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COGNITIVE VERSUS LEARNING STYLES: EMERGENCE OF THE IDEAL EDUCATION MODEL (IEM)

By

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ABSTRACT

Societies have striven through centuries to develop educational systems that would foster the most idealistic educational outcomes among learners. A brief overview of the existing body of knowledge on this issue shows the recurring patterns of underachievement and the growing rates of student drop-outs which have motivated psychologists and educators to attempt at a pathological examination of the causes of student failure, and models of learning and cognitive styles which were proposed as possible explanation. The aim of this paper is to briefly review some of the most influential models and to draw readers' attention to inherent shortcomings of the models. The methodology used for this study was library research, where the author took notes to gather the data needed for this paper. After a brief review of the existing models, the paper proposes a more comprehensive model, which is called the Ideal Education Model (IEM) and recommends it as an alternative to the existing models.

Keywords: Cognitive Style, Thinking, Visual, Imaginal, Learning style, Democratic Education.

INTRODUCTION

According to Dornyei (2005), "research on cognitive style goes back to the end of the 19th century when scholars noticed that some people had a particular way of representing information in thinking, while others were visual or imaginal." Since then, there are ongoing investigations on styles. Research on styles had its peak only in the 1940s and 1950s when Witkin, Oltman, Raskin and Karp (1971) started to work on the issue of field dependence/independence.

Through the many research studies, which followed the work of Witkin et al., scholars succeeded to identify a great number of cognitive style features. Nonetheless, there has been some argument about the number and types of cognitive styles. While some people believe that there are more than 20 different types of cognitive styles, others believe that there should be fewer because not all of them reflect clear differences. This paper attempts to provide an overview for the reader with the notion of cognitive style.

What Is Cognitive Style?

According to Keefe (as cited in Salmani Nodoushan,

2007), cognitive style is the link between personality and cognition, which has an influence upon learning in general and the specific approach that people choose, while dealing with problems. Cognitive styles show how learners perceive, interact and respond to learning environment. Saracho (2001) argued that, cognitive style creates a method, which is flexible, plausible, pertinent and useful for investigating learning achievements, differences and problems. Saracho believes that, cognitive styles related to individuals' perceptual style, personality, intelligence and social behavior and experiences, are acquired by learner in home, school and society. Scholars such as Davis and Cochran (as cited in Ku & Soulier, 2009) mentioned several other factors which influence the cognitive styles. Such factors include social statuses, patterns of sex differences, process of visual decoding/encoding, etc. Goldstein and Blackman (as cited in O'leary, Calysn & Fauria, 1980) viewed cognitive styles as hypothetical constructs which have been developed to explain an individual's characteristic style of organizing information, and a model that explains the mediation process that happens between perception of the environment and an individual's response. In Hayes

and Allinson's (1998) opinion, cognitive styles have an influence on how people look at their environment for information; they determine how people organize and interpret the information, and how they use these interpretations to guide their actions. Kahtz and Kling (1999) believed that the influence of cognitive style can go beyond learning to include the interpersonal, social and psychological functioning of individuals.

Witkin, Moore, Goodenough and Cox (1977) defined cognitive style as the factor determining why individuals consistently exhibit stylistic preferences for the ways in which they organize stimuli and construct meanings for themselves out of their experiences. According to Riding and Rayner (as cited in Ling & Salvendy, 2009), a cognitive style refers to an individual's habitual way of perceiving, remembering, thinking, problem solving, organizing and representing information.

Jarvis (2005) also maintained that, it is the cognitive style which leads us to process information in a particular way, which is why people approach the tasks differently while dealing with different tasks. For example, some people prefer to break down a problem and think logically through each part and apply ordinary approaches, whereas others prefer to find their own, more novel procedures. In the view of Jarvis, individuals' cognitive styles can influence many aspects of learning ranging from their ability to use diagrams, text and practical tasks

Reference	Styles	Description
Witkin (1964)	Field dependent	Perception of an object or situation is altered by its context
	Field independent	Perception is more independent of its context
Hudson (1966)	Converger	Logical deductive approach to problem-solving
	Diverger	Intuitive and imaginative image to problems
Pask (1976)	Serialist	Working through a task one piece at a time
	Wholist	Viewing a task or situation as a whole
Gregorc (1982)	Active	Learns through experience
	Reflective	Learns through reflection
Allinson & Hayes (1966)	Active	Learns through experience
	Reflective	Learns through reflection
Paivio (1971)	Verbaliser	Information is most easily processed in verbal form
	Visualiser	Information is most easily processed in visual form

Table 1. Taxonomies of Cognitive Styles

to the sorts of subjects towards which people are oriented.

