

ROLE OF THINKING STYLE IN CONCEPT FORMATION

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Introduction

There has always been an immense interest in the analysis of individual differences in educational psychology. Educational psychologists have understood for long time that an important key to facilitate student's thinking is to deal with individual differences in cognitive functions. Thinking is the central theme of educational psychology and research because of the complexity and importance of this process for the evolution of society. Human beings are unique among all living organisms and their primary adaptive specialization lies in identification with the process of learning and thinking. Individual differences observed in the acquisition and process of information during thinking results in style differences in learning and thinking.

With the beginning of the cognitive styles movement in the late 1960's, investigators have been studying the roles of stylistic variables in student's concept development. Sometime, students do not know how to think and study properly and effectively. They must realize the importance and objectives of having knowledge, skills and attitudes which are significant in their future employment. Traditionally, individual differences in abilities were used in explaining student's success or failure in academic achievement. In recent years, researchers have become more interested in exploring the effects of stylistic variables on concept formation and academic achievement. Ability measures account only for small proportion of individual differences in school performance, but construct of style as non-ability measure has significant predictive power for student's academic achievement. When various factors are examined, style has been considered as one of the important factors by researchers. In the past 20 years, the study on learning and thinking styles, both theoretical and applied simultaneously sparked a strong interest.

The educationists, philosophers and psychologists have accepted that 'learning' and 'thinking' are the key processes. It is necessary to make the child learn and the whole education to be self-learning oriented. Teacher teaches in the classroom with the aim to provide maximum learning experiences to students, but in same class and same atmosphere, two students do not learn in the same way because many factors affect their process of learning. Learning style is one of the factors, and every student has his/her own learning style. Learning is a process of accumulation of knowledge, skills, attitudes and values through study, experience or teaching which causes a persistent, measurable change that is specific at a behavioral level.

The way each human being processes, retains, integrates and begins to focus on new information and skills determine their preferred learning style. Learning is related to thinking and as individual differences intervene, specific styles are used in learning and thinking processes. Thinking refers to the use of cognitive skills such as posing and answering questions, searching memory, processing information or evaluating potential solutions to the problem. It involves formation of concepts. In the classroom, the teacher teaches and the process of learning and thinking helps the

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students to develop concepts related to the topic. Thinking is the mental process and it helps in the formation of concepts.

Thinking styles refer to an individual's preferred way of mentally processing information (Sternberg, 1999). It is important to generate knowledge about thinking styles and consider all the students as individuals with their unique traits to cater the needs of students for promotion of concept formation. The effective adaptation to the situation, the use of student's knowledge relative to the whole complex of factors that characterizes a particular context is possible by designing the main dimensions of the educational process, teaching learning and self evaluation based on quality standard issues related to learning and thinking styles. The harmonious relationship between learning, thinking styles and mental process promotes concept formation. The knowledge regarding styles of thinking can serve as an important tool in helping individual to improve the application of cognitive functioning and performance.

What Is Thinking?

All cognitive activities and processes are controlled by the thinking process of human beings. Information received from the environment involves manipulation and analysis of it. For example, when we see a painting, we not just focus on the color, lines and strokes of the painting. Our mind tries to focus on the deep meaning of the painting and also tries to relate it to our existing information and knowledge. Relating new knowledge with the existing one, makes clear understanding of the painting. Therefore, thinking is the process that totally involves mental part of the human being. It manipulates and analyses the acquired information which comes by the means of abstracting, reasoning, imagining, problem solving, decision making, etc.

Thinking is the mental process which is organized and goal directed. Our daily activities have some goal, either we do household work or we solve a difficult problem. All these activities are done by planning, or by repeating the same steps that has been done by someone else, or new planning is made if the task is new. We can also say that, thinking can be inferred from the observable behavior. We can take an example of a chess player. Before taking a next move, a chess player thinks a lot which is not observed by us. We can only infer or interpret what he was thinking only after the move taken by him.

Knowledge which is represented either in the form of mental images or words involve the process of thinking. Thinking process is usually done by the means of mental images and words. There are two different examples that shows people think both by means of mental images and words depending on the situation. 1st example represents process of mental images i.e., If a person wants to go to the place where he has visited long back, he would have to use the mental images of the street and other places to recognize the place. On the other hand, when a person buys a book, his thinking process is based on words or concepts because in this example his choice depends upon his knowledge about different authors, publishers, etc.

Thinking has been emphasized as 'the defining attribute of man', 'a purely human characteristic' and 'a marvelous distinguishing property' as W. Edgar Vinacke calls it. Human experience consists of countless varying events, persons, things, places having their own distinctive exquisite cognitive impressions on the organism. They form part of an abstract mental comprehensive capacity in the form of 'Rationality'. Thinking as a constituent of Rationality is an important aspect of human behavior.

