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**CONSTRUCTIVISM IN TEACHING OF SCIENCE****( Story-Telling Approach)****Anita Sood****Assistant Professor****S.N.S College of Education, YamunaNagar****ABSTRACT**

Constructivism asserts that knowledge is actively constructed by the learner through interaction with the world and social negotiation; learner explores the world and transforms his understanding of the world. Story-telling, is also an integral part of our lives, in understanding and communicating with the world. Science, on the other hand, is a subject which rests upon inductive reasoning and analytical thinking, and also requires social negotiation and classroom is the social unit where knowledge is constructed. This paper discusses how story-telling approach for the content- matter of a science textbook can be used as a constructivist tool in teaching of science.

**INTRODUCTION**

Science Education in India is not a separate faculty. It is being taught as teaching of science in Training Colleges. It is many years old but the passage of time has not made the situation satisfactory. Scientific Knowledge is increasing at such a terrific speed that even the advanced countries are mobilizing their resources to keep pace with one another. The problems facing science education in our country are both qualitative and quantitative in character. The UNESCO Planning Mission which visited India had an opportunity of looking into the training program at first hand in some establishments. They expressed their dissatisfaction in the following words :

"The professional training of a student in a teacher training college should not boil down to methodology training alone"

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The present state of affair is that teacher's use text-book for teaching science and the process is simply reading aloud. The fate of the practical work is alarming. Practical's are done in a routine way in the laboratories. It is not a process of investigation but like rituals done in most dull and monotonous way. It is simply a confirmation of what has been read aloud. Thus the very initiative is killed. The student has not learnt any skill or technique for better understanding of the problems in science.

Science has now established its claims to have a place in the school curriculum. But an examination of the actual work that is done and the nature of instruction that is being imparted in different institutions leads to the conclusion that all is not well with our science teaching.

**1. Science teaching dominated by higher education :** In spite of elaborate curriculum, the teaching of science is done in the most perfunctory manner. There is a lot of repetition and the teaching is dominated by the needs of colleges and universities.

**2. Little co-ordination between theory and practical work :** Science teaching has become a bookish affair. Experimental work is either totally ignored or if at all it is attempted, there is a little co-ordination between theory and practical work. Sometimes experiments are done simply for the sake of doing them. On the other hand, those who are too much enthusiastic about experimental work teach only those topics and branches of science which lead themselves easily to experimental work in the school laboratory.

**3. Restricted Field is covered :** In fact the field covered in the usual science course is so restricted that pupils after several years of study of science know very little of broad general topics, knowing nothing at all of certain important branches of science, and possessing little or not love for the subject.

**4. Less knowledge about applications of science :** Students may be able to give an accurate definition of Archimedes Principles or verify it experimentally but when asked to tell something about floating docks, the salvaging of sunken vessels, the diving and rising of submarines, the use of balloons and air ships, is a general way they are faced with tremendous difficulties. Similarly they know nothing about important applications of science in our daily life. After an advanced course in Botany, a student may be able to tell the different parts of a flower but may

not be able to show each part separately. Examples are a rare where science students are unable to repair a fuse even.

**5. Lack of interests :** Students know little about the work of eminent scientist; they are never thrilled by the romance of science, the triumphs of modern engineering, Chemistry, Physics and the mysteries and wonders of nature.

**6. Aim not clear :** All this is due to the fact that the real aims of science teaching have never been clearly understood and fully realised. Examination requirements and memory work have been given top priority. Hardly any opportunity for systematic observation and experimentation which is the correct way of teaching science is provided.

**7. Heterogeneous Curriculum :** It is a hard fact that present-day General Science curriculum in India is very defective. It is a hotch-potch of various branches of science, mixed together in a heterogeneous form and pelted upon the young pupils in unorganised and unpsychological way. The very purpose of teaching science is being defeated by the present curriculum. It is simply burdening the mind with dead information which may even degeberate the pupils into a new superstition.

