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Role and Importance of Schemas in Pedagogy and Learning: A Cognitive Approach

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Abstract

Educational strategies are designed to cope with and fulfill the multifarious pedagogical and educational needs of teachers and learners. Moreover, no educational plan can possibly yield the required results without incorporating suitable instructive strategies. This research paper advocates the role and importance of schemas in learning new forms of knowledge and data in the perspective of class room teaching-learning. Cognitive approach is adopted to understand how students learn new forms of knowledge and experiences through different mental processes, quite unlike that of behaviorism. The concept of schema helps us understand how learners can link new pieces of information to the already existing knowledge in their minds. The notion of 'Constructivist Approach' has been extracted from the field of educational psychology for triangulation. Extracts are taken from the textbooks of English used in matriculation and intermediate through purposive sampling. Their analysis shows that schemas can play a vital role in enhancing the learning experience and making new forms of knowledge a permanent part of the memory of students which is the ultimate goal of education.

Keywords: cognitive approach, constructivist approach, curricula, pedagogy, schema, triangulation.

Introduction

A lot of teaching techniques and methodologies have been used with the prospect of achieving the best outcome of the teaching-learning process. Schuman (1996) observes that theories like behaviorism, mentalism, progressivism, and constructivism have been practiced with varying results. This research has been conducted keeping in view the ability of the learners to link and relate the already learnt and stored data in mind in order to acquire new forms of knowledge and data through cognitive processes. The already stored data are actually packets of information called 'schemas' (Bartlett, 1932) that can be used to inculcate new forms of knowledge and experiences. The study focuses on the usefulness of schemas and

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background knowledge in the teaching-learning process and how they can enhance the learning of students in classroom activities at college level. Additionally, the current research also attempts to focus on the role and importance of schemas and background knowledge and their usage as an instructional strategy that can be helpful in enhancing the teaching learning process on behalf of both teachers and learners in order to achieve maximum positive results through classroom activities.

Extracts are taken from six different lessons of the textbooks of English taught in matriculation and intermediate. These extracts have been selected through purposive sampling. The study endeavors to put forth an ideological proposition that propagates a constructivist approach for teachers and facilitates the learning process on the part of students for them to acquire and assimilate the rightful change in behavior.

2. Important Educational and Cognitive Concepts

The current study focuses some of the mental processes that teachers and learners undergo, thereby allowing it to encompass some of the pivotal educational and cognitive aspects of the teaching-learning experience. Moreover, the objective of the cognitive psychologist is to evaluate those cognitive processes that bring change in behavior. Mental process has a function of identifying irrelevant data and separating it from other mental processes. Human brain has the capacity to receive a large amount of data in countless human activities and this processing of data is divided into *exogenous control* and *endogenous control* (Monsell, & Driver, [2000](#)). Exogenous control has the responsibility of arousing attention and sending the message of alertness. It also controls the reflex action of the mind. Endogenous control covers the actions performed deliberately. This attentional process is responsible for deliberate actions, planned activities and conscious efforts to perform any of the cognitive work.

It means that the human cognitive system enables us to collect and store information that is learnt through the continuous process of attention and this can be made a part of the already existing information in the long term memory through a systematic process of linking.

This process of learning is well explained through “cocktail party effect” (Cherry, [1953](#)) in which the participants of one experimental activity were asked to attentively listen to a large amount of data through earphones. The participants were then asked to pay attention to the information related

to one specific topic and ignore the irrelevant information. The information related to the predetermined topic was provided to the listeners through the left ear and the irrelevant information was provided through the right ear. This process was then quickly altered and the relevant information was then provided through the right ear and vice versa. The purpose of this process was to find out the ability of the human brain to understand and stream line the specific message and ignore the other ones that were not attentively learnt or were not paid attention. The ability of the brain to systematically learn one message and ignore others is known as the cocktail effect (Getzmann, Jasny & Falkenstein, 2016). The other observed fact is that the brain is unable to process all the information especially when the tone and pitch of both the relevant and irrelevant messages are the same. It can only grasp some of the incoherent detail out of a chunk of information only when the tone and the pitch of the sound are different.

