Cognitive Styles in Students' Learning and Quality Education: An Exploration of the Fundamental Issues Underpinning

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Abstract

Cognitive styles are the area of education psychology research, getting more and more importance, due to advancement of learning technologies that assure individualized learning in line to students' individual cognitive styles, but irrespective of this; there are many issues related to existing models of cognitive styles. This review surfaced some key issues about development and nature of cognitive style models. Although the empirical evidence in individual research efforts about cognitive styles indicate their potential significance and role in helping students in their learning journey but certain key issues; narrows its application in the field. The revealed repetition of the styles in models and difficulties in practicability; can be visualized.

Keywords: Cognitive Style, Intellectual Style, Cognitive Style Models, Cognitive Style Model Issues, Cognitive Style Importance

INTRODUCTION

A child has unique characteristics, abilities and talents. Some of these are inbuilt, inborn and some are acquired from the environment. These unique characteristics determine the way, how he or she will react to a certain situation or will adopt the strategy to cope with the specific situation. Every individual may perceive a different or almost different way to benefit a situation.

In schools, individuals interact with different learning situations or challenges aimed to impart specific behaviors or attitudes in students. It is very important that the students achieve the same desired objectives otherwise, the activity will be fruitless. Therefore, if we want the desired objectives to achieve then we should consider and pay attention to the uniqueness of the child in all aspects. Being the focus of education, the child should be treated in its own natural way. When a child interacts with the learning challenges in school, engage in information processing; it is related to his or her own cognitive style. It is the internal mental activity to process the information. But when they interact with the environment and gets information from the environment in its own way; it is related to their learning style which This is its specific learning style. It is also related to external and base on senses used. Each student adopts different strategies to get and process the information that result in specific learning strategies. Some strategies may be very effective some may be not at all.

In other words, if students interact to a situation where the content presented is not in line with its cognitive style, learning style and do not know any learning strategy to cope the situation, will not be able to acquire the desired objectives. In this sense, we should consider the cognitive style, learning style and knowledge of students learning strategies to create desired behavioral changes in students in a cyclic process.

In regard to school, Riding (2000) describes that the activity is assigned to bring change in students' behavior. These behaviors can be categorized as

- i. Attainment/ achievement: a degree of learning
- ii. Learning behavior: attitude towards learning
- iii. Conduct behavior: how he/she perform an activity
- iv. Emotional behavior: feeling about him/herself and others

The above different behavioral outcomes can lead us to the estimation of school success or failure. Riding (2000) further described that above behaviors in the classroom are affected by following factors

- i. Home background
- ii. Peer influence
- iii. School
- iv. Individual characteristics

The school cannot change altogether the home environment of the child. To some extent it can control the peer influence. The only thing left to do by the school is to change its philosophy, culture and helpfulness to adjust according to the inbuilt/acquired characteristics of the student. Let us discuss the one cited the previous characteristic by looking at the fundamental dimension; that is the cognitive style.

COGNITIVE STYLE IN PERSPECTIVES

Riding and Rayner (1998) considered cognitive style as a preferred and habitual way to organize and represent information. Cognitive style affects the process of decision-making that subsequently affects the social attitude,

thinking and responses to life events (Riding, 2000). Cognitive style is different from the ability and is not dependent on intelligence, gender and personality. (Riding & Pearson, 1994; Riding & Agrell, 1997; Riding, Wigley, Eysenck & Eysrnck, 1991; Ridding, Burton, Rees & Sharratt, 1995).

Zhang & Sternberg (2005) labeled the style constructs into a unified integrated term and described it in a following way: "cognitive style, conceptual tempo, decision making and problem solving style, mind style and thinking style as an intellectual style They referred intellectual style as one's preferred way of perceiving information and dealing with tasks. An intellectual style to varying degrees is cognitive, affective, physiological, and sociological but, is cognitive because in each style there is some kind of cognitive engagement to process the information and to deal with task" (p.2).

Ziętek & Roehr (2011) referred cognitive style to "an individual's preferred and habitual approach to organizing and representing information. They further elaborated the concept with regard to the experts, that some consider cognitive and learning style synonymous and some draw a line to differentiate between these two concepts. Dornyei & Skehan (2003) differentiated cognitive and learning style, "A cognitive style is a predisposition to process information in characteristic manner while learning style is a typical preference for approaching learning in general."