### SCIENCE CONTENT AND STUDENTS' INTERESTS

Learning is a purposeful, internal, mental process. Teachers can monitor learning by observing and gathering data on changes in students' actual behaviour or potential performance. Motivation drives the process of starting and continuing learning. Relevance refers to activities that give students satisfaction and meet their needs, including the chance to achieve personal learning goals. In order to capture students' attention and activate their motivation to learn, teachers must consider the relevance of each topic. Then they can connect science with students' interest, personal lives, societal issues, cultural backgrounds, and other school subjects. Cognitive learning theory emphasises the importance of learning something new by relating it to things that are already meaningful and familiar. Effective science teachers connect science concepts and instruction explicitly to learners' personal experiences, use specific examples, analogies and metaphores, plan lessons to emphasize themes of science, technology and society, and use story-telling approach in teaching of science.

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Visualise a science class going on. What will come in your mind ?Use of models and pictures, questions and answer session going on. Now picture this, a science class, going on the topic of structure of flower with teacher holding a hand puppet of honeybee and a large puppet of flower and narrating a story with full expressions and proper voice modulation about honeybee ‘’A baby bee goes to the garden for the first time and sees a beautiful red flower in centre of the garden. It goes round and round, buzzes with excitement, pokes inside the flower and it’s so curious about the flower and wants to know everything. You all are baby bees and you all come to mummy bee (teacher) and together they go on a trip to garden to explore it and know parts of flower.’’This may be followed by a slide or diagrams shown on the structure of flower.

Science has always been associated with scientific rational thinking skills and story-telling always reminds us of a literature class but these two put together can be more effective. This paper will discuss story-telling approach in teaching of science. Science has always been associated with experiments, demonstrations, inductive-deductive reasoning and analysis and for this reason scientific concepts are consistently described as challenging to learn and difficult to teach.

Enhancing student’s higher thinking, logical reasoning, scientific skill has always been a considerable challenge in education. The Dearing Report(Dearing,1997) has re-emphasised their importance and the need to introduce tasks to foster reflective thinking and skills to enable students to learn how to learn. The emphasis on skills is needed to develop the lifelong learners who will effectively be able to part of the future learning society. This supports the constructive learning approach.

Out of various views of constructivism, the two main are:-

**1.Cognitive constructivism:-** It deals with how an individual constructs his understanding of the world around him, based on their values, beliefs, prior knowledge, self-concept or identity. Such a constructivism is found in Piaget’s work. It states that knowledge is constructed by mapping external reality.

**2.Social constructivism:-** It holds that individual learns through social interactions, activities and cultural tools. According to it, knowledge is existed in social environment and individual internalise it through working together, and through interactions.

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A constructivist approach to education emphasises upon the learner and how they construct representation of reality through their interaction with the world and their discussions with others (Bruner,1986) The learners are, therefore, encouraged to explore their world, to learn by doing, to look at things in different ways, to discuss their world view with others and as a result to continually transform their understanding of the world in light of these experiences.

Many of our encounters with the world are not direct, our meaning and interpretation about an event is constructed through reflection on it with others. Bruner(1986) suggests that we need to encourage a situation whereby information is not presented from one dominant view and where reflection, discussion and opposing views are included in the process. Education shapes our thoughts and ultimately the way in which we represent and view our world.

### **Constructivism in Science Teaching**

Constructivism both radical and social asserts that knowledge is actively constructed by the learner. Learning is perceived as a cultural apprenticeship and that cognition is argued to be situated in the specific context.(Lave,1988; Brown.et.al.1989)

Driver et .al(1994) stated that scientific knowledge is symbolic in nature and socially negotiated and classroom is the social unit where knowledge is constructed and negotiated.

Constructivism makes the education child-centered, focusing on unique experiences, capacities and insight of the child. Constructivist curriculum begins with taking whole in consideration and then proceeds towards parts. Students here perceive a situation as a whole and then explore its parts. It emphasises on discovery learning. In constructivism the teacher has the following roles:-

1. Acts as a facilitator which plan and organise the learning.
2. Acs as a guide which gives counselling and show right direction to solve the problem.
3. Provide cognitive support to learners by giving suggestions, recommendations.
4. Encourages independent thinking and creativity among learners
5. Set limits and boundaries for the learners.
6. Asseses the learners needs, strengths, feelings and possibilities.
7. Acts with open mind and learn along the learners i.e. Acts with flexibility.

