

**ELEVENTH EDITION**

# EDUCATIONAL PSYCHOLOGY

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**Heredity or Environment?** Nowhere has the nature-versus-nurture debate raged so hard as in the area of intelligence. Should intelligence be seen as a potential, limited by our genetic makeup? Or does intelligence simply refer to an individual's current level of intellectual functioning, as influenced by experience and education? Beware of either/or comparisons; it is almost impossible to separate intelligence "in the genes" from intelligence "due to experience." Today, most psychologists believe that differences in intelligence are the result of both heredity and environment, probably in about equal proportions for children (Petrill & Wilkerson, 2000). "Genes do not fix behavior. Rather they establish a range of possible reactions to the range of possible experiences that the environment can provide" (Weinberg, 1989, p. 101). And environmental influences include everything from the health of a child's mother during pregnancy to the amount of lead in the child's home to the quality of teaching a child receives.

For all adults caring for children—parents, teachers, administrators, counselors, medical workers—it is especially important to realize that cognitive skills, like any other skills, are always improvable. *Intelligence is a current state of affairs*, affected by past experiences and open to future changes. Even if intelligence is a limited potential, the potential is still quite large, and a challenge to all teachers. For example, Japanese and Chinese students know much more mathematics than American students, but their intelligence test scores are quite similar. This superiority in math probably is related to differences in the way mathematics is taught and studied in the three countries and to the self-motivation skills of many Asian students (Baron, 1998; Stevenson & Stigler, 1992).

Now that you have a sense of what intelligence means, let's consider another kind of individual difference that often is misused and misunderstood in education—learning styles.

## LEARNING AND THINKING STYLES

Research in psychology over many years has focused on individual differences in "styles"—cognitive styles, learning styles, problem-solving styles, thinking styles, decision-making styles ... the list goes on. Li-fang Zhang and Robert Sternberg (2005) organize the work on individual styles into three traditions. *Cognitive-centered styles* assess ways people process information, for example, by being reflective or impulsive in responding (Kagan, 1976). *Personality-centered styles* assess more stable personality traits such as being extroverted versus introverted or relying on thinking versus feeling (Myers & McCaully, 1988). *Activity-centered styles* assess a combination of cognition and personality that affects how people approach activities, so these styles may be of special interest to teachers.

One theme in activity-centered approaches is the differences between surface and deep approaches to processing information in learning situations (Snow, Corno, & Jackson, 1996). Students who take a *surface-processing* approach focus on memorizing the learning materials, not understanding them. These students tend to be motivated by rewards, grades, external standards, and the desire to be evaluated positively by others. Individuals who have a *deep-processing approach* see the learning activities as a means for understanding some underlying concepts or meanings. They tend to learn for the sake of learning and are less concerned about how their performance is evaluated. Of course, the situation can encourage deep or surface processing, but there is evidence that individuals have tendencies to approach learning situations in characteristic ways (Biggs, 2001; Coffield, Moseley, Hall, & Eccestone, 2004; Pintrich & Schrauben, 1992; Tait & Entwistle, 1998).

### Learning Styles/Preferences

Here is another "style" term. You may have heard about *learning styles* or used the phrase yourself. *Learning style* usually is defined as the way a person approaches learning and studying. But beware—some conceptions of learning styles have little research support; others are based on solid studies. First, the cautions.

**Cautions About Learning Styles.** Since the late 1970s, a great deal has been written about differences in students' learning styles (Dunn & Dunn, 1978, 1987; Dunn & Griggs, 2003; Gregorc, 1982; Keefe, 1982). But I believe *learning preferences* is a more accurate label because most of the research describes preferences for particular learning environments—for example, where, when, with whom, or with what lighting, food, or music you like to study. There are a number of instruments for assessing students' learning preferences—*The Learning Style Inventory* (Dunn, Dunn, & Price, 1989), *Learning Styles Inventory* (Revised) (Kolb, 1985), and the *Learning Style Profile* (Keefe & Monk, 1986). Are these useful tools? The answer is not simple, as you can see in the Point/Counterpoint: *Should Teachers Focus on Students' Learning Styles?*

### Connect and Extend to PRAXIS II™

**Learning/Cognitive Styles (I, B1)** Familiarize yourself with the major issues involved with learning and cognitive styles, and understand their implications for classroom practice.

**Learning styles** Characteristic approaches to learning and studying.

**Learning preferences** Preferred ways of studying and learning, such as using pictures instead of text, working with other people versus alone, learning in structured or unstructured situations, and so on.