Cognitive Style and Human Attributes

Alloway, Banner et al., (2010a) established a relationship between the working memory and cognitive style. Student having low working memory inbuilt with an analytic cognitive style performed worst in English, math and science subjects. However, the students with high working memory and having analytical cognitive style and in Wholistic cognitive style the working memory have little effect on learning outcomes. So the interplay between working memory and cognitive style can be researched to support struggling students, whereas Riding, Grimley et al. (2003) suggested that verbalizers and analytics with a low working memory may be a victim of worse situation as they need high working memory for processing information. Alloway, Banner et al. (2010b) further argued that cognitive styles and working memory interact to influence the learning outcomes. Tinajero, Lemos et al. (2012) discovered that field independent students perform better than field dependent students. They observed this trend in cross culture studies as well.

Armstrong (2001) established the relationship between the cognitive style of supervisor. The Analytic cognitive style of the supervisors were related to higher grades of students dissertations in a research program of management education. Armstrong, Peterson et al. (2012) defined cognitive style as "Cognitive styles refer to individual differences in peoples preferred way of processing (perceiving, organizing and analyzing) information using cognitive brain-based mechanisms and structures. These are assumed to be relatively stable and possibly innate. Whilst cognitive styles can influence a person's behavior, other processing strategies may at times be employed depending on task demands – this is because they are only preferences." Cognitive styles affect the perception of a motor task and thus indirectly affect motor tasks (Yan, 2010).

Ziętek & Roehr (2011) described that learner's awareness of the concept of cognitive style and awareness of his/her own stylistic orientation (Wholistic, analytic or neutral) constitute the part of their person knowledge. A learner's interpretation of how to go about resolving an item on the test of metalinguistic knowledge and the perception of the difficulty of the task constitute the task knowledge that is knowledge of strategies which are likely to be effective in completing the task in hand. These strategies may be different in different tasks.

Person knowledge and strategy knowledge can help students effectively in their academic affairs. Zhang (2002) identified that field independent teachers have greater expectations for students, a greater number of academic interactions and their students have greater achievements as well. Majority of studies indicated that a teacher's cognitive style, as well as match and mismatch of teachers and student's cognitive style do make a difference in teaching and learning in schools. Sternberg & Zhang (2005) broaden the sphere of cognitive style to assessment and instruction. They concluded that assessment and instruction should be matched with students thinking style otherwise; this mismatch may lead to poor performance in assessment and poor learning from instruction.

From above discussion, it is clear that cognitive styles are important factor in child education. Educationists should care for cognitive styles because these may inhibit or foster the educational process and efforts. That is why in last 30 years, immense literature has been contributed for this field. This scattered and broad research in this field has contributed numerous labels for these constructs. There are as many models of cognitive style as cognitive style labels. So efforts are made to integrate research related to cognitive style construct. Following integrative models are an attempt to provide one platform and explanation to cognitive style constructs.

Models of Cognitive Style

Curry (1983) organizes nine major learning style measures into three onions like layers. The inner most layer consists of dimensions measuring personality. In the middle there are dimensions assessing/measuring information processing. The outermost layer is made up of individual instructional preferences. The degree of modification of styles decreases from the outermost layer to the central layer.

Miller (<u>1985</u>) described the cognitive style as "it is a consistent strategy that a person displays in attempting to solve problems. Zhang (<u>2005</u>) commented on the miller's model (1985) and suggested that cognitive styles exhibited, are arranged in subordination/subsidiary to analytic-holistic dimension. The Analytic aspect of the style gives birth to field independent, sharpening, convergence and serial information processing. The counterpart, holistic pole give rise to the field depended, leveler, diverger and wholistic information processing. In Miller's, viewpoint the analytic-holistic dimension give rise to individual cognitive styles which leads to durable, long term individual differences in cognitive processing but these do not bear absolute consistency. He arranged cognitive style into four orthogonal dimensions that give rise to differences in processing of information in individuals.