The Student's Dictionary of Psychological terms defines thinking as *“Any non-perceptual process or an activity not predominantly perceptual by which one apprehends an object or some aspect of an object or situation”*

Stout defines thinking as, *“Process of progressive explication or details in an implicitly apprehended whole.”*

Descartes explains the thinking process in relation to mental functioning. *“The mind is a substance with no extension, whose essential nature is to think.”* *“The mind is essentially active-its activity being to think.”*

Thought and Thinking are mental forms and processes respectively. Thinking allows beings to model the world and to deal with it according to their objectives, plans, ends and desires. Words referring to similar concepts and process include cognition, consciousness, idea and imagination. Thinking involves the mental manipulation of information, as when we form concepts, engage in problem solving, reason and make decisions. Thinking is a higher cognitive function and the analysis of thinking processes is part of cognitive psychology. Actually ‘thinking’ is very complex process because it is the combination and manipulation of both the things, i.e., the information what we get from the environment and the symbols that are stored as long-term memory in our mind. Thinking has been defined as following-

Mohsin (1967), *“Thinking is an implicit problem-solving behavior.”*

Garret (1968), *“Thinking is behavior which is often implicit and hidden and in which symbols (images, ideas, concepts) are ordinarily employed.”*

Valentine (1965) *“In strict psychological discussion it is well to keep the thinking for an activity which consists of a connected flow of ideas which are directed towards some end or purpose.”*

Thinking is defined by **Garret (1975)** as 'a behavior which is often implicit or inner, in the sense of not being readily observable. It is carried on by slight muscular movements and by mental images representing a variety of 'symbols'. Gilmer defines that thinking is a problem-solving process in which we use ideas or symbols in place of overt activity. These definitions explain that thinking is a process of internal representation of external events of past, present and future. Hence it refers to a pattern of behavior in which man make use of internal representations such as symbols and signs of the things and events for the solution of some specific purposeful problem.

Therefore, thinking may be defined as a pattern of behavior in which we make use of internal representations (symbols, images, signs etc.) of things and events for the solution of some specific, purposeful problem. Thinking is a process by which a student improves through psychological interactions with acquired expertise, developing new cognitive structures, rules, and beliefs.

Concepts

Our world is filled with sets of objects, events and ideas that share some common quality while differing in other characteristics. An organism that learns to respond to the common quality of a given set has learned a concept. The child, for example, learns the concept of “blueness” when he is able to select a ‘blue’ balloon or a ‘blue’ ball from similar objects of different colors. When he makes this conceptual response, he is abstracting the ‘blueness’ from other properties of the

objects, like size, shape or function. Similarly, the child learns the concepts of right and wrong when he discriminates between socially approved and disapproved behavior.

We always try to identify the familiar or unfamiliar objects or events which we come across in our daily life by comparing its characteristics with the existing category of objects and events in our mind. For example, after seeing a banana we categorize it as fruit. Similarly, when we see a chair or a dog, we categorize it as furniture, an animal respectively. After seeing a new object, we always try to compare its characteristics with the existing one, and if it matches with the existing one we include that object in the same category. Thus, we can say that a concept is a mental representation of a category which categorize the objects, ideas and events according to their common characteristics.

Concept is a word or symbol which indicates a class or group, e.g., flower, river, beauty, love, etc. Concept is 'a category' which is formed on the basis of those characteristics or attributes which are similar and also essential to a particular classification. The essential characteristic of concept is commonness or similarities among phenomena. Almost all educationists and psychologists who have defined concept have laid emphasis on the existing common characteristics in examples. Dececco (1970) defines concept as "a class of stimuli which have common characteristics." According to Bourne et al. (1971), concept is "any describable regularity of real or imagined objects or events." Good (1973) defines it as "an idea or representation of the common element or attribute by which groups or classes may be distinguished".

From the above definitions it can be said that concept is that form of data or content which places ideas, objects, persons or events into a category, taking into account their similarities and ignoring differences, and which is expressed through the medium of words or symbols. Thus concept is not a mere memorization of individual facts or words. It is a generalized mental image based on the common essential attributes in different unique phenomena. For example, 'vehicle' is a concept based on the common attributes, viz., mobility and means of transportation, in different things such as bicycle, motor car, truck, ship, etc. All these are the members of the same category on the basis of their common attributes but each one of them is unique because of its peculiar features such as shape, size, color, which are not essential for the concept 'vehicle'.

