

EFFECT OF CONSTRUCTIVE LEARNING APPROACH ON ACHIEVEMENT IN MATHEMATICS

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ABSTRACT

The present study investigates the effect of constructive learning approach on achievement in mathematics. A pre-test and post-test factorial design has been employed on the gain achievement scores in mathematics between male and female of experimental and control group. The total sample comprises 60 students of Harryson Model School, Mohali affiliated to Central Board of Secondary Education, New Delhi was selected randomly. The findings of the study revealed that (i) The constructive learning approach was more effective than the traditional teaching approach on achievement in mathematics. (ii) The performance of male students of experimental group have better in mathematics than that of female students.

INTRODUCTION

Constructivism has emerged as one of the greatest influences on the practice of education in the last twenty-five years. Teachers have embraced constructivist-based pedagogy with an enthusiasm that is rare in these days of quick fixes and a shopping mall approach to school improvement (Powell, Farrar & Cohen, 1985). For many teachers, the focus on constructing meaning in the teaching-learning process resonates with prior beliefs because constructivist-based instruction firmly places educational priorities on students' learning. Constructivism is a theory or philosophy of learning "based on the idea that knowledge is constructed by the knower based on mental activity" (Skaalid, no date). It can be defined as "meaning making... rooted in the context of the situation... whereby individuals construct their knowledge of, and give meaning to, the external world" (Babb et al., no date). As an educational philosophy it came to prominence in the early 1990s. Based on writing of that time (Dunlap & Grabinger, 1996; Merrill, 1991; Savery & Duffy, 1996; and Wilson, Teslow & Jouchoux, 1993), the basic precepts are: Learning is an active process of meaning-making gained in and through our experience and interactions with the world. Learning opportunities arises as people encounter cognitive conflict, challenge, or

puzzlement, and through naturally occurring as well as planned problem solving activities. Learning is a social activity involving collaboration, negotiation, and participation in Learning is a social activity involving collaboration, negotiation, and participation in authentic practices of communities where possible, reflection, assessment, and feedback should be embedded "naturally" within learning activities. Learners should take primary responsibility for their learning and "own" the process as far as possible. The constructivist approach incorporates the idea that learners are not just learning, they are learning how to learn. Therefore, as students find ways to solve mathematics problems, they are teaching themselves how to approach other mathematics problems. Finally, the constructivist approach requires that concepts be revisited again and again. This "spiralling" allows students the time to ponder concepts and construct deeper understandings. "It is assumed that learners have to construct their own knowledge-- individually and collectively. Each learner has a tool kit of concepts and skills with which he or she must construct knowledge to solve problems presented by the environment. The role of the community-- other learners and teacher-- is to provide the setting, pose the challenges, and offer the support that will encourage

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mathematical construction. (Davis, Maher & Noddings 1990, p. 3)

Brooks and Brooks (1993) "Constructivism is not a theory about teaching...it is a theory about knowledge and learning... the theory defines knowledge as temporary, developmental, socially and culturally mediated, and thus, nonobjective". Knowledge, no matter how it be defined, is in the heads of persons, and that the thinking subject has no alternative but to construct what he or she knows on the basis of his or her own experience."

Naylor and Keogh (1999) "The central principles of this approach are that learners can only make sense of new situations in terms of their existing understanding. Learning involves an active process in which learners construct meaning by linking new ideas with their existing knowledge."

Mathematics is a science of numbers, magnitude, space, geometrical figures and algebraic expressions. It is mother of all the mothers and father of all the fathers. Achievement in mathematics simply means that excellent scores in mathematics. Achievement in mathematics signifies that an individual have an ability to deal with numbers, solve difficult mathematical problems, have an understanding of geometrical figures and their constructions. A high achiever in mathematics has excellent computational and interpretation skills.

NEED AND SIGNIFICANCE

The proper teaching strategies help teachers in solving learner's problems and bringing remarkable improvement change in the behavior of students. Review of related literature shows that use of different teaching strategies gave quite positive results in comparison to traditional teaching techniques. While teaching Harryson Model School mathematics students, it was found that conventional method is not much effective and thus attempts were made to conduct a research using constructive learning approach for teaching experimental group and traditional technique for control group of students to investigate whether the use of constructive learning approach is effective. Therefore, the investigator made an attempt to determine the

effect of constructive learning approach on achievement in mathematics.

