



# REVIEW OF RESEARCH

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## EFFECT OF CONSTRUCTIVIST BASED APPROACH OF TEACHING MATHEMATICS IN IMPROVING ACHIEVEMENT OF IX STANDARD STUDENTS

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### ABSTRACT:

The purpose of the study is to find out the effect of constructivist based approach of teaching mathematics in improving the achievement of IX standard students. Experimental method is appropriate for this study, to avoid difficulty in conducting experiment two intact class divisions of IX standard were selected for the study. The investigator randomly selected 50 students from IX standard of 'A' division/section and 50 students from IX standard of 'B' division/section. Then the investigator randomly assigned one section ('A' division) as experimental group and other section as ('B' division) the control group.



The constructivist approach is new trend in teaching of mathematics by many enthusiastic teachers in many countries. Constructivist approach/pedagogy does not consist of a single teaching strategy. Instead, it has several features that should be attended to simultaneously in a classroom. It has been asserted that for a successful constructivist strategy the teaching has not only to be student centred and the teacher a mere facilitator but the teacher has the added responsibility to create an advantageous classroom environment. Research has established that constructivist methods of mathematics teaching have been much more successful than the traditional methods. The results shows that the constructivist based approach is more effective as it enhanced achievement in mathematics. Students who learn through constructivist based approach are found to be better in achievement than the students' achievement learning through traditional method.

**KEYWORDS:** constructivist approach and achievement.

### INTRODUCTION

Constructivism is a theory of knowledge i.e., epistemology and a theory of learning. It is not a particular pedagogy. Constructivists believe that human beings are active information receivers. They use their existing experience to construct understanding that makes sense to them. Humans assimilate and

accommodate new knowledge and build their own understanding knowledge is viewed as personal and subjective.

Mathematics content teaching is the narrower goal as compare to creating mathematical learning environments.

The content areas of mathematics addressed in our schools do offer a solid foundation, while there can be disputes over what gets taught

at which grade and over the level of detail included in a specific theme, there is broad agreement that the content areas (arithmetic, algebra, geometry, mensuration, trigonometry, data analysis) cover essential ground.

What can be leveled as a major criticism against our extant curriculum and pedagogy is its failure with regard to mathematical processes. We

mean a whole range of processes here: formal problem solving, use of heuristics, estimation and approximation, optimization, use of patterns, visualization, representation, reasoning and proof, making connections, mathematical communication. Giving importance to these processes constitutes the difference between doing mathematics and swallowing mathematics, between mathematization of thinking and memorizing formulas, between trivial mathematics and important mathematics, between working towards traditional teaching and constructivism teaching.

In school mathematics, certainly emphasis does need to be attached to factual idea, procedural fluency and conceptual understanding. New idea is to be constructed from experience and prior knowledge using conceptual elements. However, invariably emphasis on procedure gains ascendancy at the cost of conceptual understanding as well as construction of idea based on experience. This can be seen as a central cause for the fear of mathematics in children.

Here the investigator checks the effectiveness of constructivist based approach of teaching mathematics in improving achievement of IX standard students.

### **OBJECTIVES OF THE STUDY:**

1. To study the effect of constructivist based approach of teaching mathematics in improving achievement of IX standard students.
2. To compare the achievement of the IX standard students based on gender.
3. To develop an instructional plan(lesson transcript) on the teaching of selected units in mathematics at class IX standard based on the constructivist based approach and traditional teaching method.

### **HYPOTHESES:**

The following hypotheses have been formulated.

1. There is no significant difference between control and experimental group with respect to pre-test and post-test achievement in mathematics scores of IX standard students.
2. There is no significant interaction effects of groups(control and experimental) and gender on improvement or changes scores in an achievement in mathematics of IX standard students from pre-test to post-test.

### **METHODOLOGY:**

Experimental method was adopted for the present study.

### **SAMPLE:**

The random sample method was adopted for the present study. The sample of the study consists of 100 students studying in IX standard in Ballari city. The sample includes both boys and girls.

### **TOOLS USED:**

The following tools were prepared by investigator to collect data.

1. Lesson transcripts (plans) for traditional method of teaching mathematics.
2. Lesson transcripts (plans) for constructivist based approach of teaching mathematics.
3. Achievement test which was developed and validated by the investigator.

### **PROCEDURE OF THE STUDY:**

Experimental design was adopted. Before starting experimentation, the investigator conducted achievement test in mathematics to both the experimental group and control group and found there is no significant difference in their mean scores. The students of the experimental group were taught using constructivist based approach and the control group using traditional method of teaching. After the treatment the post test was administered to both the groups. The collected data was subjected to the statistical analysis (ANOVA & ANCOVA) and the results obtained were interpreted.

**ANALYSIS AND FINDINGS:**

**Hypothesis1:** There is no significant difference between control and experiment groups with respect to pretest and posttest achievement in mathematics scores of IX standard students.