Cognitive Style Taxonomies

Jarvis (2005) summarized the different classifications of cognitive styles in an informative table. Table 1 is based on Jarvis's classification and is a brief overview of the different taxonomies of cognitive styles.

Riding and Rayner (1998) proposed a parsimonious, comprehensive and fundamental two-dimensional model for cognitive styles consisting of, (1) the wholist-analytic dimension which includes many sub-categories, and (2) the verbal-imagery dimension. The wholist-analytic dimension determines if a given individual is inclined towards organizing information into wholes or parts. It can be understandable if individuals "take a whole view or see things in parts" (Dornyei, 2005). On the other hand, the verbal-imagery dimension determines if the individual tends to present ideas and information through thinking or in terms of mental pictures. That is, a verbalizer prefers to work with verbal information. On the other hand, an imager finds it much easier to work with

Model Dimensions	Subcategories	Description
Wholist-Analytic	Field Dependence	Dependence on perceptual field for analysis of structures/parts within the field
	Independence	
	Leveling-Sharpener	Systematically forgetting details or retaining details in memory
	Impulsivity-Reflectiveness	Preference for providing quick versus deliberate responses
	Converging-Diverging Thinking	Narrow, focused, logical, deductive thinking in contrast to broad, open-ended, associational thinking
	Holist-Serialist	Preference for incremental versus global working on learning tasks and problem solving
Verbal-Imagery	Concrete sequential random versus abstract sequential-random	Tendency to learn through random versus sequential experience or abstraction
	Assimilator-explorer	Preference for seeking familiarity or novelty in problem-solving/creativity
	Adaptor-Innovator	Preference for conventional, established procedures or restructuring/new perspectives
	Reasoning-intuitive / active-contemplative	Development of understanding through reasoning or insight
	Abstract/concrete thinker	Preferred level and capacity of abstraction
	Verbalizer/visualizer	Using verbal versus visual strategies in thinking/to represent knowledge

*Adapted from Riding and Rayner, 1998

Table 2. Subcategories of the Riding-Rayner Two-Dimensional Model*

visual and spatial information (Dornyei, 2005).

The Riding-Rayner two-dimensional model subsumes a number of cognitive styles. The wholist-analytic dimension includes nine sub-categories of cognitive styles as shown in Table 2. The first subcategory within this dimension is the field dependence-independence cognitive style. It describes an individual's reliance on a perceptual field when processing an item which is part of that field. The leveling-sharpening subcategory (second sub-category) within the wholist-analytic dimension—describes individuals' tendency to assimilate and emphasize or lose details and changes in new information. A leveler has a tendency towards losing details or what Ausubel (1963) called systematic forgetting, whereas a sharpener emphasizes details and tends to keep them in memory. The third subcategory in this dimension is the impulsivity-reflectiveness sub-category. The impulsive individual has a tendency towards quick response while the reflective individual tends to provide deliberate response. Along the same lines, the converging-diverging category distinguishes between individuals with narrow, focused, logical, deductive thinking and those with broad, open-ended, associational thinking (Dornyei, 2005). The wholist-serialist thinking category describes individuals' tendency to learn either through incremental problem solving and learning tasks or through global assimilation of details. Still another category is in use, which is concrete sequential/random distinguished from abstract sequential/random. The former describes individuals' tendency to learn, randomly or sequentially, through concrete experience; the latter, on the other hand, accounts for sequential/random learning through abstraction. Still in another categorization, assimilators were contrasted with explorers. An assimilator seeks familiarity in the process of problem-solving or creativity, but an explorer aims at novelty in that process. In a similar way, the adaptor prefers conventional and established procedures, whereas the innovator prefers restructuring or novel perspectives in problem solving (Dornyei, 2005). The last subcategory of cognitive styles in the wholist-analytic dimension is the reasoning-intuitive/active-contemplative category. People with a reasoning-

intuitive style show a tendency for developing understanding through logic and reasoning. People with an active-contemplative style, show a preference for developing understanding by spontaneous wild guesses (Riding and Rayner, 1998). The subcategories of the Riding-Rayner two-dimensional model are summarized in Table 2.

