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ABSTRACT

Learning styles and the creation of effective learning environments are of emerging significance in education as the changing nature of work requires higher-order thinking skills. Although learning style may be simply defined as the way people come to understand and remember information, the literature is filled with more complex definitions of the term that tend to reflect the perspectives of different learning styles inventories. Learning style patterns are also defined in various ways. For example, they may be categorized according to perceptual, cognitive, and affective dimensions. The perceptual dimension of learning is influenced by physical and sensory elements that reflect the body's response to external stimuli. Cognitive styles of learning are learners' ways of receiving, storing, processing, and transmitting information. The affective dimension of learning encompasses all aspects of personality, with personality dictating how an individual acquires and integrates information. Finding ways to address different students' learning styles is a challenge. Vocational educators have a history of varied instructional practices through their promotion of hands-on learning and knowledge transfer. The advent of constructivism has expanded this tradition. A number of techniques that vocational educators can use to promote concepts of brain-based learning have been identified. (Contains 13 references) (MN)

Learning Styles and Vocational Education Practice Practice Application Brief

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PRACTICE APPLICATION BRIEF

Learning Styles and Vocational Education Practice

Learning styles and the creation of effective learning environments are of emerging significance in education as the changing nature of work requires higher-order thinking. Workers must be able to analyze and interpret information to solve problems for which there are no given answers; connect facts, concepts, and processes; integrate functional capacities and behaviors; and transfer thinking across environments (Brown and Pritz forthcoming). To realize their intellectual capacity, students must become engaged in learning, stimulated by information that is presented to them in personally meaningful ways. Learning styles research identifies a broad range of preferences that individuals have for the way they assimilate information and the implications of those preferences for instructional design. This *Practice Application Brief* examines the definitions, categories, and characteristics of various learning styles; describe the instruments used to assess learning styles and provides guidelines to help vocational teachers use information on learning style to create effective learning environments.

Definitions of Learning Styles

Although learning style may be simply defined as the way people come to understand and remember information, the literature is filled with more complex variations on this theme. James and Gardner (1995), for example, define learning style as the "complex manner in which, and conditions under which, learners most efficiently and most effectively perceive, process, store, and recall what they are attempting to learn" (p. 20). Merriam and Caffarella (1991) present Smith's definition of learning style, which is popular in adult education, as the "individual's characteristic way of processing information, feeling, and behaving in learning situations" (p. 176). Swanson (1995) quotes Reichmann's reference to learning style as "a particular set of behaviors and attitudes related to the learning context" and also presents Keefe's definition of learning style as "the cognitive, affective, and physiological factors that serve as relatively stable indicators of how learners perceive, interact with, and respond to the learning environment" (p. 2). These definitions have understandable variations as they tend to reflect the perspectives of different learning styles inventories. For example, the *Grasha-Reichmann Student Learning Style Scale* distinguishes among social interaction preferences, which includes behavior and attitude tendencies (ibid.).

Categories and Characteristics

Learning style patterns are also defined in a number of different ways. James and Gardner (1995) categorize learning styles according to perceptual, cognitive, and affective dimensions. Another useful method is to categorize various learning style models: personality models, information processing models, social interaction models ,and instructional preference models (Griggs 1991; Swanson 1995). Others categorize learning style by physical and sensory preferences, e.g., visual, auditory, tactile, and kinesthetic (Gentry 1990). Asselin and Mooney (1996) use brain hemisphericity to differentiate between right brain (global) and left brain (analytic) learners. An overview of these diverse learning style dimensions and their relationship to learning style instruments is offered as a framework for conceptual understanding.

For the purpose of this discussion, the three dimensions of learning offered by James and Gardner (1995) are used to differentiate among learning styles: perceptual, cognitive, and affective.

Perceptual

The perceptual dimension of learning is influenced by physical and sensory elements that reflect the body's response to external stimuli. It includes a range of perceptual elements: visual, auditory, tactile, and kinesthetic. Learning styles research shows that most people prefer learning by experiencing and doing (kinesthetic elements), especially when reinforced through touching and movement (tactile elements). Asselin and Mooney (1996) note that people remember 90 percent of what they say and do as opposed to 30 percent of what they see and hear. Although kinesthetic learners retain best, they make up only 5 percent of the population whereas visual learners make up 65 percent and auditory learners, 30 percent (Mind Tools 1998). The *Multi-Modal Paired Associates Learning Test (MMPALT)* is one instrument used to assess perceptual learning preferences (James and Gardner 1995).

Sensory preferences are also distinguishable among different cultural groups. For example, studies identify Native Americans, Alaskan Eskimo, and Mexican American children as "having strong visual perceptions in comparison to auditory, tactile, or kinesthetic modalities (Swanson 1995, p. 10). Also, in a study of instructional preferences of teenagers, African Americans showed greater verbal spatial and auditory preferences than whites, whereas whites had higher sequential processing skills (ibid.). Other research suggests that family teaching styles and values play an important role in directing a child's learning preferences, indicating that cultural patterns in learning styles do exist.

Cognitive

Cognitive style of learning refers to learners' ways of "receiving, storing, retrieving, transforming, and transmitting information" (Merriam and Caffarella 1991, p. 159). This dimension incorporates issues of right brain/left brain functioning (hemisphericity), global/analytical orientation (psychology), and field dependence/field independence (field articulation). It reflects the ways people think about and process information, e.g., the tendency for right-brained, global, and/or field dependent learners to view things broadly and left-brained, analytical, and/or field independent learners to require detailed outlines (ibid.).