Mood and encountered situation may change our position on these four dimensions. However, it is not like that, we can adopt any dimension solely on our will. Let us briefly elaborate the discussions. In one hand, the analytic holistic aspect of one's thinking style, the analytic tendency is the result of the belief that the best way to understand and solve the problem is to break the problem into parts to facilitate detail and to reach at comprehensive understanding. Therefore, in analytic tendency, the problem is reduced in to small problems to get understanding and solution. It is based on empirical evidence. On the other hand, the holistic dimension is concerned with the belief that some time when we go in detail of the problem, then there may be inability to appreciate the problem overall and attention may trap in only just sum of all small individual problem. The holistic view enables to see the total problem in its context. It paves the way for intuition and appreciation of the problem in its totality.

Whereas objectivity leads to the degree of acceptability of mere facts, as a result, there is totally a separation between the problem and an individual's feeling and emotions. On the contrary, the subjectivity indulges in emotions in dealing with the problem. The analytic-holistic dimension enjoined with an objective-subjective element can possibly give rise to four basic cognitive styles namely; objective analytic, objective holistic, subjective holistic and subjective analytic.

Ridding & Rayner (1998) discussed the origin of style theory and concluded that cognitive style theory developed from origin and research in following psychological areas:

- i. Perception
- ii. Cognitive control and cognitive process
- iii. Mental imagery
- iv. Personality constructs

The work in the above four psychological areas gave rise to an extensive list of style labels. These all labels came into existence from two distinct style families; a Wholistic-Analytic and Verbal Imagery Dimension (Ridding & Rayner, 1998). The diagram No.2 shows the different cognitive styles merged into two broad dimensions: Wholistic-Analytic and Verbal Imagery Dimensions.

According to Riding (2002), the way to view an event is affected by cognitive styles and this effect subsequently leads to, "how person responds, think and make decisions about life events." Cognitive styles affect attitudes about others. It is automatic respond to a situation. It is consistent in a person, it may not change, but when

a person become aware of his/her style he/she may develop and use strategies to overcome or lower the weaknesses and utilize their strengths effectively Thus, there are two ways of this automatic response to an event. Individuals may take a whole view or even see things in parts. A Wholists see things in overall perspective and achieve total context appreciation. The analytics see an event as a sum of individual parts and can concentrate on one or two aspects of the situation. In the middle of these two extremes, there are intermediates having some advantages of both wholists and analysts. The wholists have blurred whole view and analytics have distorted view of an aspect. Wholists see the whole picture so they are less likely to have extreme views as compare to analysts.

In a verbal imagery dimension, which is related to a mode, that people adopt to represent the information during thinking, verbally or in images. It is commonly divided into three categories; verbalizers, imagers and bimodal. The verbalizers represent information in words/verbal associations in the process of thinking. They are active socially and outward. The imagers represent information in the form of pictures/image association in the process of thinking. They are passive socially and inward. The bimodal: They tend to use either mode of representation. They are in the middle.



Figure 2 : The merged cognitive styles in two broad dimensions

In combination, with counterpart style dimensions the possible cognitive style can emerge as; Wholist-imager, Analytic-verbalizer, Intermediate Bimodal, Analytic-Bimodal, Wholist-Bimodal, Intermediate-Imager, Intermediate-Verbalizer, Analytic-Imager. In a situation where a style becomes inappropriate, the other dimension may be to use an alternative. If an analytic –Imager becomes unable to appreciate completely, then as a strategy he/she can have a whole view of image to get a wholist view. The reflective- impulsive model was not incorporated in Riding's model (1998).

Zhang, Sternberg, and Rayner (2012) described that they arranged a considerable number of style labels by grouping them into three distinct traditions. First one is; Cognitive Centered Tradition. These style labels most closely resemble abilities, such as Field Independent/Dependent Style. Measures used for these style labels consist of right and wrong answers. These are related to performance. The second one is; Personality Centered Tradition. These style labels are treated as personality traits. Typical tools are used to measure these styles for example, the styles of personality described in personality theory of Jung. Lastly, the Activity Centered Tradition. This style considered both kind of activities described and in domain of the both personality and cognitive-centered types. Deep and surface approach is the example of Activity-Centered Approach.

