Constructivism and Science Performing Skill Among Elementary Students: A Study

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ABSTRACT *Constructivism is one of the new theories which has very much influenced the teaching learning process. The basic idea of constructivism is that the learner must construct knowledge; the teacher cannot supply it. From behaviorism to constructivism is known as paradigm shift in education. There is a shift from teacher - centered education to learner - centered education and now it is towards learning- centered education. A constructivist classroom is student centered, activity based, interactive and knowledge is constructed by joining previous knowledge with new experiences. It is a search for meaning which helps in promoting understanding and insight. The leaner is actively engaged his/her own dialogue with facilitating construction of knowledge. The present study is intended to develop an understanding of improvement of the skill of doing science by learning science through constructivist teaching approach. It was an experimental study and the researcher taught ten lessons to two different group of students by constructivist approach of teaching and traditional approach of teaching. It was found that the constructivist approach of teaching has a great impact on the science performance skill of students.*

Science is a method of investigating nature, a way of knowing about nature and discovers reliable knowledge about it. In other words, science is a method of discovering reliable knowledge about nature. There are other methods of discovering and learning knowledge about, but science is the only method that results in the acquisition of reliable knowledge. Science as a separate subject was included in school curriculum in the beginning of nineteenth century. It was then referred to as general science and after the independence o Indian government set up the University Education Commission under the Chairmanship of Dr. Radha Krishnan and it recommended inclusion of General Science as a course of study in secondary schools. During 1947-52 the system of Basic Education, accepted as a national system of education visualized the General Science approach to teach science at elementary stage. The science education in India has been shaped by the ideas of Mudaliar Commission Kothari Commission NPE-1968,1986 And 1992, Prof Yash Pal, NCF-2005. And now the modern science teaching is greatly influenced by constructivism which challenges to the concept of traditional knowledge transmission saying that -*knowledge is not attained but constructed.*

Science learning makes enhancement not only in cognitive abilities but also in affective and psychomotor abilities. The psychomotor abilities are often considered to be reflected in the process skill of learner. Constructivism, a modern paradigm of teaching also advocates in favor of acquiring of some process skill.

Science Process Skills A Process is a series of activities or operations performed to attain certain goal or product. Science Processes are the inter-linked activities performed by any qualified person during the exploration of universe. The Science process outcomes are the intellectual skills needed for scientific investigation attained by student as a result of learning of science. In order to get a better insight into the nature of processes the investigator examined some of the important classifications attempted by top authorities in the field. Some of the representative classifications are given below.

Observing - using the senses to gather information about an object or event.

Inferring - making an "educated guess" about an object or event based on previously gathered data or information.

Measuring - using both standard and nonstandard measures and estimates to describe the dimensions of an object or event.

Communicating - using words or graphic symbols to describe an action, object or event. *Classifying* - grouping or ordering objects or events into categories based on properties or criteria.

Predicting - stating the outcome of a future event based on a pattern of evidence.

Problem solving-it consists of using generic temporary methods, in an orderly manner, for finding solutions to problems.

Scientific thinking This type of thinking can lead to experiments, and it can help people develop skills for determining whether something they hear or see is true.

Constructivist approach of teaching-learning- Knowledge is not attained but constructed (**Von Glaserfeld, 1989**)This statement came from a new challenge to the concept of traditional knowledge. Students need to construct their own understanding of each scientific concepts, So that the primary role of teaching is not to lecture, explain or otherwise attempt to transfer knowledge, but to create situations for students that will foster their making the necessary mental constructions. Research in science learning has given new dimensions to information processing and constructivist view of learning. Constructivism that focuses on learner - centered approach can transform thinking and practice beyond the conventional boundaries of our educational system.

It is not surprising that constructivism has a strong voice

in the current dialogue on science education. Many are concerned about the success - or lack of success of science education. Constructivism cuts a nice path between the main ideas that have influenced how science has been taught: the concept of science as facts, to be transmitted to the student, and the view that some people have it and some people do not, where the educator's task is to figure out how "smart" students are and choose the right tasks for them to perform.

Objectives- To study the effectiveness of constructivist approach on students' science performing skill in elementary classes.

Hypothesis There will be no significant effect of constructivist approach on students' science performing skill in elementary classes.

Design of the study- The study was an experimental study, the researcher had selected two groups randomly. Treatment (constructivist teaching) was given to one of the group randomly and other group was given no special treatment. The researcher taught the control group by traditional method of teaching. The plan of the study was to check the entry behaviour of both the group and the changes of the behaviour after the treatment.

Sample and Sampling- In this study the class VII students of all the 530 middle Schools of Bilaspur were the population. Probability sampling technique was used for the sampling. By the lottery method 2 schools were selected. Twenty VII students of each school were the sample of the study.

Tools and Techniques used- In the present study the researcher had made use of two types of tools for the data collection. These were instructional tools and testing tools. In this study instructional tools were prepared by the researcher for the teaching learning of science in VII standard. The content were newly designed according to the mental level of standard vii. For control group these lessons were taught by traditional method. No direct instruction was given to the experimental group. The researcher had created constructivist learning situations in the form of activity. The achievement of students was evaluated by the use performance based testing tools.

