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Impact of constructivist approach of learning on academic achievement of class vii students in mathematics at primary school, Nadia, West Bengal

Swarupa Chakraborty[1*], Dr. Anita Soni[2]
[1] Research Scholar, Sunrise University, Alwar, Rajasthan, India
[2] Supervisor, Sunrise University, Alwar, Rajasthan, India

Abstract
The objective of the study was to find the impact of constructivist approach of learning as compared to traditional method of teaching in academic achievement of class VII class students in mathematics. An experiment in teaching mathematics at class VII level was conducted. Where two groups, experimental and controlled were taught constructivist approach of learning and traditional method of teaching respectively. A sample of 60 students, 30 each constitute experimental and control group was selected. The investigator used two different tools called the i) Instructional materials ii) Measuring instruments. Two types of instructional tools were used, the constructivist approach (CA) followed by experimental group and traditional method of teaching (TMT) followed by control group. The Mathematics Achievement Test (MAT) was used for measuring students' achievement in mathematics. The "t" test revealed that i) the performance of experimental and control groups in pre test score was an similar line, ii) the mean achievement score of experimental group is comparatively higher than that of control group in post achievement test; iii) both pre and post test scores were found to be almost equal in case of control group; it means the students taught through traditional method of teaching marked no such differences in their achievement and iv) there exists significant difference between pre and post test scores of experimental group; students taught through constructivist approach of learning have marked higher achievement than students taught through traditional method of teaching.

Keywords: constructivist approach of learning, traditional method of teaching, academic achievement, experimental group

Introduction
Classroom teaching, leaning practice becomes more effective, when it is well informed by an understanding, of how students' learn and learning will be more successful if students are given the opportunity to explain or clarify their ideas. So in terms of pedagogy, teaching learning practices has been given emphasis on students' involvement in their learning, where focus in on knowledge construction rather knowledge transformation. Constructivist pedagogy in an meta learning strategy where students in the classroom had significantly higher learning skills in mathematical computation, constructivist instruction is more effective than the direct instruction constructivist pedagogy improves achievement in mathematics constructivist-based approach to be promising and its positive effects have been found for both students' performance and motivation; integrated constructivist learning, constructivist instruction appears to motivate students because they find it more pleasant to learn and more challenging to study in the constructivist classroom (Ames and Ames, 1989) [9]; a shift form behaviourism to constructivism, effectiveness of 5E's model. A retrospective review of literature revealed that there has been growing demand of constructivist classroom for students' achievement in 21st century. Therefore the present study has been conducted.

Objectives of the study
1. To study the pre-test scores of experimental and control groups.
2. To study the post test scores of experimental and control groups.
3. To study the pre and post test scores of control groups.
4. To study the pre and post test scores of experimental groups.

Hypotheses
H1: There exists no significant difference between pre-test scores of experimental and control group.
H2: There exists no significant difference between post-test scores of experimental and control group.
H3: There exists no significant difference between pre-test and post test scores of control group.
H4: There exists no significant difference between pre-test scores of experimental group.

Methodology
Design
An experiment in teaching mathematics at class VII level was conducted where two groups such as experimental and controlled were taught through constructivist approach of learning and traditional method of teaching respectively. During the treatment process, the experiment al group participated in the constructivist approach and the control group participated in the normal traditional instructional strategy. The researcher himself taught to both the experimental group and control group in each class separately.

In experimental class in order to create the constructivist learning situation, the researcher followed the 5E' instruction model (engage-explore-explain-elaborate-evaluation) and continuous students growth was measured through tests, observations.

Sample

A sample of 60 students, 30 each constitute experimental and control group was selected. The sample was taken from Primary School Nadia District.

Tools

The investigator used two different tools called the i) Instructional materials ii) Measuring instruments. Two types of instructional tools were the constructivist approach (CA) followed by experimental group and traditional method of teaching (TMT) followed by control group. The Mathematics Achievement Test (MAT) was used for measuring students' achievement in mathematics. The MAT was validated by expert teachers in mathematics. The reliability of the MAT was 0.619.