To accomplish the above assumption (hypothesis), the Analysis of covariance (ANCOVA) (pretest scores as covariate) technique has been applied and the results are presented in the following table.

**Table: Comparison of between control and experiment groups with respect to pretest and posttest achievement in mathematics scores of IX standard students by Analysis of covariance (ANCOVA)**

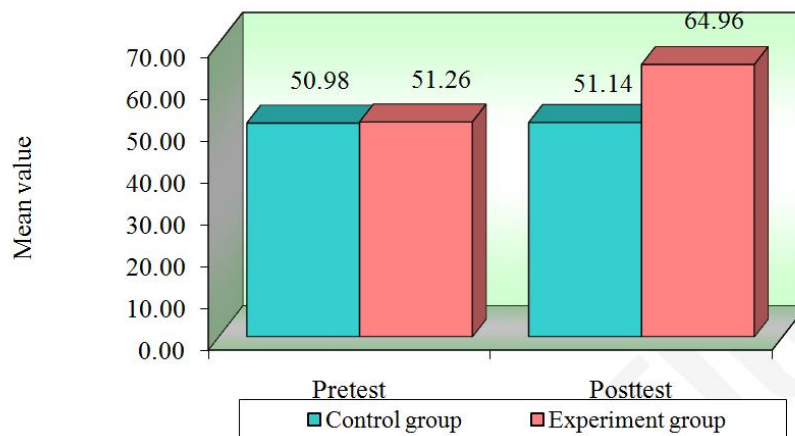
Groups	Pretest		Posttest		
	Mean	SD	Mean	SD	Adjusted mean
Control group	50.98	3.44	51.14	3.79	51.23
Experiment group	51.26	4.83	64.96	5.40	64.87
F-test	0.1115@		319.4090#		
P-value	0.7391		0.0001*		

\* $p < 0.05$ , @one way ANOVA applied, # ANCOVA applied

The results of the above table clearly show the following:

- The control and experiment groups do not differ significantly with respect to pretest achievement in mathematics scores of IX standard students ( $F=0.1115$ ,  $p > 0.05$ ) at significance level of 5 percent. It means that, the pretest achievement in mathematics scores of IX standard students are similar in control and experiment group.
- The control and experiment groups differ significantly with respect to posttest achievement in mathematics scores of IX standard students ( $F=319.4090$ ,  $p < 0.05$ ) at significance level of 5 percent. Hence, the null hypothesis is rejected and alternative hypothesis is accepted. It means that, the posttest achievement in mathematics scores of IX standard students are different in control and experiment groups. It means that, the posttest achievement in mathematics scores of IX standard students is significantly higher in experiment group as compared to control group. The mean scores of pretest and posttest achievement in mathematics scores of IX standard students are also presented in the following figure.

**Figure: Comparison of between control and experiment groups with respect to pretest and posttest achievement in mathematics scores of IX standard students**



**Hypothesis 2:** No significant interaction effects of groups (control and experiment) and gender (male and female) on improvement or changes scores in achievement in mathematics of IX standard students from pretest to posttest

To accomplish the above assumption (hypothesis), the two factor analysis of variance with interaction design was performed and the results are presented in the table given below.

**Table: Two factor analysis of variance for interaction effects of groups (control and experiment) and gender (male and female) on improvement or changes scores in achievement in mathematics of IX standard students from pretest to posttest**

Sources of variation	Degrees of freedom	Sum of squares	Mean sum of squares	F-value	p-value
<b>Main effects</b>					
Groups	1	4577.28	4577.28	307.5383	0.0001*
Gender	1	89.56	89.56	6.0172	0.0160*
<b>2-way interaction effects</b>					
Groups x Gender	1	106.68	106.68	7.1676	0.0087*
Error	96	1428.83	14.88		
Total	99	6202.34			

\* $p < 0.05$

From the results of the above table, it can be observed that,

- The main effect of groups (control and experiment) on improvement or changes scores in achievement in mathematics of IX standard students from pretest to posttest is found to be statistically significant ( $F=307.5383$ ,  $p < 0.05$ ) at significance level of 5 percent. Therefore, the  $H_0$  is rejected and  $H_1$  is accepted. It means that, the IX standard students belongs to control and experiment groups have different improvement or changes scores in achievement in mathematics from pretest to posttest.
- The main effect of gender (male and female) on improvement or changes scores in achievement in mathematics of IX standard students from pretest to posttest is found to be statistically significant ( $F=6.0172$ ,  $p < 0.05$ ) at significance level of 5 percent. Therefore, the  $H_0$  is rejected and  $H_1$  is accepted. It means that, the male and female of IX standard students have different improvement or changes scores in achievement in mathematics from pretest to posttest.
- The interaction effects of groups (control and experiment) and gender (male and female) on improvement or changes scores in achievement in mathematics of IX standard students from pretest to posttest is found to be statistically significant ( $F=7.1676$ ,  $p < 0.05$ ) at significance level of 5 percent. Therefore, the  $H_0$  is rejected and  $H_1$  is accepted. It means that, the male and female of IX standard students belongs to control and experiment groups have different improvement or changes scores in achievement in mathematics from pretest to posttest.