The verbal-imagery dimension includes a number of sub-categories of cognitive styles. One such sub-category is the abstract versus concrete thinker sub-category. The abstract thinker is distinguished from the concrete thinker based on their 'preferred level and capacity of abstraction' (Dornyei, 2005). Along the same lines, the verbalizer is distinguished from the visualizer. The verbalizer uses verbal strategies to represent knowledge while the visualizer uses visual ones (Riding and Rayner, 1998).

Later in 2002, Riding argued that, wholist individuals tend to perceive any given situation as a whole, to appreciate the total context, and to have an overall perspective. Dornyei (2005) uses the term "big picture people" to describe the wholist. Wholist can easily lose sight of details. In reading comprehension, providing a title summarizes the content of the reading passage which will be a learning aid to the wholist. On the other hand, the analytic sees any situation as a collection of component parts. They often focus on one aspect of the whole at a time, and can decompose a situation into its parts.

What is Learning Style?

Learning style refers to the consistent way in which a learner responds to a given stimulus in a learning context. It is claimed that individuals' cognitive, affective, and physiological characteristics pass through to determine how they perceive, interact with, and respond to the learning contexts (Keefe, 1979). Stewart and Felicetti (1992) take learning styles to be on par with conditions which are conducive to learning. They are the descriptions of how a learner learns his/her best.

Taxonomies of Learning Style

A glimpse at the literature on learning styles shows that, there is a wide acceptance of the importance of learning styles. The many taxonomies of learning styles that have

emerged over the past few decades attest to their importance in educational settings. Learning styles are deeply rooted in groundbreaking personality theories which were proposed by the psychologists and psychiatrists of the early 20th century. For example, Carl Jung's personality theory introduced the extroversion-introversion dimensions of personality (Jung, 1933a). Later in the same year, Jung revised his personality theory and identified four psychic functions which drove human behaviors such as, thinking, feeling, intuition, and sensation (Jung, 1933b). The thinking-feeling dimension requires acts of judgment and thus determines rationality. On the other hand, the intuition-sensation dimension involves immediate experiences. This theory of personality was so strong that many psychologists over the years to come after 1933 tried to develop questionnaires and tools that could measure people's personalities based on Jung's theory. One such instrument was the Myers Briggs Type Indicator (MBTI) which was originally developed by Katharine Cook Briggs and her daughter, Isabel Briggs Myers in 1962.

According to Jung (1933b), introverts are inclined towards their inner worlds of ideas, concepts, and abstractions. Extroverts are interested in things and people. The sensing individual prefers to rely on his/her five senses while the intuitive individual prefers to rely on intuition (i.e., the sixth sense) to gather facts and seek patterns. Similarly, the thinker relies on analysis, logic, and principle, whereas the feeling person focuses on human feelings and values harmony. Along the same lines, judging individuals are self-starters, self-regimented and decisive, but perceiving individuals are able to adapt, curious, and spontaneous.

Early in the 1970s, Kolb proposed his Experiential Learning Theory (ELT), which employs two continua which make a quadrant : (1) the processing continuum (with doing-watching extremes or modes), and (2) the perception continuum (with thinking-feeling extremes or modes). The processing continuum describes individuals' approach to learning tasks, but the perception continuum controls individuals' emotional responses. This model is essentially an outline of two ways through which individuals grasp experience : (a) concrete experience versus abstract

conceptualization, and (b) reflective observation versus active experimentation (Kolb, 1984). The ideal situation, which is most conducive to learning, engages the four modes. In fact, Kolb's model assumes that optimal learning takes place if individuals enter into a learning cycle which consists of all the four modes. The combination of those modes turns up in what Kolb (1984) calls learning preferences (but others called learning styles). Those learning preferences have been summarized under four headings :