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A Teacher can follow following process for developing learning experiences in constructivist classroom:

1. Presentation of a situation.
2. Grouping of Students.
3. Grouping of material.
4. Relating present and future knowledge.
5. Deciding about questions.
6. Recording of thinking
7. Reflecting

Constructivism in science teaching is an approach which focuses on each student, treat her /him as a unique case with her/him own set of realities, experiences, values and culture. It emphasises that students should be taught in natural settings with multiple representations of reality and varied experiences.

The opportunities to explore observe and discuss, should be provided to children. Students should be encouraged to ask questions, share their experiences, carry out analogies and reach to conclusions and draw inferences. Negotiation of outcomes is equally important so that students can compare their reality with others and correlate their knowledge with the outside world.

Constructivist learning has emphasis on all three- past, present, and future. The students are actively involved in construction of knowledge by reflecting upon old and new knowledge and thus evolve new knowledge and learns, unlearns and relearns in this process.

### **Story-telling- A Constructivist Tool in Science Teaching**

Story-telling is one of the constructivist approaches that can be used in science teaching. It is one of the basic to our everyday lives in communicating with and understanding the people around us and the world we live in (Schank and Abelson, 1995). The stories we tell are more about how we experience and perceive events than about how things really are. They can help us deal with unexpected situations and consider the possibilities for what could have happened as well as what actually transpired (Bruner, 1990). They are an excellent constructivist tool, enabling us to explore the many representations of our worlds. Story-telling has been extensively used in child education as a valuable and creative tool. Construction of stories requires students to actively

engage in making sense of their experiences to present stories from different view points. Students were able to set their own goals, thus enabling them to become self-organised and independent learners.

Story-telling, thus enables the students to make their own decisions, share their views and experiences, and this is the basics premise of constructivism, to construct own knowledge. Story-telling in science teaching can be used to make it more effective as analogy uses the learner,s existing knowledge to generate new understanding. Elaborated analogies tend to be more effective when explaining, because they allow the learner to predict which as the basics of establishing casual relationships, one of the key scientific skills. According to Glynn(1991)Analogy is the process of identifying similarities between different concepts.

Harrison(2002) points out that the ability of analogies to raise students interest levels is at times more important in the motivation for learning. Analogies matched to developmental levels are more likely to result in effective learning partially because they are more likely to be interesting and accessible to the learner. For nearly 50 years(Oppenheimer,1956),science educators have been concerned with how children use analogies to create new understandings in science. The purpose of analogy in science education is to effect conceptual change specifically in terms of new or attended understanding. A complex, boring class can be transformed into simpler and more interesting class where in students can connect with their past experiences and construct the own knowledge, ideas, relate the new knowledge with old one and come up with new ideas.

#### **A practical Experience:-**

This approach was used during practice teaching where in the pupil-teacher used story-telling as constructivist tool to explain the concept of translation of DNA. Instead of starting the class in usual inductive manner, she narrated the story about the candy factory and correlated with translation process. This not only enhanced the aesthetic aspect of pupils and teachers, but the affective domain also which is always seen as a neglected aspect in science teaching.

The pupil-teacher started the lesson with narration of story about David the boss, who owns a candy factory and makes delicious candies of the world. And he has the library of all the recipes store in his office. As the recipes are with the boss David, similarly the recipes to make the protein is stored in the DNA(Boss of the cell0 and as the candies are produced in factory, the

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proteins are produced in the protein producing factories called the ribosomes, as messenger or the peon would deliver the recipe of the candy to the workers from the office to the factory, same way the mRNA is the poem or the messenger in the cell which delivers the message from the DNA-the boss from the nucleus(office of the boss) to the ribosomes(factory). Thus analogy between candy production and protein synthesis was established through this story.

Story-telling is one of the constructive tool which can be used in teaching of science, There are various other ways in which we can make our lessons interesting and effective. We just need to challenge our thinking and push ourselves a bit more beyond the envelope to make an impact.

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