

# EFFECT OF COOPERATIVE LEARNING STRATEGY ON ATTITUDE TOWARDS MATHEMATICS OF SECONDARY SCHOOL STUDENTS

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## ABSTRACT:

Cooperative learning has been defined in many ways by various people. Balkcom (1992), has defined cooperative learning as “a successful teaching strategy in which small teams, each with students of different levels of ability, use a variety of learning activities to improve their understanding of a subject. Each member of a team is responsible not only for learning what is taught but also for helping teammates learn, thus creating an atmosphere of achievement”. Cooperative learning techniques are student centred in exploration and learning of content. Cooperative learning has been implemented in schools by teachers of many countries for years and has given mixed results. The present study was on the “Effect of Cooperative Learning Strategy on Attitude towards Mathematics of Secondary School Students”. Rally Table Technique, Group Investigation, Jigsaw and Three step interview are the cooperative techniques used in the study. Learning was planned based on the lessons in Mathematics of IX std. prescribed by the Govt of Karnataka. The study was quasi-experimental in nature with an *Equivalent Groups Pre-test and Post-test* design. The Experimental group was taught using cooperative learning strategy for 90 periods, the duration of each period was forty five minutes and the Control group was taught by *conventional approach*. A standardised rating scale to assess students' attitude towards mathematics by Martha Tapia was used. The statistical technique used to analyse the data were Mean, Standard deviation, t-test and ANOVA. It was found that the cooperative learning strategy was more effective in enhancing the positive attitude of students towards mathematics as compared to the students who were taught through conventional approach.

**KEYWORDS:** *Cooperative Learning Strategy, Attitude towards Mathematics*

## INTRODUCTION

Cooperative learning involves students working together in small groups to accomplish shared goals. Discussing problems with classmates helps students to understand how to solve them in an adequate way. Cooperative learning approach can create such an environment in the classroom. Students receive a supporting interaction within cooperative groups that allows them to increase confidence in their own individual ability for Mathematics. According to Johnson and Johnson (1990), “in co-operative learning situations, students like mathematics more and they are more intrinsically motivated to continue to learn it”. Hence, by changing the approach to teaching of mathematics from traditional approach to cooperative learning approach it would be possible to create a positive attitude in the students towards mathematics.

## CLASSROOM ENVIRONMENT FOR COOPERATIVE LEARNING

In such small group techniques, students get a chance to share strengths and also develop their weaker skills. They develop their interpersonal skills and learn to deal with conflicts. When cooperative groups are guided by clear objectives, students engage in numerous activities and this helps them to improve their understanding of the specific subjects explored. In order to create an environment in which cooperative learning can take place it is important that students be made to understand the CL techniques and how they would be implemented and while implementing these techniques it has to be taken care that students feel at ease to express themselves along with the feeling of being challenged. For this, a positive learning environment is what is needed.

## TECHNIQUES IN COOPERATIVE LEARNING

There are very specific cooperative learning strategies teachers use to organize interactions between students. There are many such techniques that can be used in classrooms. The cooperative learning techniques used in the present

study are:-

- **Rally Table Technique**

It is the written version of Robin Table. The group of students are given a sheet of paper and a pencil. A question is posed to the students in such a manner that the students can write multiple answers for a given question. A timer is set and the students are asked to write the answers. Each student of a group writes one answer and passes the paper to his other group member. Till the time is up, the students keep writing answers by passing the paper in group. After the time is up, the student is asked to read out the answer he has written. This enables the entire group to work together and come up with suitable answers.

- **Group Investigation**

This was developed by Sharanand Lazarowitz (1978). This is a general classroom organization plan in which students work in small groups using cooperative inquiry, group discussion, an cooperative planning and projects. In this method, students form their own two- to- six- member groups. After choosing subtopics from a unit that the entire class is studying, the groups break their subtopics into individual tasks and carry out the activities that are necessary to prepare group reports. Each group then makes a presentation or display to communicate its findings to the entire class.

- **Jigsaw**

Developed by Aronson (1978). Groups with five students are set up. Each group member is assigned some unique material to learn and then to teach to his group members. To help in the learning process, students across the class working on the same sub-section get together to decide what is important and how to teach it. After practice in these “expert” groups the original groups’ reform and students teach each other. Tests or assessment follows.

- **Three Step Interview**

Developed by Kagan (1989). Each member of a team chooses another member to be a partner. During the first step individuals interview their partners by asking clarifying questions. During the second step partners reverse the roles. For the final step, members share their partner’s response with the team.

## OBJECTIVES OF THE STUDY

- To study the effect of Cooperative Learning Strategy on Attitude towards Mathematics of secondary school students as compared to the Conventional Approach.
- To study the differential effect of Cooperative Learning Strategy on Attitude towards Mathematics of Male and Female students of secondary level.