Kolb describes learning as a process by which one moves from concrete experiences to reflective observations to abstract conceptualization and finally to active experimentation (Swanson 1995). Drawing upon Kolb's theory, Swanson describes ways in which people absorb information and make sense of an experience by categorizing learners as divergers, assimilators, convergers, and accommodators. These definitions reflect McCarthy's *4-MAT* model, which identifies types of learners as concrete, abstract, reflective, and active (Asselin and Mooney 1996), correlating how people absorb information (divergers and assimilators) and how they make sense of experience (convergers and accommodators (Swanson 1995, p. 5-6):

Divergers perceive information *concretely* and process it reflectively. They are called imaginative learners because they integrate experiences with the self and need to be personally engaged in the learning process. **Assimilators** perceive information *abstractly* and process it actively. They are pragmatists and place high value on skill development and problem solving. **Convergers** perceive information abstractly and process it *reflectively*. They learn by sequen-

tial thinking, and are attentive to detail. Accommodators perceive information concretely and process it *actively*. They are dynamic learners who relish change, risk-taking, and flexibility.

Several well-known instruments that define cognitive ability include *Kolb's Learning Style Inventory, Gregorc's Style Delineator, McCarthy's Hemispheric Model of Indicator*, and *Hermann's Brain Dominance Inventory* (James and Gardner 1995).

Affective

The affective dimension of learning encompasses all aspects of personality, with personality traits at the core initiating the evolutionary process of learning (Swanson 1995). Personality sets the stage for how one acquires and integrates information. It reflects genetic influences as well as the influences of culture, environment, and experiences. Two learning style models that emphasize personality are *Herman Witkin's bipolar construct of field dependence and field independence*, which measures the extent to which the learner is influenced by a surrounding field, and the *Myers-Briggs Type Indicator (MBTI)*, which assesses the relative strength of the processes of introversion versus extraversion, sensing versus intuition, thinking versus feeling, and judging versus perception.

The ways students interact in the classroom and deal with the elements of attention, emotion, and valuing are reflective of the affective dimension of learning. They reveal an individual's preferences for social setting and social constructs of learning, e.g., working alone, in pairs, on a team. The *Grasha-Reichmann Student Learning Style Scale* addresses these preferences by seeking student responses to questions concerning their attitudes toward learning, views of instructor and/or peers, and reactions to classroom procedures (James and Gardner 1995). Other instruments that address affective dimensions of learning include the Keirsey *Temperament Sorter* and *Honey and Mumford's Learning Styles Questionnaire* (James and Gardner 1995). Instruments that have proved to be effective in addressing all three dimensions of learning—perceptual, cognitive, and affective—are the *Productivity Environmental Preference Survey, Learning Styles Inventory Reliability Report*, and *the Learning Style Profile* (ibid.).

Applications and Instructional Strategies

Whether assessing individuals or cultural groups, it is apparent from the literature that learning styles differ. Finding ways to address these differences is a challenge to education. Vocational educators have a history of varied instructional practices through their promotion of hands-on learning and knowledge transfer. This tradition is now expanded through the advent of constructivism, which attests that people construct knowledge based on the shaping of internal mental models, using previous experience, taking into account sociological/emotional issues, and building problem-solving skills (Brandt 1996). Constructivist pedagogy is reflected in current school-to-work initiatives that require students to be active learners who draw upon perceptual, cognitive, and affective learning dimensions as they "test academic theories via tangible real world application" (Loring 1998, p. 1). It implies that instructors need to develop connections between brain functions and to teach in accordance with the way the brain operates. As Parnell (1996) notes, the brain tends to discard information for which it finds no connection or meaning or for which the meaning is obscure.

Brain research shows that the brain performs many functions simultaneously—thoughts, emotions, imagination, and predispositions—which are continually interacting within social and cultural contexts (Brown and Pritz forthcoming). This functioning for each individual is as unique as a human's learning style, which "is as individual as a signature" (Kussrow 1997, p. 9). The theory of brain-based learning supports the proposition that teachers must expand their repertoire of techniques for accommodating the students' diverse learning styles. It reflects the concept of multiple intelligences, which suggests that linguistic and logical-mathematical intelligences can no longer be "given preferential treatment over musical, spatial, bodily-kinesthetic, interpersonal, intrapersonal, and natural intelligences" (ibid., p. 10). Strategies for applying knowledge of diverse learning styles in the classroom may be developed by drawing upon the following techniques for promoting concepts of brain-based learning suggested by Caine and Caine (1990, pp. 66-70):

- Coordinate student learning experiences to draw upon and reflect the simultaneous processing of all brain functions.
- Introduce novelty, discovery, and challenge into the learning environment.
- Engage students in active learning processes, such as problem solving and critical thinking to help them develop personally relevant learning patterns.
- Create a supportive emotional climate.
- Provide learning experiences that engage the functions of both left and right brain hemispheres.
- Extend the learning environment beyond that in the learner's immediate focus.
- Incorporate awareness and reflection as part of the learning process.
- Draw upon the personal world of the learner to expand memory functions.
- Enhance spatial memory through experiential learning activities.
- Create in learners a state of relaxed alertness.
- Use a multifaceted approach to teaching that allows for uniqueness.

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