



## Review

# Learning styles theory fails to explain learning and achievement: Recommendations for alternative approaches



Donggun An<sup>a,\*</sup>, Martha Carr<sup>b</sup>

<sup>a</sup> Department of Education, Seoul National University, 1 Gwanak-ro, Gwanak-gu, Seoul 08826, Republic of Korea

<sup>b</sup> Department of Educational Psychology, University of Georgia, 110 Carlton St., Athens, GA 30602, United States

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## ABSTRACT

The purpose of this paper is to propose a multiple approaches to explaining and predicting individual differences in learning. First, this article briefly reviews critical problems with learning styles. Three major concepts are discussed: lack of a clear, explanatory framework, problems of measurement, and a failure to link learning styles to achievement. Next, this paper presents several alternative approaches to learning styles that do a better job of explaining how learning styles might predict achievement. Alternatives to learning styles include individual differences in verbal and visual skills, expertise and domain knowledge, self-regulation and inhibition, and perfectionism. For expertise and domain knowledge, knowledge representation and fluency are specifically discussed. It is recommended that the new approach that focuses on individual differences in learning be used by teachers.

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The term of learning styles has been used in education to explain individual differences in the ways students approach learning (Kozhevnikov, 2007). It is assumed that instruction based in learning styles theory produces better achievement (Sternberg, Grigorenko, & Zhang, 2008). Despite considerable interest in learning styles there are a number of critical problems with the theory and the activities developed for schools based on the theory (Coffield, Moseley, Hall, & Ecclestone, 2004; Henson & Hwang, 2002; Joniak & Isaksen, 1988; Price, 2004). The problems include the lack of solid explanatory theory, a lack of research supporting the theory, poor reliability and validity of constructs, and a failure to link learning styles-based instruction to achievement. The goal of this paper is to present a better way to understand and respond to individual differences teachers see in their students. In this article, we will briefly review the problems with learning styles and then present several alternative approaches to explaining individual differences in learning. These approaches will be based in research in educational psychology and cognition and will explain individual differences in learning and achievement in terms of differences in expertise, development and personality.

## 1. A brief critique of learning styles

Learning styles theories have a number of significant problems that make them useless for explaining learning or achievement. Specifically,

\* Corresponding author at: Department of Education, Seoul National University, 1 Gwanak-ro, Gwanak-gu, Seoul 08826, Republic of Korea.  
E-mail address: [bonnet413@naver.com](mailto:bonnet413@naver.com) (D. An).

the theories describe and categorize behaviors, but fail to explain the developmental processes and causal mechanisms that underlie these behaviors. Another problem is that learning style measures often use rank ordering which forces individuals to rank one style higher or lower than another, creating differences that are not evident in measures that separately assess the different styles. Furthermore, many of the measures of learning styles lack reliability and validity. Finally, the work on learning styles assumes that gearing instruction to learning styles produces better achievement, but the research either does not exist or does not support that assumption (e.g., Massa & Mayer, 2006; McKay, 1999; Price, 2004).

### 1.1. Lack of clear, explanatory framework

One of the critical problems with learning styles theory is the lack of clear, explanatory framework. Even learning styles researchers have acknowledged this limitation. Sternberg (2001) stated that it is difficult for learning styles researchers to interact with each other as well as with other researchers in psychology because each learning styles theory has its own different conceptual framework. Sternberg also pointed out that learning styles researchers do not consider cognition or personality theories or research even though many of the learning styles include constructs from these theories. The lack of explanatory framework contributes to the following specific problems: a failure to explain the underlying mechanisms, a blend of borrowed constructs or measures, and an ignorance of the research contradicting learning styles theories.

### 1.1.1. Failure to explain the underlying mechanisms

A good learning styles theory should explain the common processes and causal mechanisms that underlie the learning styles described in the theory. Instead, learning styles theories tend to consist of lists of preferences with no explanation as to the underlying cognitive, motivational and personality mechanisms that underlie the preferences. Nor is there any theoretical or empirical rationale for including a preference on the list. For example, Gregorc (1982, 1985) has created two learning style dimensions (concrete/abstract and sequential/random) each with its own attributes. Concrete processors enjoy processing through physical expression, and abstract people desire a more figurative expression. Random learners are disorganized in their learning while sequential learners are systematic. No explanation is given as to the developmental processes that determine whether an individual becomes one type of learner and not another or the relationship between the two dimensions. Individuals simply have these characteristics and there is no explanation about what produces these differences. As another example, Riding and Cheema (1991) described students as being either holist or analytic. No explanation is given as to the cognitive processing that would result in a student being one or the other. Instead, these categories are justified through differences in behavior with holists being students who like seeing context from an overall perspective, whereas analytics refer to people who enjoy seeing a situation as a group of parts. Theory and research must explain why students have these characteristics. Simply describing a behavior is not an explanation.