# POINT / COUNTERPOINT

## Should Teachers Focus on Students' Learning Styles?

### POINT

**Teaching to different learning styles has no strong research basis.**

Tests of learning style have been strongly criticized for lacking evidence of reliability and validity (Snider, 1990; Wintergerst, DeCapua, & Itzen, 2001). In fact, in an extensive examination of learning styles instruments, researchers at the Learning Skills Research Centre in England concluded, "... with regard to work by Dunn and Dunn, Gregorc, and Riding, our examination of the reliability and validity of their learning style instruments strongly suggests that they should not be used in education or business" (Coffield, et al., 2004, p. 127). As to most of the other research on learning preferences, even though results of some studies indicate that students learn more when they study in their preferred setting and manner (Dunn & Griggs, 2003), generally there is little hard evidence; most researchers are skeptical about the value of learning preferences. "The reason researchers roll their eyes at learning styles research is the utter failure to find that assessing children's learning styles and matching to instructional methods has any effect on their learning (Stahl, 2002, p. 99). In fact, an experimental study had college students self-assess their learning style as auditory, visual, or kinesthetic and then taught the students in keeping with their style (Kratzig & Arbuthnott, 2006). Matching learning with teaching styles did not improve learning. When the researchers examined how people identify their own learning styles, they concluded, "people's intuitions about their learning styles may be incorrectly attributed. Specifically, such styles may indicate preferences and motivations rather than inherent efficiency at taking in and recalling information through specific sensory modalities" (p. 245). If college students have trouble identifying their own learning style, think about 4th or 9th graders!

Why are these ideas so popular? Part of the answer is, "A thriving commercial industry has also been built to offer advice to teachers, tutors and managers on learning styles, and much of it consists of inflated claims and sweeping conclusions which go beyond the current knowledge base and the specific recommendations of particular theorists" (Coffield et al., 2004, p. 127).

### COUNTERPOINT

**Some differences in learning styles do matter.**

There is one learning styles distinction that has research support. Richard Mayer (e.g., Mayer & Massa, 2003) has been studying the distinction between visual and verbal learners, with a focus on learning from computer-based multimedia. Here, the assessment of learning styles is carefully done and more valid than assessments based on many of the commercial inventories. Mayer is finding that there is a visualizer-verbalizer dimension and that it has three facets: *cognitive spatial ability* (low or high), *cognitive style* (visualizer versus verbalizer), and *learning preference* (verbal learner versus visual learner), as shown in Table 4.2. So the picture is more complex than simply being a visual or a verbal learner. A student might have a preference for learning with pictures, but low spatial ability could make using pictures to learn less effective. These differences can be reliably measured, but research has not identified the effects of teaching to these styles; certainly presenting information in multiple modalities might be useful.

Schools can make learning options available. Having quiet, private corners as well as large tables for working; comfortable cushions as well as straight chairs; brightly lighted desks along with darker areas; headphones for listening to music as well as earplugs; structured as well as open-ended assignments; information available on DVDs and tapes as well as in books. All these options will allow students to work and learn in their preferred mode at least some of the time. Will making these alterations lead to greater learning? Here the answer is not clear. Very bright students appear to need less structure and prefer quiet, solitary learning (Torrance, 1986) and the visual-verbal distinction seems to be valid.

So before you encourage your teachers to accommodate all your students' learning styles, remember that students, especially younger ones, may not be the best judges of how they should learn. Preference for a particular style does not guarantee that using the style will be effective. Sometimes students, particularly poorer students, prefer what is easy and comfortable; real learning can be hard and uncomfortable. Sometimes students prefer to learn in a certain way because they have no alternatives; it is the only way they know how to approach the task. These students may benefit from developing new—and perhaps more effective—ways to learn. Learning styles probably are a minor factor in learning—contextual factors such as teaching strategies and social connections in classrooms likely play much larger roles (Kratzig & Arbuthnott, 2006).

TABLE 4.2

**Three Facets of the Visualizer-Verbalizer Dimension**

There are three dimensions to visual versus verbal learning: ability, style, and preference. Individuals can be high or low on any or all of these dimensions.

Facet	Types of Learners	Definition
Cognitive Ability	High spatial ability	Good abilities to create, remember, and manipulate images and spatial information
	Low spatial ability	Poor abilities to create, remember, and manipulate images and spatial information
Cognitive Style	Visualizer	Thinks using images and visual information
	Verbalizer	Thinks using words and verbal information
Learning Preference	Visual learner	Prefers instruction using pictures
	Verbal learner	Prefers instruction using words

Source: From R. E. Mayer & L. J. Massa (2003). "Three facets of visual and verbal learners: Cognitive ability, cognitive style and learning preference." *Journal of Educational Psychology*, 95(4), p. 838.

**The Value of Considering Learning Styles.** Even though much of the work on matching learning styles and preferences to teaching is suspect, with unreliable measures and inflated claims, there is some value in thinking about learning styles. First, by helping students think about how they learn, you can develop thoughtful self-monitoring and self-awareness. In upcoming chapters, we will look at the value of such self-knowledge for learning and motivation. Second, looking at individual students' approaches to learning might help teachers appreciate, accept, and accommodate student differences (Coffield et al., 2004; Rosenfeld & Rosenfeld, 2004).

Recent research points to the person in context—the entire teaching–learning system as a better way to understand student learning (Coffield et al., 2004). I end this section by reviewing some recent work that takes the teaching–learning context into consideration.

