

# Current Practice **ALERTS**

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A focus on:

**Learning Styles**

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## What are Learning Styles?

The concept of learning styles is grounded in the idea that individuals differ in the ways they learn—how they absorb and retain new information (see Dunn, 1983). Though there are several models of learning styles and how they might be assessed (e.g., Canfield & Lafferty, 1970; Gregorc, 1979; Kolb, 1981), the Dunn and Dunn model (1993, 1999) has received perhaps the greatest attention in discussions about students with disabilities. In referring to “exceptionality at both ends of the spectrum,” Dunn (1983) suggested that the “combination of environmental, emotional, sociological, physical, and psychological elements that permit individuals to receive, store, and use knowledge” (p. 496) comprise an individual’s learning style. Across these five elements or domains, Dunn and Dunn (1979) described 18 specific variables that may influence learning (see Figure 1).

Recommendations to provide instruction based on individuals’ learning styles (e.g., Murawski & Spencer, 2011; Tomlinson, 1999, 2009; Villa, Thousand, & Nevin, 2008) have emerged from arguments that the factors related to each element included in Figure 1 are not merely preferences, but are associated with improved student outcomes (Carbo, 1983; Dunn, 1983). Simply stated, the concept of learning styles implies that individuals differ when it comes to which mode of instruction (e.g., auditory, visual, kinesthetic) is most effective in terms of enhanced academic achievement (Pashler, McDaniel, Rohrer, & Bjork, 2009). As Willingham (2005) and others have noted, matching instruction to a modality preference or learning style is appealing and an accepted practice among educators. As such, references to learning styles remain frequent in the popular literature, especially in the context of differentiated instruction or



co-teaching (e.g., Anderson, 2007; Friend & Bursuck, 2012; Robinson, 1999; Salend, 2005; van Garderen & Whittaker, 2006).

## For Whom is it Intended?

A number of models of learning styles have been proposed, and proponents have suggested that any learner from early childhood through adulthood may have a distinct learning style. Assessments are available for learners as young as age seven (e.g., Elementary Learning Style Assessment, Burke & Dunn, 2007) and as old as ages 17 and older (e.g., Building Excellence, Rundle & Dunn, 2007). As Pashler et al. (2009) noted, learning styles have gained significant popularity in the field of education and statements of the importance of assessing learning styles in students from kindergarten to graduate school remain common. Despite the popularity of the concept of learning styles, there are few direct references to students identified with learning disabilities (LD) in the learning styles literature, even though the Dunn and Dunn model (1993; 1999) has been suggested to be particularly relevant for teachers of students with disabilities. This model gained prominence in part based on a series of papers in *Exceptional Children* in 1983, in which Carbo (1983) suggested that diagnosing learning styles and prescribing instruction based on identified learning styles can enhance the enjoyment of and achievement in reading for “handicapped students with reading problems” (p. 491). In that same issue, Dunn (1983) stated that (a) learning styles could be established for students who were gifted as well as those who were underachieving, and (b) when students were taught with instruction matched to their learning styles, results included improved academic achievement, improved attitudes toward school, and a reduction on discipline problems. In addition, a number of organizations or

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professional websites at least implicitly endorse the usefulness of basing instruction for students with LD on learning styles. For example, on the website for the National Center for Learning Disabilities (NCLD), under a heading, “Self-knowledge of learning styles can lead to success,” Horowitz (n.d.) suggested that students should inform teachers about features of instruction that might be adjusted to help them learn and that educators should modify instruction for students with “highly stylized learning preferences.” Further, an unidentified author for the Website for LD Pride indicated that “information about learning styles and Multiple Intelligence (MI) is helpful for everyone, but especially for people with learning disabilities” (“Learning styles and multiple intelligences,” n.d.).

**How Does it Work?**

The application of learning style theory to education is straightforward. Teachers are encouraged to assess their students’ learning styles and then to tailor instruction to match the needs associated with those styles. For example, some students may prefer different environmental conditions (e.g., low light, warmer temperatures), varied instructional arrangements (small group instruction, working 1:1 with a peer), or different emphases in instructional delivery methods (primarily auditory, visual, or kinesthetic input). More recently, the concept of learning styles has appeared in combination with implementing differentiated instruction (see Landrum & McDuffie, 2010) and co-teaching (e.g., Murawski, 2010; Murawski & Spencer, 2011; Villa, Thousand, & Nevin, 2008). For example, Villa et al. (2008) provided an example of how to use learning styles when parallel teaching a co-taught class. They suggest “one co-teacher works with a group of students using primarily visual strategies, another co-teacher works with a group using primarily auditory strategies, and yet another may work with a group using kinesthetic strategies” (p. 42). Similarly, Murawski and Spencer (2011) provided strategies for visual learners (e.g. reducing visual clutter, using videos), auditory learners (e.g., verbally sharing with peers, teaching self-talk, creating podcasts), and kinesthetic learners (e.g., allowing mobility while learning, squeezing a “Koosh ball,”