### 1.1.2. A blend of borrowed constructs or measures

Often learning styles theories are a blend of borrowed constructs or measures from other, better-developed theories. Several researchers include styles that reflect differences in personality or self-regulatory skills. For example, Kagan (1965, 1966) used a task in which respondents were asked to match the same figures to measure impulsive/reflective styles. Dunn, Dunn, and Price (1989) included persistence as one of many unrelated learning styles. Persistence and impulsivity are better described and explained in the temperament literature as one of a number of temperament or personality traits (e.g., Martin & Holbrook, 1985; Martin, Wisenbaker, & Huttunen, 1994). A number of learning styles describe students as being visual or verbal learners (e.g., Richardson, 1977; Riding & Cheema, 1991), ignoring a considerable body of theory and research on verbal and visuo-spatial processing in working and short-term memory that does a better job of explaining individual differences in learning. Other research involves measuring spatial ability (visual processing), but under a different name. For example, Riding's (1991, 1998) measure of holistic/analytic styles and Witkin, Oltman, Raskin, and Karp's (1971) measure of field dependent/field independent styles are essentially measures of spatial visualization. Such measures assess one's capacity to find a simple figure hidden within a more complex figure (see Linn and Petersen (1985) for a review of the different spatial measures). Unlike the learning styles literature, the literature on spatial skills and personality includes research on the development of these skills and how these skills impact learning.

### 1.1.3. An ignorance of the research contradicting the theories

Most important, learning styles theorists have ignored the research that directly contradicts learning styles theories. There is substantial research showing that students are often skilled at both verbal and visual processing and that the two are correlated, that both types of processing are important for learning (as opposed to gearing instruction to only one learning style), and that both can be improved through instruction (as opposed to instruction designed to work within a given learning style). Other researchers (e.g., Gregorc, 1982, 1985; Honey & Mumford, 1989; Kolb, 1976, 1985) described students as being either concrete or abstract but ignore the considerable body of research showing that students who are concrete are either immature or delayed in their learning whereas more abstract learners tend to be advanced learners (e.g., Chi, Feltovich, & Glaser, 1981; Slotka, Chi, & Joram, 1995;

Taasobshirazi & Carr, 2009). In the case of the concrete/abstract dichotomy, the dichotomy is not a set of attributes but reflects the level of development of expertise and an individual's educational experiences.

## 1.2. Problems of measurement

Learning styles theories have critical problems with measurement. Specifically, the theories often use rank ordering, thus forcing a false dichotomy. Another problem is that many measures of learning styles use a self-report instrument that may not be a valid measure of behavior or skill level. Finally, most of the measures of learning styles have poor reliability and validity.

### 1.2.1. Use of less valid measures

Many measures of learning styles use rank ordering (e.g., Gregorc Style Delineator, Gregorc, 1982; Learning Style Inventory, Kolb, 1976, 1985), forcing individuals to be high in one learning style and low in the other. Rank ordering produces negative correlations between the constructs that are being measured so that the construct validity is inflated (Cornwell & Dunlap, 1994; Henson & Hwang, 2002). In addition, the false dichotomy created by rank ordering is not supported by measures that independently assess each construct.

A self-report instrument (e.g., Gregorc Style Delineator and Learning Style Inventory) may be affected by the respondents' honesty, memory (Runco & Okuda, 1988), and concern for social desirability. Specifically, social desirability may push examinees to report what they believe is preferred to be true rather than what is actually true. If reported interests are not matched with actual behaviors, any conclusions drawn from correlations with achievement are suspect.

### 1.2.2. Poor reliability and validity

The measures of learning styles do not have good reliability. The reliability of the Gregorc Style Delineator (Gregorc, 1982) has been reported as poor (Jonjak & Isaksen, 1988; O'Brien, 1990; Reio & Wiswell, 2006). Neither the original Learning Style Inventory (Kolb, 1976) nor revised Learning Style Inventory (Kolb, 1985) has good test-retest reliability (Atkinson, 1989, 1991; Freedman & Stumpf, 1980; Henson & Hwang, 2002). The Cognitive Style Analysis (Riding, 1998) showed a poor test-retest reliability (Rezaei & Katz, 2004). The reliability of the Verbalizer-Visualizer Questionnaire (Richardson, 1977) has been reported as poor (Sullivan & Macklin, 1986). If a teacher cannot replicate test performance using the same test then it is of little value.

The measures of learning styles have poor validity. The Gregorc Style Delineator (Gregorc, 1982) has been shown to have poor construct validity (Jonjak & Isaksen, 1988; O'Brien, 1990). Several studies have found that the Learning Styles Inventory has poor construct validity (Cornwell, Manfredo, & Dunlap, 1991; Freedman & Stumpf, 1980; Kolb, 1976, 1985; Platsidou & Metallidou, 2009). The Verbalizer-Visualizer Questionnaire (Richardson, 1977) has poor construct validity (Boswell & Pickett, 1991) and external validity (Edwards & Wilkins, 1981). The Cognitive Style Analysis (Riding, 1991) has poor external validity with measures that would assess verbal and visual abilities (Massa & Mayer, 2006).

## 1.3. Failure to link to achievement

Despite the claim that teaching to a learning style results in better achievement, there is little research showing that this is the case. Learning styles researchers assume that their measures will predict learners' preferences of instructional materials. They assume that teaching to a learning style will result in better academic achievement. However, a number of studies have shown that learning styles measures do not correlate with preferences of instructional materials nor does achievement correlate with learning styles (e.g., Mayer & Massa, 2003; McKay, 1999; Price, 2004; Riding & Agrell, 1997; Riding & Pearson, 1994). Research by Price (2004) indicated that learning styles as measured by the Learning

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