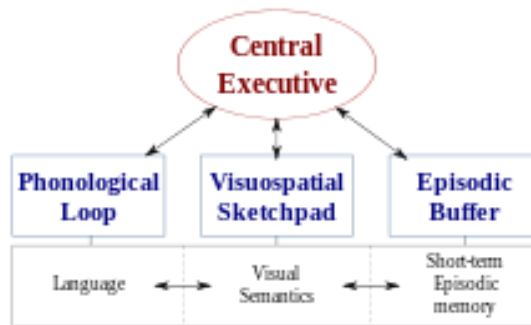


Figure 1. Von Restorff effect

Then there are two kinds of memory, short term memory and long term memory. Educational and cognitive psychologists recognize short term memory more viable to work on. Working memory is quite often understood as short-term memory but it is more significantly studied as the ability of the mind to recall and remember the relevant data when the mind is not fully involved in the activity. Ebbinghaus (1913) found an interesting phenomenon. A list of random words was provided to learners and it was interesting to note that the learners were better able to recall words from the beginning and end of the given list rather than the words in the middle of the list. This is known as Von Restorff effect which is illustrated in figure 1.

Human mind has the capacity to store a large amount of data as information (data bundles) used differently as per need and according to the

situation. It is generally called long-term memory and it is further divided into following sub-categories.

- i. Procedural memory
- ii. Semantic memory
- iii. Episodic memory

Procedural memory allows us to perform actions with minimal conscious effort. It is, in other words, a kind of stimulus-response type information that can be used to perform numerous routine activities without any conscious or laborious effort. Semantic memory is actually the long term memory that contains the knowledge and information of the past events and happenings in the form of information bank. This is the bank where human brain stores all the information that is to be used when and where it is needed. This information is also upgraded and modified with the passage of time. This upgradation of knowledge also helps in the assimilation of new knowledge and information to the already existing knowledge in the long term memory. Episodic memory is the conscious awareness of current situation and events. Through episodic memory we can control our daily routine activities alongside the responsibilities to be performed in a systematic and planned manner (Turner, [n.d.](#))

Human brain has the ability to make sense of the physical world perceived through the five senses through different mental processes. Cognitive psychology also discusses how these cognitive perceptions affect human behavior. Language, on the other hand, has been an essential part of the study of cognitive processes. Researchers and scholars study language acquisition, different constituents of a language and the use of language in different situations. Meta-cognition is the awareness and understanding of one's thought processes. Here, old knowledge can be utilized as a stimulus towards the understanding and absorption of new forms of knowledge in combination with other teaching techniques. Meta-cognition discusses the ability of a person to perform different tasks and monitor them by himself. It also includes the understanding and remembering of the techniques applied to solve some the problems and the results obtained with the application of those techniques. The same can be done using educational and pedagogical techniques and strategies to arrive at certain conclusions. The schemas and knowledge stored in the log-term memory of students can be utilized to assimilate new knowledge through recalling the relevant stored information.

2.1. Constructivism

Constructivism as a paradigm hypothesizes that learning is an active, constructive process. The learner is an information constructor. Objective reality is perceived differently by different people because of their individual differences and outlook towards life. Knowledge is acquired and transmitted through an active teaching-learning process in the backdrop of educational techniques and strategies (Vygotsky, [1980](#)). New information is linked to prior knowledge, thus mental representations are subjective. Old information and schemas can be of vital help in the manipulation and assimilation of old knowledge with new knowledge and information and this is what constructionists strive to achieve through educational processes.

2.2. Progressive Theory

In the early 20th century, there was a national movement for vested political interests. Vocational education was promoted and the people were encouraged to learn some form of skilled manual work for earning a livelihood. The movement wanted to separate the educational scholars and the skilled labor which was a kind of cognitive colonization. In other words, the government wanted education to be restricted to fewer people which was quite unnatural and unrealistic. The progressive educators led by John Dewey opposed the idea and emphasized the importance of education and creativity. Nuremberg also emphasized "the most living and essential parts of our natures" in her book. A movement was started for the diversity of education and not succumbing to the vested interests of the ruling elite. Dewey and his followers taught and trained thousands of teachers about the concepts of progressive education and its benefits in order to establish a balance of skill and education in the society. Books like *Experience and Education* (1938), *Progressive Education at the Crossroads* (1938), *I Learn from the Students* (Pratt, [1948](#)) and others promoted and advocated the ideas of progressive education and contributed a lot in this regard. The success of this movement can be seen in the "eight-year study" that showed that those learners were more able, diversified and learned who excelled in all fields and made their names even in the top class universities of the world.