permitting doodling during instruction). Setting aside questions about whether individual students’ specific learning styles can be reliably identified, the key assumption underlying this model is that instruction tailored to a specific learning style results in improved outcomes.

**How Adequate is the Research Knowledge Base?**

Despite the volume of literature on the concept of learning styles, few quality empirical studies have examined whether designing and delivering instruction according to an identified learning style improves student outcomes (e.g., Kavale & LeFever, 2007; Pashler et al., 2009). As Pashler et al. (2009) noted, “although the literature on learning styles is enormous, very few studies have used an experimental methodology capable of testing the validity of learning styles applied to education” (p. 105).

Several reviews of research have been conducted that call to question the benefits of determining instruction on the basis of sensory channels emphasized in Dunn and Dunn’s (1979) physical element (that individuals are primarily auditory, visual, or kinesthetic learners) (see Arter & Jenkins, 1977; 1979; Kampwirth & Bates, 1980; Tarver & Dawson, 1978; Ysseldyke, 1973). Another source of some degree of controversy since at least the 1980s is that very few studies of the assessment of learning styles or the application of instruction based on learning styles have met reasonable criteria for methodological rigor (see Dunn 1983, 1990; Kavale & Forness, 1987, 1990; Kavale & LeFever, 2007; Landrum & McDuffie, 2010; Lovelace, 2005). Dunn (1983) claimed that when students receive instruction based on their learning style, academic achievement and attitudes toward school are more positive and discipline problems are reduced. Kavale and Forness (1987) conducted a meta-analysis on modality-based instruction in special education and found that teaching toward a particular modality (or learning style) resulted in an effect size of .14 on standardized measures of achievement, concluding, “no appreciable gain was found by differentiating instruction according to modality preference” (p. 238). Additional reviews of the literature and meta-analyses have been conducted that offer support for a learning styles-based approach to instruction

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**Figure 1 Domains and Elements of Learning Style according to the Dunn and Dunn Model**

<b>DOMAIN</b>	<b>ELEMENTS</b>
Environmental	sound, light, temperature
Emotional	motivation, task persistence, structure
Sociological	alone, pairs, peers, team, with an adult
Physical/Physiological	auditory, visual, tactual, kinesthetic, time of day, mobility
Psychological	analytic/global, impulsive/reflective



(Dunn & Dunn, 1979; see also [www.learningstyles.net](http://www.learningstyles.net))

(e.g., Dunn, Griggs, Olson, Bailey, & Gorman, 1995; Lovelace 2005). However, these reviews have been sharply critiqued, most notably for the bodies of literature reviewed (Kavale, Hirshoren, & Forness, 1998; Kavale & LeFever, 2007). For example, the Dunn et al. (1995) meta-analysis of 36 studies of instruction matched to learning styles reported an effect size of .75. In an overview of the learning styles literature, Landrum and McDuffie (2010) noted that the body of studies reviewed by Dunn et al. consisted of 35 dissertations, including 20 from a single university, and one published study, which examined the impact of perceptual preferences on the effectiveness of employee training. Landrum and McDuffie concluded that the only reviews they found that supported the use of learning styles “rely heavily on unpublished reports (which lack the check point of peer review) and too often include a preponderance of unpublished dissertations from a single university” (p. 13).

