

CONSTRUCTIVIST APPROACH: PRESENT REQUIREMENT FOR EFFECTIVE TEACHING LEARNING

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ABSTRACT

Education should promote creativity, innovations, new ideas, practices and science is the subject by which it can be done. NCF-2005 envisions that the learner is not passive recipient but an active participant in the process of learning. The learner constructs his knowledge by connecting new information to his prior knowledge on the basis of the materials and activities given to them. Constructivism is based on the maxim that the learner constructs his own understanding by the reflection on his experiences. 5E learning model promotes collaborative learning and active participation of the learner. This paper is an effort to seek an appropriate approach for science education. Through the review of empirical research evidences, the researcher has found that constructivist approach can be a good approach for science education and for the fulfilment of the future need of the learner.

KEYWORDS: *Constructivist Approach, 5-E Model, NCF-2005*

INTRODUCTION

According to National Policy of Education, 1986, "Science education will be strengthened, so as to develop in the child, well developed abilities and values such as the spirit of inquiry, the courage to questioning and our aesthetic sensibility. Science education programmes will be designed to enable the learner to acquire problem solving and decision-making skills and to discover the relationship of science with health, agriculture, industry and other aspect of daily life." In order to strengthen science education an appropriate approach should be brought into practice.

In all states and boards of education, science is taught as a compulsory subject up to secondary stage. All students study science as a compulsory subject at secondary level. But a large number of students do not attempt science after secondary level. Any how they pass the exam and after that they leave science subject. Even some students are not able to pass the secondary exam / matriculation because of their poor performance in science subject. Why? What is the reason behind this? It is said that science can be understand by the examples of our surroundings. Perhaps the reasons are many like lack of interest and motivation, inaptness of science teaching methods, shortage of labs, untrained teachers, lack of science equipped schools etc.

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NCF-NATIONAL CURRICULUM FRAMEWORK (2005)

National Curriculum Framework, prepared by NCERT has also highlighted the important role of Constructivism in teaching-learning process. As NCF-2005 has recognized the main principles of constructivist approach are (NCERT book):

- "Knowledge construction is earned by learning.
- Learner construct his own knowledge by adding new information to the prior information on the basis of his activities.
- Amendment of ideas or information is most important fact for learner's learning and progress.
- Construction of mental images is facilitated by the learner's activities and engagement in the work given to them.
- Collaborative learning offers sharing of several views, meanings and interpretations."

NCF-2005 has recommended that in teaching-learning process active participation of students should be emphasised to construct the new knowledge. In schools, science teaching should be learner centered and based on inquiry, questioning and process oriented. As recommended in NCERT book, "the learner should be encouraged to question and learn to observe carefully, interpret their observations to understand the situation. This motivates the learners to learn more and more themselves and to explore the world around them."

Science is an organised system of knowledge. Science has developed a huge number of technologies for the benefit of society. By using these inventions and technologies world

has become a global village. In the present age of science and technology, science education should be more emphasized. Those methods of teaching science should be brought into practice which can motivate and arouse the interest of the learner to search and apply scientific rules around them. It is proved that science is a systematic knowledge and all mechanism of this world is based on science theories. The learner must have curiosity and reasoning ability to observe these rules. In this context constructivist approach has been proved a good method of teaching science. Basically, constructivism is not any particular method but an umbrella term which covers wide diversified views. It can be named as a set of theories of learning which bridges the cognitive and humanistic learning views (Pandey, 2007). Constructivism provides explanation of the nature of knowledge and human learning concentrating on learning as conceptual change.