Zhang & Sternberg (2005) developed a threefold, 'Model of Intellectual styles' based on three types of thinking styles identified in theory of Mental Self-Government and styles literature. This model dealt with four issues of existing cognitive style models. The first one is; Criteria for style construct to be included in Threefold Model of Intellectual Styles and Style Construct included. In this model the Existing, style models were selected and

included in this threefold model of intellectual styles on the base of their common consideration and influence in literature, operationalization and empiricity tested at least against one other style construct. Considering above observation, there were 10 style constructs/models selected to be incorporated in the threefold model of intellectual style, Thinking Style (Sternberg, 1995), Learning Approaches (Biggs, 1978), Modes of Thinking (Torrance,1988), Jung's personality type based styles (Myers and McCaulley,1988), Career Personality Types (Holland (1973), Mind Styles (Gregore, 1979), Adaptation- Innovation decision making and problem solving styles (Kirton, 1961,1976), Reflective-impulsive styles (Kagan et.al., 1964), Divergent-Convergent Thinking (Guilford, 1950), Field Independence-Dependence (Witkin,1962).

The second issue dealt by Zhang & Sternberg (2005) investigated the intended measurements and a desired kind of evidence that these style constructs seek. This review revealed at nine out of 10 reviewed style constructs are value laden and their measured output carry some value socially, morally, or intellectually. The one style found value free was Kirton's (1976) decision-making style. The Research findings indicate that styles change gradually and develop over a period and these can be taught and learned. All these styles were related to each other in some way.

The next issue on their list was the nature of Intellectual Style. The categorized the intellectual styles into three categories or types. First type: is related to some kind of performances mostly desirable and, considered an ideal for humans. The second type is of undesirable humanistic styles. Whereas the third type of Intellectual Styles have characteristics of both first and second type depending upon the individual and social interest. They classified intellectual styles in to three types on the base of their nature

- a) Type 1 Intellectual Style
 - These are the performances mostly desirable and considered ideal for humans such as low degrees of structure, cognitive complexity, divergent thinking, and liberal thinking styles.
- b) Type 11 Intellectual Style These are usually not desirable humanistic styles such as conformity and authority, surface learning approach, convergent thinking and the field dependent perceptual style.
- c) Type 111 Intellectual Style These types have characteristics of both Type 1 and Type 11 intellectual styles depending upon the interest of individual and interest such as achieving learning approach, introversion, and extroversion.

Zhang & Sternberg (2005) in their model also tried to resolve the controversial issues identified in their discussion of intellectual styles. The first one is the issue whether a style is a trait or state. They considered these as states because these, can be learned, socialized, developed over a period and vulnerable to change. However, their status as a state does not means that they constantly change. They are normally stable. The second issues were about the value nature of these styles, they concluded that the first two types have value associated with them whether negative or positive. So these are value laden. Type 1 thinking styles are normally positive, but type 11 are negative. Type 111 styles may be positive or negative, as these may fall in Type 1 and Type 11 as well. The third controversial and conventional issue was the similarity or distinctiveness of styles. In their model, they included 10 models that have some kind of correlation with at least one other style construct.

In 2009, (<u>Sadler</u>) proposed that there are two basic information processing modes that may be used in the process of decision making and problem solving; intuitive and analytic styles. The intuitive mode is considered more affective, fast in operation but has slow formation. The analytic mode is not affective, relatively slow in operation but has fast formation. An Intuitive style is cognitively undemanding, is imagistic and can never be consciously available. The Analytic mode is cognitively demanding, symbolic and consciously available. Duplex model has the characteristic of changeability in its proposed styles. A person can develop inclination toward usage of two modes when encounter over a variety of specific tasks over a period. A Versatile style is formed at flexible level, but at specialized level.

DISCUSSION AND CONCLUSION

Psychologists, educationists, corporate researchers and social scientists researched on many aspects of cognitive styles. Multidisciplinary applications of cognitive styles helped researchers to explain individual differences in receiving information, responding to the situation and development of different attitudes (Riding, 2002)

Efforts to explain real world situations in perspective of cognitive style are the result of people's belief that cognitive styles are responsible for variations in performance that are considered beyond the explanation of abilities (<u>Sternberg & Gregorinko, 2001</u>).

There are many models of cognitive styles, but we contend that a few of them are practical and can be used in educational settings. Some of the proposed models even seemed to struggle to give a clear concept of cognitive styles and differentiate them from abilities and other constructs of cognition. There is need to see the cognitive style models in perspective of educational perspectives. Cognitive style is now valid and emerged an area of interest for the researchers, its application and relationship to educational practices can facilitate to students and teachers to achieve the desired overall educational activity outcomes.

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