2.3. Social Development Theory

Vygotsky's ([1978](#)) theory laid the basis for constructivism. His theory rejects the concept of transmitting knowledge through the traditional

concept of schooling in which the role of the students is that of the passive listener and the teachers transmit knowledge through the educational process of classroom teaching. Vygotsky rejects the instructionist model of teaching where the students have no role to play. He is of the view that learning involves an active participation on behalf of students and learners and one of the basic roles of teachers is to facilitate the learning process. Lee and Kinzie (2012) observe that the responses of students yield effects depending upon the questions of teachers. It means that students exploit their cognitive skills when they are exposed to questions based on logic and reasoning. Here, education and learning become a kind of a reciprocal process for both teachers and learners. The background knowledge of students is to be exploited by teachers to facilitate learning. Students, on the other hand, have the responsibility of recollecting their past educational experiences to learn the new knowledge through an active process of recognition and assimilation.

2.4. Discovery Learning Theory

Discovery learning is “an inquiry-based approach” towards learning through past knowledge and educational experiences. It is a problem solving technique where students contemplate their past experiences and knowledge to find out the solution to their problems (Bruner, 2009). So, this is a kind of recursive learning technique in which learners continuously go back and forth in their minds to assimilate new knowledge while comparing and contrasting it with the already gained knowledge through experience and learning. The technique is student-centered where students explore through comparison and contrast and solve problems relying on their previously acquired knowledge. The role of teacher is minimal as it is a kind of learning through doing experiments and finding solutions. The assumption of this theory is very similar to the work of Jean Piaget (1977) who also believed in the independence of learners to learn and explore the world and find out the solutions to their problems depending upon their mental faculties and previously acquired knowledge.

2.5. Schemata Theory and Triangulation

Frederic Charles Bartlett (1932) defined schema as “an active organization of past reactions, or of past experiences, which must always be supposed to be operating in any well-adapted organic response. That is, whenever there is any order or regularity of behavior, a particular response

is possible only because it is related to other similar responses which have been serially organized.” It means that Bartlett believed schemas to be the generic mental structures that not only help us understand new events and experiences but also make them a part of the previously existing mental structures. This means that storing past experiences and information is not a passive process, rather it is an active process of sorting, evaluating and understanding new experiences. “Triangulation”, on the other hand, “refers to the use of more than one approach to the investigation of a research question in order to enhance confidence in ensuing finding”. It is a kind of multi-method technique derived from reviewing and it is related to plotting out an area (Bryman, [2004](#)). Here, the notion of “constructionism” has been adopted from the field of educational psychology in order to verify and validate the outcomes of the subject under discussion. Webb, Campbell, Schwartz and Sechrest ([1996](#), p.3), on the other hand, says that “Once a proposition has been confirmed by two or more independent measurement processes, the uncertainty of its interpretation is greatly reduced. The most persuasive evidence comes through a triangulation of measurement processes”.

3. Data Collection and Analysis

Extract 1:

*“All that other folk can do,
Why with patience should not you?
Only keep this rule in view,
Try again”.*
(“Try Again” by W. E. Hickson, English 10th grade)

This is the last stanza of the poem “Try Again” by W. E. Hickson. This poem advocates the importance of the effort and the struggle one makes to achieve any objective(s) in the world. All the success in the world is achieved through hard work and dedication. If someone fails to achieve something he must remember that that is not the end in itself. He should rather do more hard work to achieve his goal. There will ultimately be a time when one becomes successful in whatever task one has been up to. The only parameter one has to follow is “try again”.

Extract 2:

*“Once he raised a hand to touch the lowest of
the swings that were hung from the roof. But*

again the applause broke out, asserting him that no actual activity was expected of him. And so, having made his bows, he was led to a seat, his life's ambition achieved (of crating the post of a court acrobat). It must have been taken him more than sixty years to do it, since first he came by that strange ambition of his. But he did it".

(The Reward" by Lord Dunsany, English, Intermediate part-I)

This extract is the second last paragraph of the "The Reward" by Lord Dunsany. This is the story of an ambitious man who wanted to create the post of a court acrobat. The story advocates the significance of struggle, determination and persistent hard work. Terbut, the main character of the story, wanted to do so because he thought that it would inspire and motivate the soldiers of his country through the exhibition of perfect physical fitness by a court acrobat. It took him sixty years to do so but he proved that nothing in this world is impossible. Determination, struggle, consistency and hard work are the parameters through which one can achieve anything whatsoever.