CONSTRUCTIVE APPROACH

Constructivism is based on the maxim that the learner constructs his own understanding by the reflection on his experiences. According to constructivist epistemology knowledge cannot be transferred intact from the teacher to the learner. Teaching and learning cannot be synonymous (Pandey, 2007). It is possible that a teacher teaches very well but the learner is not learning. It is because every learner is a different individual (Raman, 2017). Different in terms of personality, intelligent, motivation, curiosity, experiences, approach, background, support-system, and so on. Therefore, every learner cannot be benefitted by the same method. Constructivism provides explanation of nature of knowledge and concentrates human learning as conceptual change. As Jean Piaget has stated, "Knowledge is actively constructed by the learner, not passively received from the environment." By delivering lecture or by traditional method each learner cannot acquire knowledge or built his idea. Learner should be involved in this process. He is not a passive receiver of the content (Pieget, 1977). A passive receiver cannot learn the skill. According to Benjamin Franklin, "Tell me and I forget. Teach me and I remember. Involve me and I learn." The learner does not acquire knowledge mechanically but actively constructs his understanding on his prior experiences (Vygotsky). Brooks and Brooks (1984) has deeply studied constructivism and found, "Constructivism is a philosophy of learning founded on the premise that, by reflecting on our experiences, we construct our own understanding of the world we live in." Open-ended approaches, experimentation, skilled based teaching, activity-based learning, reasoning, thinking and sense making are important rather than rote learning.

ORIGINATORS AND IMPORTANT CONTRIBUTORS OF CONSTRUCTIVISM

In last two or three decades an influential doctrine has emerged in education known as constructivism. Italian philosopher Giambattista Vico (1668-1744) is regarded as the propounder of constructivist theory of knowledge (Walia, 2016). He stated, "The known is the made" means human knowledge is constructed by human himself. Jean Pieget worked for 60 years and established the basis of a dynamic constructivist theory of knowledge (Glaserfeld, 1995). He developed 'Cognitive Learning Theory' and accounted that knowledge is constructed through different process like equilibration, assimilation and accommodation (Glaserfeld, 1995). According to Piaget learner's conceptual development takes place in cognitive schema. Second prominent constructivist is Lev Vygotsky. He worked on social cognition theory which "asserts that culture is the prime determinant of individual development." Learning happens through the culture. A child learns through his involvement in social-cultural activities around him under the guidance of 'the more knowledgeable others' (Vygotsky). Vygotsky has provided some key terms like social interaction, sociological tools, ZPD (zone of proximal development), MKO (more knowledgeable others), Scaffolding. In this way the child learns 'thinking' and 'problem solving' abilities. John Dewey, Jerome Bruner, David Ausubel, Novak (1987) are some other important contributors of constructivist theory.

CONSTRUCTIVE CLASSROOM

Constructivist classroom has some specific characteristics which are as follows: (Gupta & Gupta, 2017).

- "Student centred approach
- Teacher is a facilitator
- Based on student-teacher interaction
- Teacher follows the maxim, "whole to part"
- Curriculum is not fixed
- Integrated learning"

ROLE OF THE TEACHER IN CONSTRUCTIVIST CLASSROOM

In constructivist classroom, teacher is a facilitator and he work in different ways like:

- To understand learner's reasoning
- To facilitate learner's knowledge construction
- To foster co-operation among students
- To promote Creation of Emotional Balance and Coping competencies
- To promote creation of interpersonal understanding
- To promote Construction of Moral Values (Seefeldt,)
- Presenting tasks of real-world application
- Providing assistance so that learners can unite their previous knowledge with their new learning.
- Providing scaffolds to fill the gap between what the learner already knows and what he is being presented with.

DIFFERENCE BETWEEN CONSTRUCTIVIST APPROACH AND TRADITIONAL APPROACH

Basis	Constructivist Approach	Traditional Approach
Learning	Behavioural change which is brought by selected reinforcement of responses	Process of subjective construction of knowledge based on learner's personal experience.
Knowledge	Imparted, conveyed, reproducible	Built, constructed on previous knowledges, spiral
Curriculum	Fixed, same typed	Supple, flexible, developing, changeable
Material	Primarily textbooks, workbooks	Primary source of material, manipulative materials
Pedagogy	Teacher centred; students follow the instructions	Learner centred, activity based, different tasks for students
Motivation	External, Grade attentive	Internal, learning attentive
Teacher	Imparts content, questions, gives explanations, in directive role 'sage on the stage'	Creates situations, Facilitator, arouse questions, motivator, concept connector 'guide by the side'
Learner	Passive receiver, can asks for clarifications only	Actively participate, Centre of attention, asks questions, co-inquirer
Evaluation	Periodic, based on content knowledge, summative,	Formative, continuous, skill based, spiral

