment allows students to benefit from multiple educators with unique talents and skills. This greater pool of resources makes it more likely that each student will receive instruction appropriate to their individual needs.

INFORMED APPLICATION

1. You have a new student in your class this year. The student was formally educated in a self-contained classroom for students with intellectual limitations. The school district decided that these students would be better served in the regular classroom. You assume you will be working closely with the special educator, but what other collaborative relations could help you meet the needs of your new student?
2. Your school has developed a system for helping teachers address students who are failing to learn at a typical rate. This pre-referral system is intended to serve as an intervention approach prior to any special education referral. Your principal has asked you to serve on the pre-referral team. What unique skills and knowledge could you bring to the team to help enhance their intervention efforts?

THE CHAPTER IN REVIEW



In this chapter, we began by reviewing the field of educational psychology. Educational psychology is a relatively new field of scientific inquiry. It merges research from psychology on thinking, reasoning, and human behavior with research on educational best practices. We then explored the importance of this field for educators, emphasizing the importance for communication between practicing teachers and researchers. This communication helps focus research in directions that are more relevant to real-life teaching environments. We also discussed how education is under constant scrutiny and how society is making increased demands for science-based educational practices. Educational psychologists engage in research designed to address this need. Also, educators are practicing science every day in their classrooms as they investigate what works and what needs improvement. They constantly engage in what is known as action research.

The second part of the chapter examined the qualities typical of expert teachers. A researcher often focuses on expert teachers as a source of information regarding important teacher characteristics. Early research in this area has shown expert teachers have several common characteristics. Expert teachers are well versed in their subject matter, possess an extensive knowledge of general teaching practices, and have a sound base of knowledge for making educational decisions. We also looked at current

research into expert teaching that moves away from detailing specific characteristics and instead focuses on “fuzzy” or more general characteristics. General areas that have surfaced as important indicators of expertise include knowledge, efficiency, and insight.

The final section of the chapter examines how today’s classrooms are becoming increasingly diverse. This leads to a greater need to tailor education so the unique needs of each student are met. At times, this is difficult for a single teacher, necessitating the collaboration of multiple educational professionals. Most schools recognize this need for increased collaboration among educators. Schools have already had similar collaborative models in place for students in special education. More progressive schools realize that implementing a similar model for all students helps insure education is meeting the unique needs of each student. Some of these schools have informal mechanisms for collaboration, while others have well-developed systems to promote interdisciplinary collaboration.

Interdisciplinary Case Focus

principal *special educator*
teacher *parents* *psychologist*
social worker *physical educator*
nurse *peers* *doctor*



Meet the Team An Interdisciplinary Case Focus is presented at the end of each chapter. This feature gives the reader examples of how interdisciplinary cooperation helps create effective learning environments. There are many ways to put together a team of dedicated individuals to help support student learning. Sometimes the regular education teacher simply coordinates with the parent to address isolated issues. Other situations necessitate a broader team, drawing on the skills of a variety of professionals.

This first Interdisciplinary Case Focus introduces you to the professions typically involved in collaborative education.

Regular Educator The regular educator (primary, secondary, physical, health, etc.) is the central person involved in interdisciplinary education. As the primary instructor of students in the general education program, the regular education teacher is often responsible for intervention implementation and overall coordination of the process. Preparation of regular education teachers varies by state, but generally includes a bachelor’s or master’s degree in education and additional preparation to teach specific subject areas.

Parent The parent or guardian is a crucial member of any educational team. Without close collaboration with the parent, interventions tend to be inconsistent. The parent is the best source of information about the student’s history and provides the group with information on the student’s life outside school. Additionally, parents frequently bring their own professional expertise.

Special Educator The special educator works with a student’s individual learning needs. He/she specifically coordinates the education of students in the special education program and also plays a role in the education of students in the regular education program. Training of special educators usually consists of a bachelor’s or master’s degree. Preparation programs may be specifically in special education or a dual program of both regular and special education. Often special educators have expertise with specific populations (i.e., learning disabilities, autism, hearing impaired, etc.).

Social Worker Social work is an extremely versatile field. Social workers address a wide variety of issues related to personal improvement. Social workers who specialize in education work with family life

issues, interpersonal problems, traumatic events, etc. Typically, the focus of their work is to establish a sense of well-being and to promote academic achievement. Training in social work can be at the bachelor's level, but most states require a master's degree for certification.

Psychologist The psychologist usually plays one of two roles in an educational situation. The first role is to provide assessment of cognitive and behavioral functioning, which leads to appropriate recommendations. The psychologist may also play a role similar to the social worker and may also provide direct clinical treatment, helping students through a particular life issue. Training for the psychologist involved in school systems is at the master's or doctoral level.

Speech Language Pathologist The speech language pathologist handles problems with speech sounds or the ability to communicate effectively and addresses problems with fluency, articulation, and abnormalities of voice quality. He/she also helps students who have difficulty understanding what people say to them or with how they express themselves. Training

for the speech language pathologist is typically at the bachelor's or master's degree level.

Behavior Specialist Individuals with specific training in helping behavioral issues is increasing in popularity. These individuals assess and treat behavioral problems. They work closely with the regular educator to develop interventions that continue once the behavior specialist is no longer involved. The training of the behavior specialist is becoming more consistent with national organizations providing standards for professional certification. Behavioral specialists often work with a bachelor's degree, but many have master's and doctoral degrees in the field.

This preview provides you with a brief overview of the individuals involved in education today. Depending on the nature of the situation, other professionals may participate on an intervention team (e.g., medical, administration, etc.). The Interdisciplinary Case Focus presented at the end of each chapter provides you with situations illustrating how these individuals work together to produce effective education that is sensitive to the unique needs of the student.

Key Terms

TERM	Page	TERM	Page
A-B-A-B single-participant design	10	Empirical	6
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Baseline	10	Experimental research	7
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