3.1. Schematic Analysis

The first extract is taken from the textbook of English taught to 10th class. Schema of hard work and struggle is taken from the first extract that is only theoretical. It advocates the importance of struggle and hard work. This schema is now used to impart new knowledge that is 'The Reward', the reward of determination, struggle and hard work. The most important thing is the justification of the theoretical teachings that were imbibed into the minds of students through social and moral rules, disciplines and guiding parameters. These conceptual ideas of "Try Again" serve as active schemas to understand the concept of 'The Reward'. The students are asked to recall and narrate other stories they have learned earlier. The learners are able to recall some of the moral stories like "King Bruce and The Spider". Short verbal tests also show that the learners are easily able to remember the stories with the moral lesson of success through hard work and determination.

Extract 3:

"The seeing see little. If I were the president of a university, I should establish a compulsory course in How to use your

eyes. The professor would try to show his pupils how they could add joy to their lives by really seeing what passes untouched before them. He would try to awaken their dormant and sluggish faculties”.

(“Three Days to See” by Helen Keller, English 9th grade)

This extract is taken from “Three Days to See” by famous American writer Helen Keller. She was unfortunately left blind and deaf at the very small age of 19 months. Here, she briefly describes how the people with eyes miss and ignore the delicacies of life around us. If a blind and deaf person can feel and enjoy the bounties of life and the nature around us, why are we taking the life and its pleasures for granted. There is nothing to regret or lament but to enjoy life in its true sense.

Extract 4:

*“No time to turn at Beauty’s glance
And watch her feet how they can dance:
No time to wait till her mouth can
Enrich that smile her eyes began.
A poor life this if full of care”*

(We have no time to stand and stare by W. H. Davies, English Inter-I)

These lines are taken from “Leisure” by William Henry Davies. The poet laments the inability of people to enjoy the bounties life offers free of cost. They are so deeply engrossed in their daily affairs that they are truly unable to relish the charms of life and nature. The schema of “blindness and deafness” is to be used to teach students the unlimited generosity of life and nature to mankind. People are always found complaining about one thing or another but they forget that they only see and focus one side of the picture while completely ignore its other side that is very bright, colorful and worth seeing. Now, it is not very hard to imagine what would happen if we lose the blessing of seeing and hearing at once. The world would become dark, soundless and boring. The learners not only understand but also become thankful to Allah Almighty who have blessed them with priceless blessings.

3.2. Schematic Analysis

The test was conducted by taking two volunteers from class with the task of describing exactly what they would feel if they were unfortunately destined to become blind for some time. The activity showed that the

students performing the role of blind men eventually asserted that they had never experienced and valued the great blessing they had in the form of eyes and eyesight. They had never thought of the importance of eyes and never tried to be thankful to God for them.

Extract 5:

“I am glad that I have got a taste of what the real world has to offer. I have learned many lessons from my Public High School, boarding school, and work experiences. I am now ready to learn many more lessons through my college experience. Although it has been tough, I have succeeded so far, I am prepared to excel and make it much further in the years to come with my college education. This developing positive outlook has given me the motivation that I need to become successful. I never give up. When I am determined to achieve, I shoot for the moon and land amongst the stars”.

(“Little by little One Walks Far”, English, Grade 10)

This is the story of a young boy who has completed his school education and is ready and enthusiastic to start his college life. He elaborates his learning experience through education and practical work experience that have changed his outlook towards life and the challenges it carries with it. He has achieved success in different educational and practical fields and he is anxious enough to go further to achieve the milestones he has set for him. He also tells the readers that he is a daring person and has the courage and strength to counter the odds through hard work and determination. His positive approach towards life and its challenges have enabled him to excel and he has gone so far that his comrades are left far behind. In the coming years of his life, he is determined to achieve whatever he could as sky is the limit for him and there is no one to stop him from making progress and succeed in life.

Extract 6:

“There are two opposite worlds just as the ways of considering China’s future are opposite. One is the rigid world of figures and prospects based on economic facts as seen by the West. The other is the world of faith, of the development of Mao thought throughout China, with the little Red Book. As for Western economic laws, the endless

mass of 800 million people, who can be convinced, governed and directed along the paths decided by the powers that be, might well overthrow the whole problems from all sides. Reasoning with the dry yardstick of figures, the contribution of one dollar from each Chinese would make 800 million dollars and a contribution of a day's work from each person would mean two million extra laborers for one year without cost to the State..."