Concept learning is a naturally occurring process in people of all ages. In a restricted meaning, concept learning refers to any activity which requires a learner to group two or more objects together (Johnson 1971). This classification activity involves the act of generalizing within classes and discriminating between classes. Through generalization and discrimination, a learner groups various objects or events into categories on the basis of their similarities ignoring differences. Each category represents a different concept. This type of concept learning is called concept formation.

Concept Formation

Concept formation is a process of developing abstract rules or mental constructs based on sensory experience. Concept Formation figures prominently in cognitive development and was a subject of great importance to **Jean Piaget (1936)**, who argued that learning entails an understanding of a phenomenon characteristics and how they logically linked. **Noam Chomsky (1959)** later argued that certain cognitive structures such as basic grammatical rules are naturally in human beings. Psychologists use the term 'concept formation' or 'concept learning' to refer the development of the ability to respond to common feature of categories of objects and events or ideas that have a

common set of features. Concepts allow us to classify objects and events. In learning a concept, one must focus on the relevant features and ignore those that are irrelevant.

The objectivist theory explained the first step in concept formation, called 'differentiation' is to isolate two or more things as belonging together, as 'units' of the same class. Where many theories of concept formation hold that such isolation begins by noticing degree of similarity objectivism holds that it starts by noticing degrees of differences. At the perceptual level everything is different, however, something are more different from others. The difference between two tables, for instance, is less than the difference between a table and a chair. Because two tables are less different from one another when contrasted against a third object, we group them together as 'Units' as members of a group of similar objects. The 'second step' of concept formation, 'integration' is based on a process called '*measure omission*'. For example, when forming the concept '*table*' we retain the distinguishing characteristics a flat, level surface and supports but omits the particular measurements of those features. Based on the two-step process, concepts are defined as 'a mental integration of two or more units possessing the same distinguishing characteristics, with their particular measurement omitted'.

Thinking style

The attentions of many educational scholars and educational psychologists have been attracted towards individual difference variable of human performance which can be defined as Styles. Many root words for the term 'Style' have been created with different labels. Cognitive styles, learning styles and thinking styles are the most frequently terms which are used. These three types of styles differ with each other in concepts, but there is one similarity among them i.e. all the three are differ from abilities. What a person can do by himself/herself is termed as ability, whereas Style can be defined as how a person uses his/her ability to do any work.

Thinking styles are frequently studied in educational concepts since thinking is the core component which shapes the learning environment. The way the individual thinks, leads to thoughts which is one of the main aspects of human being as stated by Cloninger (2008). Thinking style is at forefront of research. Thinking style profile is used in all areas where skill in communication and the need to understand how other people think and learn are critical to success.

Some of the views about thinking styles are as follows:

Hermann (1996), "*Thinking style preferences reflect the ways in which individual approach challenges and problems*".

Sternberg (1997), "*Thinking style is the way people govern their own lives in everyday living, just as the government does for the society*".

Zhang & Sternberg (2000), "*Thinking style refers to the way an individual prefers to process and manage the intellect and knowledge*".

Researchers have described a variety of different thinking styles:

- An up scale process of mental knowledge that involves reorganization of situational elements of a problem in a new way so as to allow the realization of relationships or the solving of problems. This process includes thinking as well as other mental and cognitive processes, including attention, perception, and memory in addition to skills such as classification and conclusion, analysis, synthesis, and comparisons of circular and other arguments (El-Maati, 2005).

- Different styles of thinking define the way that people organize, or consider, their answers and approaches to positive procedures. Importantly, styles of thinking do not refer to the skills used, such as intelligence, but rather to how people choose their thoughts. Analysis of thinking styles is also concerned with how people respond, or choose to respond, to a given occurrence (Kim & Song, 2012).

We consider that the thinking style represents the profile of correlation of generation, selection, sense transfer, realization functions in the innovation creation processes in accomplishment of thinking tasks. So we come to the opinion that the style of thinking represents manifestation of individual emotional-attitude complex as a common controller of psychological system in human thinking activity. In this case the thinking style acts as one of the controllers, which determines dynamics and stability, nature of activity.

Thinking styles refers to the way a person's natural tendency in processing information - including the qualities of thinking processes as well as types of thinking. Understanding of a person's thinking style is important in all areas of social dealings. For example, from the perspective of education, understanding a person's thinking style is important as it contributes towards effective teaching and learning. Learning involved thinking and each student has different thinking and learning styles that needs to be understood by a teacher.