Result and discussion- Acquiring of some process skill was the objective of the teaching learning process. At the end of the teaching learning process the researcher had assessed the process skills acquired by learners. The process skills were assessed in terms of the following expected outcomes-

Table 1: Description of Scores of process skill

| Sl. No.	Description	Control Group	Experimental Group
1	Mean	11.3	17.9
4	Percentage of students having more than 75% marks	10%	100%`
5	Percentage of students having scores up to 25%	0%	0%

From the above table 1 it is observed that mean of the scores of process skill of experimental group is higher than that of the control group. When the percentage of students having scores above 75% in process skill test is observed, it is evident from the above table that all students

of experimental group scored above 75% than where as only 10% students of the control group achieved this. When the percentage of students having scores up to 25% was considered, every student of the two group scored above 25%.

The achievement of learners in different items had reflected the fulfillment of the teaching learning objectives set for the lesson. The details reflection of the objectives in the achievement of learners with respect to different process skill is mentioned in the following table.

Table: 2 Fulfillment of teaching learning objectives of process skill

Sl. No.	Name of process skill	Percentage of student who had full filled the objectives	
		Control Group	Experimental Group
1	Observing	95%	100%
2	Inferring	80%	100%
3	Measuring	40%	95%
4	Communicating	35%	95%
5	Classifying	40%	100%
6	Predicting	5%	75%
7	Problem solving	50%	85%
8	Scientific thinking	10%	50%
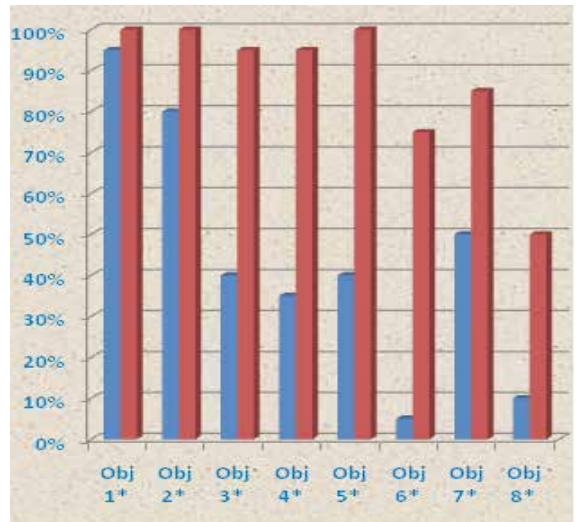
Fulfillment of Objectives of Process Skill

From the above table it is evident that all most all students had acquired skill of observation and Inferring. When the skill of measuring and communicating is considered performance of experimental group was better than the control group. Similar result was found in the skill of classifying and predicting. There the difference was larger in the same direction. The problem solving skill was much better in the experimental group than the control group. Scientific thinking was reflected in the behaviour of students of experimental group in a much better way than the control group

The combined result of the study indicates that the constructivist approach was significantly effective on the on students' science performing skill in elementary classes. Similar success of constructivism was seen in the studies done by Hemalata P. K. (2002) Kipnis & Hefstein (2008), Heard (2007) and Folashade& Akinbobola (2009). In the

activity method the knowledge constructed was found to be more permanent in nature. This was because students were actively participating in the learning process in experimental group. The knowledge was constructed and evaluated by the peer group. The cooperation between the peer members had made the method more effective. In the activity method verbalism was less and learning was purposive. Students were getting motivated by the success of other students in activity. (**A. Bandura**) Here the artificial dilemma created by the researcher was facilitating learning. That dilemma was working as secondary reinforcement and was found to be more effective (**Dollard and Miller**). The retention of the scientific concepts in the cognitive map of students was more frequently seen in experimental group than that of control group. Direct instructions were given to the control group because of which their performance in the formative tests was good. But experimental group students had constructed their knowledge by themselves, which reflected in their result of summative test. This retention was due to the activity. For example when acid base concept was the topic, no definition of acid and base was told in experimental group. Some edible acid and bases were given them to test. After it the properties and definition were discussed by the students. This concept was retained till the post treatment test. They had learnt the litmus test by performing it. So when they were asked to demonstrate the litmus test as a part of process skill evaluation most of the students of the experimental

group were successful. In the post treatment achievement test they had also written the correct answer regarding it. The control group students were provided theoretical idea of litmus test. At post treatment it was found that they were confused with the colour change, and had made mistake in the post treatment test. Even the conceptual problem was more serious when students of control group were asked to perform it. Similarly the students of control group had faced difficulty to choose the good conductor of electricity between pencil and the graphite of pencil. But the experimental group students learnt the concept by making circuit complete with the help of various materials including graphite. So with being provided direct information, no conceptual confusion was seen.

Conclusion- It was observed that the students of both the control and experimental group were taking part in the discussion. But the quality of discussion was more objective in the experimental group. Students were always interested to perform activity. The learning was joyful for them. It was surprised to observe that the students of the experimental group were learning without instruction and their performance was better than the control group students in most of the classes. Class control in the experimental group was much easier than that of control group. Students of experimental group had learnt the skill of working in a group and leading the group.

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