The Results

Table 1: Table for mean, standard deviation and t-value of pre test score of both experimental and control groups.

Groups	N	Pre test		t-value	Significance at 0.05 level
		Mean	SD		
Experimental Group	30	22.80	8.29	0.015	Not significant
Control Group	30	22.83	8.49		

The table-1 revealed that the t-value of test was 0.015 that is less than the tabulated value (1.98) at 0.05 level of significance; hence there is no significant difference between the pre test scores of experimental and control group on their achievement in mathematics. Further it is seen that the performance of experimental and control groups in pre test scores was on similar line.

Table 2: Table for mean, standard deviation and t-value of post test score of both experimental and control groups.

Groups	N	Pre test		t-value	Significance at 0.05 level
		Mean	SD		
Experimental Group	30	27.73	7.75	1.603	Not significant
Control Group	30	24.40	8.34		

The table-2 revealed that the t-value of test 1.603 that is less than the tabulated value (1.96) at 0.05 level of significance; hence there is no significant difference between the post test scores of experimental and control group on their achievement in mathematics. Thus, the mean achievement score of experimental group is comparatively higher than that of control group in post achievement test.

Table 3: Table for mean, standard deviation and t-value of pre and post test scores taught through traditional method (control group).

Variables	Type of test	N	Pre test		t-value	Significance at 0.05 level
			Mean	SD		
Traditional method of teaching and academic achievement	Pre test	30	22.83	8.49	0.721	Not significant
	Post test	30	24.40	8.34		

The table-3 revealed that the t-value of test 0.721 that is less than the tabulated value (1.96) at 0.05 level of significance; hence there is no significant difference between the pre-test score and post test score of control group on their achievement in mathematics. Both pre and post test scores were found to be almost equal in case of control group; it means the students taught through traditional method of teaching marked no such differences in their achievement.

Table 4: Table for mean, standard deviation and t-value of pre and post test scores taught through constructivist approach of learning (Experimental group).

Variables	Type of test	N	Pre test		t-value	Significance at 0.05 level
			Mean	SD		
Constructivist approach of learning and academic achievement	Pre test	30	22.80	8.29	2.381	Significant
	Post test	30	27.73	7.75		

The table-4 revealed that that the t-value of test 2.381 that is more than the tabulated value (2.05) at 0.05 level of significance; hence these is significant difference the pre-test score and post score of experimental group on their achievement in mathematics. This result prompts to conclude that, teaching/learning through the constructivist approach has substantially improved the students' achievement in Mathematics as compared to the teaching/learning through traditional expository teaching method.

Major Findings

1. The performance of experimental and control groups in pre-test score was on similar line.
2. The mean achievement score of experimental group is comparatively higher than that of control group in post achievement test.
3. Both pre and post test scores were found to be almost equal in case of control group; it means the students taught

through traditional method of teaching marked no such differences in their achievement.

4. There exists significant difference between pre and post test scores of experimental group; students taught through constructivist approach of learning have marked higher achievement than students taught through traditional method of teaching.

Results and Discussion

Form the above study in was found that students taught through constructivist approach gain significantly high achievement score in mathematics is retained since a marked change was observed in the achievement of the grade VII students who participated in the constructivist learning environment based on 5E's learning model, as compared to their counterparts taught in traditional model of teaching. Moreover, the students taught in constructivist-learning environment have significantly enhanced their knowledge, understanding and application abilities. In order to capitalize the potential of students particularly constructivism as a learning approach there is an urgent need of professional development of teachers. Professional development that allows teachers to construct professional knowledge about pedagogy, content as well as strategies for managing the changing classroom environments brought about the creation of constructivist learning environment. By providing constructivist brought about the creation of constructivist learning environment. By providing constructivist learning situation we can enable them to enhance their achievement in mathematics in particular and overall achievement in general.

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