Role of Thinking style in Concept Formation

Thinking style can be considered as the factor which is the basis for individualization of education and education of a person on the whole. We suppose that established forms and methods of education in the educational system do not always correspond to those thinking styles, which are developed. Although educational system, education technologies are largely one of the factors which influence thinking styles formation.

Pondering the meaning of a black hole, solving the daily scrambled word or anagram puzzle in your local newspaper, and deducing what your bridge partner has in mind with that last strange bid. These are everyday examples of the three main activities experimental psychologists study under the general heading of *directed thinking*: concept formation (the black hole example), problem solving (the scrambled word example), and reasoning (the bridge example). In directed thinking, symbols, whether words or images, are manipulated secretly to achieve a particular objective. These manipulations clearly involve higher order processes, that is, processes that are more complex than the lower order processes governing perception, memory, and so on.

Why do we need to form concepts? The term concept formation describes how a person learns to form classes, whereas the term conceptual thinking refers to an individual's subjective manipulation of these abstract classes. A concept is a rule that may be applied to decide if a particular object falls into a certain class. Concept formation helps us to save our time and effort by organizing our knowledge. At home, we all do the same thing, i.e. we all keep our things organized so that it becomes easier to get it. For example, children put their books, pen, pencil, etc. organized at their specific places so that they can find it easily in the morning. Similarly, we all form concepts and categorize them according to their specific characteristics for quick and efficient thought process.

What is thinking and understanding? In the cognitive sciences the term 'deep understanding' generally refers to how concepts are "represented" in the student's mind, and most importantly

how they are “connected” with each other. Representations are generally made in the form of images in simple cases, and in the forms of models in more abstract situations. Deep understanding then means that the concepts are well represented and well connected. As such deep understanding of a subject involves the ability to recall many connected concepts at once, where every single concept has a deep meaning in itself. Deep thinking then involves being able to make further connections between the webs of concepts. Deep thinking involves the construction of new concepts and is almost always based on what the student already knows. When a learner “make sense” of new material he is able to make connections between different concepts.

On the basis of the amount of control over mental functioning and vividness of experiencing, the thinking process is divided into certain categories. Affective and cognitive processes in the form of imagination and reasoning culminating in what can be called autistic and Reflective thinking respectively provide two distinct categories. Thinking whether on the plans of imagination or reasoning is purely a personalized process. In the words of Ward, *"Strictly speaking everything that truly is, at all, is individual."* The sets systematizing the mental organization which distinguishes the reactions from one organism to another need special emphasis here. These are termed as ‘concepts’, attributes, sets, traits, motives behind the personalized thinking process. They give variedness, individuality, originality and vividness to the concept formation. Thinking as future recall by 'adoption of an attitude or a frame of mind' (Ryle) is a cultivation of thinking attitude involving reflection, reasoning, resourcefulness, judgment, creativity, based on a flight of imagination.

Mr. B. Russell in his work 'Analysis of mind' explains the process of thinking. He believes in the existence of images which can neither be denied nor reduced to movements of the body. While thinking, the mind may take two turns. (1) Form of image (2) or form of words.

Categorizing an event in a definite identity involves an act of inference which leads to the attainment of concept. Concepts may be regarded as a kind of selective system in the mental organization of a person. Concepts are organized systems which have dynamic function in the process of thinking. As stated by Bruner, *'Concept involves drawing an inference from a defining attribute to the class membership or identity of an object'*. The development of concept is an accumulation of experience, with some kind of resulting organisation and secondly the labelling, manipulation and application of aspects by means of symbols. The entire process is shaped in the thinking process.

Conclusion

When we're thinking about something, what are we really doing in our mind? Thinking is an activity that occurs in our brain, as electrical and chemical signals travel all over our cerebral cortex, that dense blanket of nerves that covers most of our brain and lies just under our skull. Thinking allows us to put ideas together and create other ideas. We can see pictures in our mind. We connect logical points together. We can imagine things that could happen and remember things that have already happened. We can develop works of art and science in our mind. We can dream and imagine.

Our mind thinks in visual pictures and other sensations, and often those pictures and sensations represent something. These form concepts. Concepts are complex mental representations whose structure generally encodes a specification of necessary and sufficient conditions for their own application. Initially many concepts emerge on the object-image sensual basis as definite empirical

image of an object or a phenomenon (eg. image of a house, a park, a village) in the collective activity context. Later these images maintain their function of the most illustrative representative of this concept in human consciousness. A concept is a class of objects that all share some common characteristic. All these types of thinking style are only the process of concept formation in our mind because concept formation is a form of thinking that helps us to better understand the world we live in, as well as ourselves. As thinking is a mental process, it helps in the formation of concept in every aspect.

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