OBJECTIVES

1. To compare the performance of group taught through constructive learning approach and traditional teaching approach.
2. To examine the performance of male and female group on achievement in mathematics.

HYPOTHESES

H1: The performance of groups taught through constructive learning approach will be significantly higher than that of traditional teaching approach.

H2: The performance of male groups will be significantly higher than that of female group on achievement in mathematics.

SAMPLE

The study was conducted on a sample of sixty students of 6th class of Harryson Model School, both male and female of Mohali District affiliated to Central Board of Secondary Education, New Delhi. The two intact sections of 30 students were formed. The two intact sections were named as experimental and control group. It was purposive sample.

DESIGN

The study was experimental in nature. A pre-test and post test factorial design was employed. The experimental group was taught through constructive learning approach and control group was taught through traditional teaching approach. Variably constructive learning approach was independent variable and performance gain was the dependent variable, which was calculated as the difference in post-test and pre test scores.

TOOLS USED

1. Achievement Test in Mathematics prepared by the investigators.
2. Five Lesson Plans based on Constructive Learning Approach prepared by the investigators.

PROCEDURE

After the selection of sample and allocation of students to the two instructional strategy. The experiment was conducted in three phases i.e. firstly, a pre-test was administered to the students of both the treatment and control group. The answer- sheets were scored to obtained information regarding the previous knowledge of the students. Secondly, the experimental group was taught through constructive learning approach and control group was taught through traditional teaching approach by the investigators. Thirdly after the completion of the course, the post test was administered to the students of both the groups. The answer sheets were scored with the help of scoring key. Time limit for the test was 30 minutes. The scores of experimental and control group was compared according to their pre test and post-test scores. The difference was the gain achievement scores.

ANALYSIS AND INTERPRETATION OF THE RESULTS

The analysis of the obtained data was done by statistics such as mean, SD and t-ratio techniques were used. The results are presented in table 1 and 2.

Table-1: t- ratio for mean gain achievement scores in mathematics between experimental and control group

Variable	Experimental Group			Control Group			SE _D	t-ratio
	N	Mean	SD	N	Mean	SD		
Gain Scores	30	5.1	4.67	30	2.2	1.09	0.88	2.70**

**Significant at the 0.01 level of significance ((Critical Value 2.00 at 0.05 and 2.66 at 0.01 level, df 58)

A table 1 show that the mean gain scores of constructive learning approach is 5.1, which is higher than the mean gain scores of 2.2 of traditional teaching approach. The t-value testing significance of mean difference of constructive learning approach and traditional teaching approach is 3.30, which in comparison to table value was found significant at 0.01 level. Hence,

the hypothesis H1: The performance of groups taught through constructive learning approach will be significantly higher than that of traditional teaching approach, is accepted. The result indicates that constructive learning approach is more effective than traditional teaching approach. The results were supported by the findings of Tynjälä (1999) found that constructivist group students described their learning in a greater variety of ways than the traditional group. Cobb, Wood, Yackel,, Nicholls, Wheatley, Trigatti and Perlwitz, (1991) found that project students demonstrated higher levels of arithmetical thinking than non-project students. Christianson and Fisher (1999) revealed a significant difference in the post-test scores in favor of constructivist group. Koch (1992) revealed that constructive learning approach was more effective than traditional teaching.

Table-2: t- ratio for mean gain achievement scores in mathematics between male and female students

Variable	Male			Female			SE _D	t-ratio
	N	Mean	SD	N	Mean	SD		
Gain Scores	30	5.37	2.65	30	3.07	3.59	0.83	2.77**

**Significant at the 0.01 level of significance ((Critical Value 2.00 at 0.05 and 2.66 at 0.01 level, df 58)

Table -2 shows that the mean score of male student is 5.37, which is higher than the corresponding mean gain score of 3.07 of female students. The t-value testing significance of mean difference between male and female students is 2.77, which in comparison to table value was found significant at 0.01 level of significance. Hence, the hypothesis H2: The performance of male groups will be significantly higher than that of female group on achievement in mathematics, is accepted. The result indicates that male students have better performance in mathematics than female students.

FINDINGS

1. The performance of students in mathematics taught through constructive learning

approach was significantly higher than that of traditional teaching approach.

2. The performances of male students have better when we taught through constructive learning approach than that of female students.

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