(China's Way to Progress by Galeazzo Santini, English, Intermediate grade 12)

This is simply the story of how China succeeded. China has bewildered the whole world through its progress in all the fields of life. For other countries including the Western countries, population is a great cause of worry and remains a problem for the growth and progress of any nation. But China has completely changed the very basis of this concept. Population has not been the issue, rather it has utilized its strength in numbers in making economic progress. They go not from top to bottom but from bottom to top where each individual is significant in making the nation economically strong and powerful. China is one of the most populated countries of the world and China has wisely taken its population as its strength and not its weakness. It has not spared its women and children. They even contribute towards the cause of the nation. The 800 million Chinese can simply generate 800 million dollars by simply contributing one dollar per person. This means that economy is not the issue for China. They have followed their great leader Mao through his little Red Book that encompasses the golden rules of success for the Chinese people. In other words, China has set a golden example for the rest of the world to follow which explicates that through faith, determination and guidance one can aspire to the heights of glory and success, only when sincere efforts are made by all and sundry.

3.3. Schematic Analysis

The schema of determination and hard work is clearly reflected in the very title of the lesson "Little by Little One Walks Far". The student in this lesson (from English text book, Grade 10) has described his school life experience; educational as well as practical. He is of the view that it is the

determination and steadfastness of a person that enables him to achieve what he strives for.

Undoubtedly, the way to success is not that easy but success can be achieved through struggle, will power and positive outlook. These characteristics of an individual guarantee the fulfillment of his/her predetermined goals in life.

This knowledge of “Little by Little One Walks Far” and the schema of hard work and determination may serve as a guiding principal to understand China’s way to progress in “China’s Way to Progress”. China came into being as an independent state in 1949 but it took a lot time for it to be recognized by the world. ‘Little by little’ it came to be known and accepted as the most powerful Asian State. And it was the teaching and the guidance of the great Chinese leader Mao who inspired the common masses of China to raise themselves up to the status of the Asian Super Power. Their huge population could have easily be their greatest weakness but the Chinese followed the principles of their leader through that ‘little Red book” and turned their greatest weakness into their greatest strength and worked hard to come up to the level of powerful Western nations. A little effort on the part of each Chinese can generate such surprising economic resources and manpower that other nations can hardly think of. To conclude, it can be said that the concept of little by little effort, hard work, steadfastness and determination taken from the lesson “Little by Little One Walks Far” can serve as the founding principles to understand Chinese progress. Furthermore, this new knowledge can also serve as the guiding principle for students to motivate them to strive hard for their respective goals in their lives whatever they might be.

4. Conclusion

The basic purpose of education is to discover the unknown and this journey of discovery is made from the familiar to the unfamiliar and through the assimilation of older concepts with that of the newer ones. Books give us knowledge and information while teachers teach us the art of life. Teachers use multi-dimensional techniques to make their students learn new knowledge and make it a permanent part of their experience and long term memory. Human brain has the ability to store different forms of knowledge in the form of schemas that are actually ‘information packets’ that remain stored in the long-term memory. These packets of information can then be

used to assimilate the unknown. One of the most effective teaching techniques is the use of background knowledge of students to impart new knowledge. The knowledge assimilated through this effective method can serve a great deal in the learning process of students. The constructivists also consider learners knowledge constructors as that they construct through a continuous process of building and assimilation of knowledge.

Data analysis shows that the schemas and background knowledge of students can rightly be exploited for gaining and assimilation of new knowledge, thereby not only increasing the already attained knowledge but also making it rich, effective and purposeful. It involves pedagogical expertise on behalf of teachers for the manipulation of the background knowledge of students towards the right direction during the learning process. Hence, it is inevitable for teachers to be competent, skilled and well-equipped so that they can use the above technique effectively. School, class and teachers also serve as the most important schemas in the new learning environment and the new kind of learning experiences the students undergo. To sum up it can be said that schemas and background knowledge of students have a significant role to play in the understanding of the newer educational concepts and the assimilation of the newly learned experiences with that of the earlier ones. Teachers can utilize this technique as an effective pedagogical method of imparting knowledge and information to students. Students, on the other hand, would be in a better position to make their learning experience more effective, reliable and life-lasting through the understanding and assimilation of newer concepts with that of the older ones which is the ultimate goal of education and educational programs.

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