## Intellectual Styles

There are literally hundreds of ways to think about individual differences in styles that might affect learning—too many distinctions to assess and accommodate in teaching. Intellectual style is one way to think about students' style differences that is manageable. Zhang and Sternberg (2005) describe three basic intellectual styles (Types I, II, and III) that capture individual preferences for structure, complexity, conformity, and autonomy. So the questions are, "Do you work best on tasks that are more structured or more free-flowing?" (structured versus unstructured). "Do you prefer problems that can be solved with simple, straightforward thinking or do you prefer more complex thinking?" (cognitive simplicity versus complexity). "Do you like to follow established ways of doing things or would you rather strike out on your own and be unconventional?" (conformity versus nonconformity). "Do you like tasks where authorities and experts have found many answers or do you prefer to work toward your own autonomous answer?" (authority versus autonomy).

Your answers to these questions place you on a continuum from the Type I intellectual style at one extreme that prefers unstructured, free-flowing, creative, complex, autonomous learning to the other extreme of Type II that prefers structured, straightforward tasks that follow established traditional ways to authoritative answers. Type III individuals pick and choose from the other two styles, depending on the situation and their own interests. For example, they may prefer structured tasks in areas that do not interest them, but free-flowing tasks for topics of interest to them. No matter what

TABLE 4.3

**Three Intellectual Styles**

Zhang and Sternberg actually see intellectual styles on a continuum, anchored by Type I at one extreme and Type II at the other with Type III moving between the extremes as appropriate for the situation.

Dimensions	Preferences for Thinking and Learning		
	Type I	Type II	Type III
<b>From Free-flowing to Structured</b>	Free-flowing, unstructured, open-ended	Highly structured	Degree of preferred structure depends on situation
<b>From Complex to Simple</b>	Complexity in thinking	Simplicity and straightforward thinking	Degree of complexity preferred depends on situation
<b>From Unconventional to Traditional</b>	Unconventional, creative, original, nonconforming	Traditional ways of doing and thinking	Degree of creativity preferred depends on situation
<b>From Being Autonomous to Relying on Authority</b>	Autonomous, find your own way	Values experts and authorities	Degree of autonomy preferred depends on situation
<b>Characteristics</b>	Deep-learning, reflective, artistic careers, divergent thinking	Surface learning, conventional careers, analytic sequential thinker	Realistic, social, investigative, integrating, enterprising careers

Source: With kind permission from Springer Science + Business Media: *Educational Psychology Review*, 17. The threefold model of intellectual styles, 2005, pp. 1–53, Zhang, L., & Sternberg, R. J.

your type, you may prefer group versus individual learning—so that is the final question to consider. Table 4.3 shows the characteristics of the three styles and teaching strategies that might be useful.

Thus far, we have focused mostly on the varying abilities and styles of students. For the rest of the chapter, we will consider factors that can interfere with learning. It is important for all teachers to be aware of these issues because laws and policy changes over the past 30 years have expanded teachers' responsibilities in working with all students.

## INDIVIDUAL DIFFERENCES AND THE LAW

**STOP & THINK** Have you ever had the experience of being the only one in a group who had trouble doing something? How would you feel if every day in school you faced the same kind of difficulty, while everyone else seemed to find the work easier than you? What kind of support and teaching would you need to keep trying? \*

### IDEA

Since 1975, in the United States, beginning with PL 94-142 (the Education of the Handicapped Act), a series of laws has led to revolutionary changes in the education of children with disabilities. The legislation, now called the **Individuals with Disabilities Education Act (IDEA)**, was revised in 1990, 1997, and 2004. At the most general level, the law now requires states to provide a **free, appropriate public education (FAPE)** for all students with disabilities who participate in special education. There are no exceptions—the law requires **zero reject**. This policy also applies to students with communicable diseases such as AIDS. The expenses of meeting the special needs of these students are considered a public responsibility.

The definition of *disability* is specific in IDEA. The 13 categories of disabilities covered are listed in Table 4.4, along with the numbers of students in each category. About 10% of all students, aged 6 through 21, receive special education services under IDEA. The percentage for children aged 3 through 5 is 5% (U.S. Department of Education, 2007). Most of these students spend some of their school day in general education classes. Table 4.4 also indicates the percentage of these students who are taught in general education classes for *at least* 40% of their school day. You can see that no matter what grade or subject you teach, you will work with students with special needs.

Before we look at the different categories, let's examine the requirements in IDEA. There are three major points of interest to parents and teachers: the concept of "least restrictive placement"; the individualized education program (IEP); and the protection of the rights of both students with disabilities and their parents.

**Individuals with Disabilities Education Improvement Act (IDEA)** Latest amendment of PL 94-142; guarantees a free public education to all children regardless of disability.

**Free, appropriate public education (FAPE)** Public funding to support appropriate educational programs for all students, no matter what their needs.

**Zero reject** A basic principle of IDEA specifying that no student with a disability, no matter what kind or how severe, can be denied a free public education.