- Diverging: A diverging style engages concrete and reflective modes. A diverger or "feel-and-watch" individual prefers to observe and then reflect on the observation.
- Assimilating: An assimilator or a "think-and-watch" combines abstract conceptualizations and reflective observations. The assimilator prefers to use inductive reasoning to create theoretical models. This style makes it possible for the assimilator to pull together several observations in such a way as to create an integrated whole.
- Converging: Convergences or "think-and-do" individuals combine abstract conceptualizations and active experimentation. They apply ideas and use deductive reasoning to solve learning problems.
- Accommodating: Accommodators or "feel-and-do" individuals combine concrete experience with active experimentation. They prefer trial-and-error to thought and reflection.

Figure 1 is an illustration of Kolb's Experiential Learning Theory (ELT).

In Kolb's model, the perception continuum is responsible for experience grasping, and the processing continuum is responsible for experience transforming. Kolb's model stimulated the development of several other learning style inventories. Honey and Mumford developed a learning style inventory in mid 1970s that directly built on Kolb's ELT. They made adaptations to Kolb's model to come up with four types of learning styles : (a) Activist, (b) Theorist, (c) Pragmatist, and (d) Reflector (Honey & Mumford, 1986). The first change they made to Kolb's

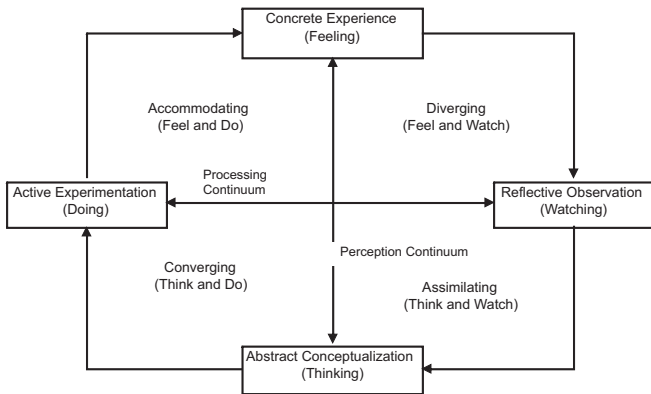


Figure 1. Schematic representation of Kolb's Experiential Learning Theory (ELT).

inventory was to rename its stages to (1) Having an experience, (2) Reviewing the experience, (3) Concluding from the experience, and (4) Planning the next steps. The second adaptation they made was to align the styles to the stages in the cycle directly. According to this model, in order to maximize their learning, individuals need to understand their own learning styles, and to search for learning opportunities using their styles. Honey and Mumford (1986) further argued that learning styles are not innate; rather, they can be acquired. The characteristics of the four learning styles proposed by Honey and Mumford (1986) are summarized in Table 3.

Another learning style inventory was developed by Gregorc and Butler (1984). Their model was an attempt at describing how the human mind works. The model employs two perceptual qualities (i.e., concrete and

Learning style	Attributes
Activist	Activists are those people who learn by doing. Activists need to get their hands dirty, to dive in with both feet first. Have an open-minded approach to learning, involving themselves fully and without bias in new experiences.
Theorist	These learners like to understand the theory behind the actions. They need models, concepts and facts in order to engage in the learning process. Prefer to analyze and synthesize, drawing new information into a systematic and logical 'theory'.
Pragmatist	These people need to be able to see how to put the learning into practice in the real world. Abstract concepts and games are of limited use unless they can see a way to put the ideas into action in their lives. Experimenters are trying out new ideas, theories and techniques to see if they work.
Reflector	These people learn by observing and thinking about what happened. They may avoid leaping in and prefer to watch from the sidelines. Prefer to stand back and view experiences from a number of different perspectives, collecting data and taking the time to work towards an appropriate conclusion.