(Pandey, 2007)

ESSENTIAL FACTORS OF CONSTRUCTIVIST PEDAGOGY

Some certain common principles have been identified by different constructivist pedagogies. Some of them are as follows (NCERT BOOK):

- 1) "Authentic and real-world environment is necessary for learning.
- 2) Learning should involve social negotiation and mediation;
- 3) Content and skills should be understood within the framework of learners' prior knowledge.
- 4) Content and skills should be made relevant to the learner;
- 5) Students should be assessed formatively, serving to help them acquire further learning experiences.
- 6) Students should be encouraged to become self-regulatory, self-mediated and self-aware of learning
- 7) Teacher should serve primarily as facilitator of learning, not instructor; and
- 8) Teacher should provide for and encourage multiple perspectives and representations of content."

5E LEARNING MODEL

Teacher's activity, learner's activity and teaching-learning resources on different steps have been described as-

Steps	Teacher's Activity	Learner's Activity	Teaching-Learning Resources
Engagement	Elicit student's prior knowledge, stimulate interest, arouse curiosity, introduces the topic with a question or activity, brain storming,	Get curiosity, give responses, active participation with interest, raise questions	Resource material from their surroundings
Exploration	Provides hands on activity, leads students through inquiry-based questions, encourages the learner for collaborative work, allows them to refer the resource material	Active participation, explore concept or skill, investigate problem, start to pose real questions, develop hypothesis, test variables, define the problem	Resource material
Explanation	Asks the students to explain what they have learnt, gives answers, elicits student's discussion, utilizes other aids to boost knowledge	Explain their understanding, share what have learnt,	Charts, maps, videos, computer software, other aids
Elaboration	Encourages learners to apply concepts and skills in new situations, helps learners to establish connections between the prior knowledge and new concept	Apply what they have learnt, establish connections among different related concepts they have learnt, give justification of their responses with evidences	Relevant material
Evaluation	Diagnoses the acquired knowledge and skills of the learners, determine the desired level of it, asks open-ended application-oriented questions	Demonstrate their understanding of the concepts, construct the right kind of knowledge, Evaluate their own progress	Relevant material

(Joy, 2015, Duran, et al 2004)

EDUCATIONAL IMPLICATIONS OF CONSTRUCTIVISM

Learning requires self-regulation and conceptual structures should be built on through reflection and abstraction.

Thinking, reasoning and construction of knowledge are more important than knowing content. For the learner, giving 'right answer' is not learning but motivation, searching and finding a path to the goal is more important (Glaserfeld, 1995). Here experimentation replaces rote learning. Teaching follows both skill-based and open-ended approaches. Learning is not individual but cooperative and collaborative. Constructivist classroom is productive and outcomes from its participants is significantly greater than traditional classroom. Constructivist classrooms become multidimensional, with different types of activities at different levels taking place instantaneously. Constructivism is a system for education to give more responsibility on the learner for the construction of their understanding. It encourages a broader understanding of the world by appealing the spatial memory system of the brain. It generates a challenging, but not intimidating classroom situation. Constructivist approach is a viable alternative to traditional teaching modes (Mohapatra et al). As constructivist approach arouses interest of the students it is evident that the students who were taught through constructivist learning models have shown better result (Patil & Kudte, 2017). Science teachers should promote basics of constructivist learning like student interaction and attention for their ideas and this approach should be implemented at all level of education (Aina, 2017).

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