Further, to know the pair wise comparisons of interaction effects of groups (control and experiment) and gender (male and female) on improvement or changes scores in achievement in mathematics of IX standard students from pretest to posttest by applying the **Tukeys multiple posthoc** procedures and the results are presented in the tables given below:

**Table: Interaction effects of groups (control and experiment) and gender (male and female) on improvement or changes scores in achievement in mathematics of IX standard students from pretest to posttest**

Interactions	Males in control	Females in control	Males in Experiment	Females in Experiment
Mean	0.08	0.25	15.68	11.72
SD	1.62	1.82	4.90	5.44
Males in control	-			
Females in control	p=0.9986	-		
Males in Experiment	p=0.0001*	p=0.0001*	-	
Females in Experiment	p=0.0001*	p=0.0001*	p=0.0026*	-

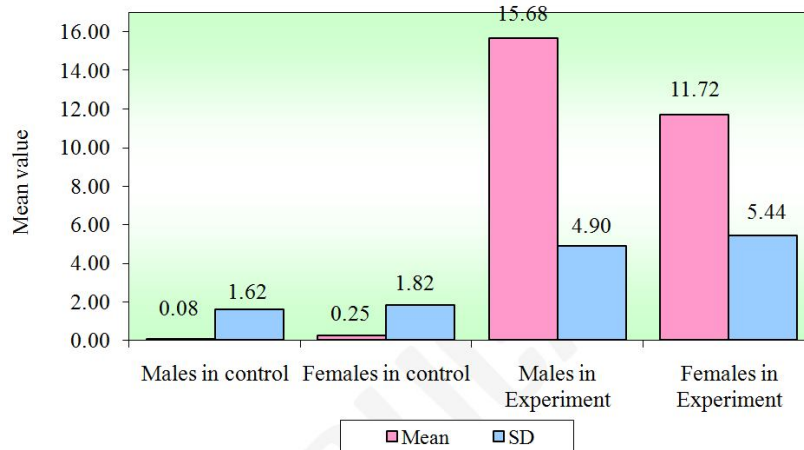
\*p<0.05

From the results of the above table, it can be seen that,

- The male students of IX standard in control group and female students of same standard in control group do not differ significantly with respect to improvement or changes scores in achievement in mathematics from pretest to posttest at significance level of 5 percent. It means that, the male students of IX standard in control group and female students of same standard in control group have similar improvement or changes in achievement in mathematics from pretest to posttest.
- The male students of IX standard in control group and male students of IX standard in experiment group differ significantly with respect to improvement or changes scores in achievement in mathematics from pretest to posttest at significance level of 5 percent. It means that, the male students of IX standard in experiment group have significant higher improvement or changes in achievement in mathematics from pretest to posttest as compared to male students of IX standard in control group.
- The male students of IX standard in control group and female students of IX standard in experiment group differ significantly with respect to improvement or changes scores in achievement in mathematics from pretest to posttest at significance level of 5 percent. It means that, the female students of IX standard in experiment group have significant higher improvement or changes in achievement in mathematics from pretest to posttest as compared to male students of IX standard in control group.
- The female students of IX standard in control group and male students of IX standard in experiment group differ significantly with respect to improvement or changes scores in achievement in mathematics from pretest to posttest at significance level of 5 percent. It means that, the male students of IX standard in experiment group have significant higher improvement or changes in achievement in mathematics from pretest to posttest as compared to female students of IX standard in control group.
- The female students of IX standard in control group and female students of IX standard in experiment group differ significantly with respect to improvement or changes scores in achievement in mathematics from pretest to posttest at significance level of 5 percent. It means that, the female students of IX standard in experiment group have significant higher improvement or changes in achievement in mathematics from pretest to posttest as compared to female students of IX standard in control group.
- The male students of IX standard in experiment group and female students of IX standard in experiment group differ significantly with respect to improvement or changes scores in achievement in mathematics from pretest to posttest at significance level of 5 percent. It means that, the male students of IX standard in experiment group have significant higher improvement or changes in achievement in mathematics from pretest to posttest as compared to female

students of IX standard in experiment group. The mean scores are also presented in the figure given below.

**Figure: Comparison of Interaction effects of groups (control and experiment) and gender (male and female) on improvement or changes scores in achievement in mathematics of IX standard students from pretest to posttest**



#### CONCLUSION:

The study revealed that the effect of constructivist based approach of teaching mathematics in improving achievement of IX standard students. The results shows that the constructivist based approach is more effective as it enhanced achievement in mathematics. Students who learn through constructivist based approach are found to be better in achievement than the students' achievement learning through traditional method.

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