* Adapted from Honey and Mumford's (1986)

Table 3. Attributes of Learning Styles in Honey and Mumford's (1986) Learning Style Inventory*

abstract) and two ordering abilities (i.e., random and sequential). According to Gregorc and Butler (1984), concrete perceptions engage the five human sense modalities to register information, whereas abstract perceptions have to do with intangible ideas, qualities, and concepts. They also argue that random ordering involves unordered organization of chunks of information, whereas sequential ordering involves linear and logical organization of information. Individuals are said to possess all four characteristics. However, certain perceptual qualities and ordering abilities are dominant in any given individual (Gregorc & Butler, 1984). As such, four types of learning styles can be distinguished : (1) Concrete Sequential, (2) Abstract Random, (3) Abstract Sequential, and (4) Concrete Random. Depending on the category in which learners belong to, they are expected to have different strengths. They are also expected to make sense of different things in their own specific ways. In addition, they will not experience the same difficulty when they face the same learning task. The questions they ask in the learning process will not be the same either.

Another learning style model, the Sudbury model, was originally theorized by Dewey (1916). According to Dewey, the aim and reward of learning is a continued capacity for growth, and the pre-requisite condition that leads to growth is democracy. Dewey's aspirations were later taken up by the Sudbury Valley School in Framingham, Massachusetts, in 1968. Other schools around the world started to follow this model, and today there are lots of schools around the world, that follow Sudbury's model of "democratic schools" or "free schools." These schools emphasize that there are many different ways to study and learn. According to the Sudbury model, learning is a process that the learners do, not a process that is done to learners. This model is an alternative to education in which learners are left to themselves to learn at their own pace, using their own learning style, and based on their personal freedom and responsibility for actions.

Still another learning style inventory was proposed by Fleming (2001). The model is in common use today. Fleming's model is referred to as the 'VARK', sometimes VAK model, and classifies learners as visual, auditory, or

kinesthetic/tactile learners. According to the VAK model, visual learners learn through seeing the thing. Auditory learners learn through hearing. Tactile/kinesthetic learners have a tendency to learn through experience. The VAK model also distinguishes a fourth class of learners, the reading/writing learner, who learns best through reading/writing. It should be noted that, learners may have some percentage of all learning abilities and that one ability becomes predominant.

Another important model for the classification of learners is Gardner's model of Multiple Intelligences (MI) first proposed in his seminal work *Frames of Mind: The Theory of Multiple Intelligences* (Gardner, 1983). Gardner proposed that, any individual possesses seven independent intelligences which collaborate to enable people to solve problems or perform tasks with varying degrees of skill. Earlier explanations of intelligence held that each individual possessed only one type of intelligence (verbal/linguistic or logical/mathematical). In 1999, Gardner reframed intelligence to include another type of intelligence which is known as 'Naturalist Intelligence'. Gardner's colleagues also argued in favor of two other intelligence forms : spiritual intelligence, and existential intelligence. However, Gardner himself favored the eight-intelligence frame of mind (Gardner, 1999).

In essence, the theory of multiple intelligences holds that there are eight modules of mind or societies of mind or intelligences:

- Verbal-Linguistic: Sensitivity to meaning and word order.
- Logical-Mathematical: Ability to handle logical reasoning or to recognize patterns.
- Musical: Sensitivity to melody, tone, pitch, and the like.
- Spatial: Accurate perception of dimensions and space in the world.
- Bodily-Kinesthetic: Ability to handle one's own body or other objects adroitly.
- Interpersonal: Ability to socialize, sympathize, or think by ideas bouncing from others.
- Intrapersonal: Ability to hold control over one's own emotions, views, and the like.

- Naturalist: Ability to appreciate the natural world.

A natural implication of the theory of multiple Intelligences is that different individuals will differ in their learning outcomes partly, if not completely, because of the type of intelligence that dominates their mind. The acceptance of this claim requires further confirmatory empirical research.

A more recent model for learning has been proposed by Jackson (2009). The model was an attempt at explaining the interface between curiosity, learning, and exploration. Jackson argued that 'Sensation Seeking' works as the main factor which provides the core biological drive. Jackson's model is called 'Neuropsychological Hybrid Model of Learning in Personality' (Jackson, 2009). According to this model, people with a high drive to explore need to be cautious that they should base their activities on emotional intelligence, deep learning, and goal orientation if they want to achieve such functional outcomes as high work performance. Otherwise, they face dysfunctional learning consequences. Being strongly grounded in the literature, the model explains both functional and dysfunctional forms of behavior. Earlier in 2007, Siadaty and Taghiyareh had argued that, performance is increased if training is based on conscientious achievement rather than on sensation seeking (Siadaty & Taghiyareh 2006). Jackson's model reinforced their claims by providing evidence to argue