The scientific strength of the evidence favoring learning styles is important. In their meta-analysis, Kavale and Forness (1987) reported negative relationship between methodological rigor and effectiveness—more rigorous studies were associated with smaller effect sizes and vice versa. In a more recent review, Pashler et al. (2009) defined criteria for acceptable evidence of the effectiveness of learning styles-based instruction as follows: (a) participants should be divided into two or more groups on the basis of some measure of learning style, (b) students within each group should be randomly assigned to treatments or learning methods, (c) the same test of achievement must be used with all participants, and (d) results must demonstrate that the learning method maximizing one group’s performance differs from that which maximizes the performance of a second learning style group. They located one study of learning styles that met their criteria (Sternberg, Grigorenko, Ferrari, & Clinkenbeard, 1999). In this study, gifted high school students grouped into analytical, creative, or practical ability groups on the basis of the Sternberg Triarchic Abilities Test performed better, based on ratings of their course performance, in matched versus mismatched summer psychology class sessions that emphasized analytical, creative, or practical instruction. Pashler et al. found three additional methodologically strong studies, none of which provided evidence of positive effects for learning styles-matched instruction. These studies assessed (a) visual versus verbal learners on a variety of computer-based electronics lessons presented in different formats (Massa & Mayer, 2006), (b) differences between medical residents with a sensing learning style versus an intuitive learning style on different forms of a problem-solving task (Cook, Thompson, Thomas, & Thomas, 2009), and (c) the performance of adults with different expressed preferences for information uptake on a verbal free-recall task in which items were presented through visual versus auditory means (Constantinidou & Baker, 2002).

In summary, empirical support for basing instruction on students’ learning styles is inadequate, and for students with LD in particular, there is simply no evidence. Published reviews of relevant research suggest that (a) evidence for modality-based instruction is weak

(Kavale & Forness, 1987), (b) reviews that offer support for learning styles-based approach (Dunn et al., 1995; Lovelace, 2005) rely on a preponderance of unpublished literature (see Kavale et al., 1998; Kavale & LeFever, 2007), and (c) among the small number of rigorous published studies of learning style-based instruction, few show positive effects (see Pashler et al., 2009) and fewer still are school-based studies with relevance to instruction.

### How Practical Is It?

There are many options available for assessing students’ learning styles, which include checklists or rating scales available on-line. The most popular inventory, the Dunn and Dunn Learning Style Inventory (which comes in four different versions based on the age of the student), is available online and costs \$5 per student ([www.learningstyles.net](http://www.learningstyles.net)). Another popular inventory, Kolb Learning Styles Inventory, distributed by the Hay Group, is sold in packs of 10 booklets for approximately \$150 (<http://www.haygroup.com>). In addition to the cost of learning styles assessment materials, resources are needed to develop, validate, and implement instruction and interventions around distinct learning styles, as well as to train or provide professional development for teachers who may need to learn to assess and teach to different learning styles.

### How Effective Is It?

As we have discussed, the research base underlying the application of learning style-based instruction is limited in several ways. First, meta-analyses or integrative reviews of studies of modality-based instruction or aptitude-treatment interactions have generally concluded that there is no appreciable benefit to matching instruction to aptitudes or modality preferences. Second, there is a dearth of published empirical literature on the effects of teaching to learning styles, and the limited number of studies that meet minimal standards for methodological rigor either focus on college students or adults, or provide no evidence of benefit. Finally, and most important for our purpose in this Current Practice Alert, there seems to be no support to date for assessing the learning styles of students with identified LD in order to guide instruction.

### What Questions Remain?

Many questions remain with regard to learning styles. Perhaps foremost, there is simply a dearth of published research that applies rigorous methods to the evaluation of (a) whether a learning style can be reliably established for an individual student and, if so, (b) whether matching instruction to learning styles results in improved learning outcomes. This is especially true with regard to students identified with LD. Second, it may be important for researchers to distinguish more clearly between a learning style and a learning preference; unfortunately, these terms appear to have been misused or used interchangeably in some cases. As Willingham (2005) and others have noted, most individuals can



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readily identify their learning preferences, and research supports the notion that allowing students choice on certain instructional matters (e.g., choice of materials, where to complete their work) can result in improved performance (see Kern & State, 2009).

But the distinction between a preference and a learning style is critical, and as models of differentiated instruction increasingly promote attention to students' learning profiles, it is imperative that researchers continue to distinguish between these two concepts, and that teachers are aware of the relative benefits of providing students with choices in the context of classroom instruction compared to the value of altering instruction to match a student's purported learning style.



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Each *Alerts* issue focuses on a single practice or family of practices that is widely used or discussed in the LD field. The *Alert* describes the target practice and provides a critical overview of the existing data regarding its effectiveness for individuals with learning disabilities. Practices judged by the Alerts Editorial Committee to be well validated and reliably used are featured under the rubric of **Go For It**. Those practices judged to have insufficient evidence of effectiveness are featured as **Use Caution**.

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