Developer	Styles
Felder & Silverman (1988)	Active-reflective Sensing-intuitive Visual-verbal Sequential-global
Dunn & Dunn (1992)	Environmental Emotional Sociological Physical Psychological
Schmeck & Grove (1979)	Synthesis-analysis Elaborative processing Fact retention study methods
Cattell (1966)	Source traits Surface traits
Riechmann & Grasha (1974)	Participant-avoidant Collaborative-competitive Dependent-independent

Table 4. Less Popular Classifications of Cognitive Styles

that intervention is possible in conscientious achievement but not in Sensation Seeking because the latter has a biological basis.

Models of learning style described above are only a few examples from a rich repertoire of models. There are several other learning style frameworks. A detailed discussion of those frameworks is presented by Sternberg in *Thinking Styles* (Sternberg, 1997). A summary of these other models is presented in Jarvis (2005). A very short synopsis of some of them is provided in Table 4.

Salmani Nodoushan (2014) believes that a justified description of human learning requires an attention to certain facets that are presented in the Ideal Education Model (IEM) shown in Figure 2. The IEM assumes that the learner lives in Popperian world that is composed of objects (concrete or abstract) and relationships between objects (Popper, 1959). This world provides the learner with access to infinite input. The educational context, however, restricts the individual's access to the rich infinite input through the implementation of a global filter. This global filter includes a rich repertoire of social, cultural, political, economic, ideological, and educational considerations and restrictions that decide what proportion of the infinite input can be available to the learner; it changes the infinite input into available input. The individual, then, uses his/her five senses and intuition to capture the available input. However, any individual's five senses and intuition are under the influence of that individual's personal preferences and readiness (i.e., individual filters). The individual filters (i.e., economic, familial, cultural, genetic, ideological preferences) determine how much and which kinds of input will be subsumed by the individual (i.e., will change into intake). Once input is taken into the mind, the individual needs to retain it. However, retention itself is under the influence of individual filters. Some

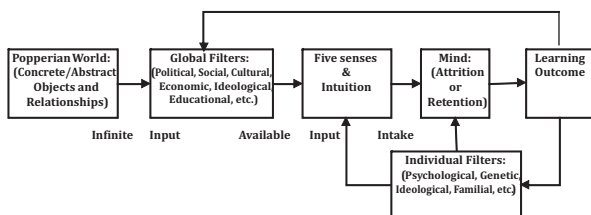


Figure 2. Ideal Education Model (IEM)-Developed by Salmani Nodoushan (2014)

fraction of the subsumed intake may be lost as a result of the function of the individual filter. The learning outcome is the end product of this process. The learning outcome itself affects the individual and global filters. Once learners grow, they modify their individual filters. In a democratic society, individuals are also able to change the global filter because each society is made up of individual citizens. The implication of this last consideration is that the model is dynamic in nature. Another implication of this model is that cognitive/learning styles are in fact facets of the global/individual filters.

Conclusion

The materials presented in this paper point to the fact that, the same educational system will not provide the same learning outcomes for different individuals, nor will it provide the same outcome for different societies. While many scholars attributed the source of this difference to individuals' preferred cognitive and learning styles, this paper argued that, those styles are not the only sources of difference in learning outcomes. It was claimed in the paper that, in addition to learner differences in terms of cognition and learning styles, global filters are a source of difference in educational outcomes.

Recommendations

Based on the discussion, it can be recommended that families, societies, and educational systems should strive for building an environment in which learners will have full access to the Popperian world of objects and relationships. The minimum acceptable policy adopted by societies in general, and educational systems in specific, should be to build an adaptable learning environment which presents knowledge in a variety of methods to address all learners' desires and aspirations.

It is important to remember that the IEM model presented here is a theoretical one, and needs to be evaluated in real practice. As such, the theoretical nature of the model can be considered as a limitation which needs to be addressed in future research studies. It is therefore recommended that teachers and educators put that model into practice to see what practical outcomes can be achieved through its theoretical assumptions.

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