## HYPOTHESES

- There is no significant difference in the post mean attitude total scores of the IX standard students studying mathematics through cooperative learning strategy and those studying mathematics through conventional approach at .05 level of significance.
- Boys studying mathematics through Cooperative Learning Strategy do not differ from the girls who study mathematics through the same strategy in terms of gain scores of attitude towards mathematics.

## METHODOLOGY

The present study is a quasi-experimental study and was conducted with a research design ‘*equivalent groups pre-test and post-test design*’.

## SAMPLE

Two intact groups of 35 students each of standard IX were selected for the study. The two groups were matched on intelligence test scores to make them equivalent groups. The groups were randomly assigned as experimental and control groups. The experimental group was taught using cooperative learning strategy and the control group was taught using conventional approach of explanation, discussion and illustration.

## TOOLS

Attitude towards Mathematics scale developed by Martha Topia was used for measuring attitude towards mathematics of IX standard students in the experimental and the control groups. This scale is a standardised rating scale to measure the attitude of students towards mathematics. The scale consists of 40 items with five point scale with codes A, B, C, D and E where the scale positions are A - strongly disagree, B - disagree, C- neutral, D - agree

and E - strongly agree.

## ANALYSIS OF DATA

### Effectiveness of Cooperative Learning Strategy in terms of Student Attitude towards Mathematics

As stated earlier, effectiveness of the cooperative learning strategy for teaching mathematics has been made in terms of the significance of difference in mean attitude scores of the experimental and the control groups on the post-test. Hypothesis formulated in this regard and the results are presented below

$H_0$  : There is no significant difference in the post mean attitude total scores of the IX standard students studying mathematics through cooperative learning strategy and those studying mathematics through conventional approach at .05 level of significance.

The post mean attitude total scores of the students in the experimental and control groups were compared by computing student's t-value and the hypothesis stated above was tested at .05 level of significance. The result obtained is presented in Table.

Summary result of the test of significance of difference between the mean post-test scores on attitude

Category	N	Mean	SD	SE	t	df	Sig. (2-tailed)
Control Group	35	115.94	28.76	4.86	9.07	68	.000
Experimental Group	35	162.20	9.14	1.55			

Table reveals that the obtained value of t (9.070) with *df.* 68 is significant beyond .05 level of significance. Hence, the null hypothesis is not accepted at .05 level of significance. This would mean that the experimental group students (Mean=162.20) performed significantly better than the control group students (Mean = 115.94). Hence, it can be said that the mean attitude total of students studying mathematics through cooperative learning strategy was significantly higher than the mean attitude total of the students who studied mathematics in conventional class.

Based on the findings it can be stated that the cooperative learning strategy was more effective in terms of student attitude towards mathematics than the conventional approach to teaching mathematics.

### Differential Gain in Attitude of Cooperative Learning Group in terms of Gender of the Students

The study sought to find out whether the boys benefitted equally from the cooperative learning strategy as girls in so far as their gain in attitude is concerned. The following hypothesis was formulated for this purpose.

$H_0$  : Boys studying mathematics through Cooperative Learning Strategy do not differ from the girls who study mathematics through the same strategy in terms of gain scores of attitude towards mathematics.

A t-test was conducted to test the hypothesis. Results are given below.

Significance of gain in total scores of attitude across gender

Gender	N	Mean	Std. Deviation	Std. Error Mean
Female	27	30.96	32.16	6.19
Male	43	31.00	29.67	4.53
t-test for Equality of Means				
t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
.005	68	.996	.037	7.53

Results of the analysis reveals that even though the girls and boys groups made differential gains from the cooperative learning strategy, the difference was not large enough for it to be statistically significant at .05 level. This is because the obtained value of t is less than the tabled value for it to be significant.

Hence, the null hypothesis that 'boys studying mathematics through Cooperative Learning Strategy do not differ from the girls who study mathematics through the same strategy in terms of gain scores of attitude towards mathematics' is accepted.

## DISCUSSION OF RESULTS

According to Erden (1988), “since 1970s, educational researchers have examined small group activities and the interaction of students within the group. These studies have made significant contribution to the development of cooperative learning techniques. Moreover, if the course in question is mathematics, prejudices and negative attitudes of the students take precedence over the course content. At this point, teaching-learning methods and activities are the most critical factors in influencing achievement via positive attitude towards mathematics”. As per Karali and Aydemir (2018) teachers who used cooperative techniques in their classes stated that they believed that cooperative learning would provide many benefits in terms of academic, social and psychological aspects such as students' development of positive attitude towards mathematics.

Daud (2010), based on a quasi-experimental study to determine the effect of cooperative learning on mathematics achievement and attitude towards mathematics found that the strategy helped in fostering a positive attitude. Significant effect on attitude toward mathematics after teaching through cooperative learning strategy was also found by Whicker, Bol and Nunnery (1997). In an action research study, Johnsen (2009) discovered that the type of cooperative group formation had an impact on the attitudes of students and how well they work together.

In the present study, it was found that the students gained positive attitude towards mathematics by studying through cooperative learning strategy. The cooperative learning strategy was more effective in terms of students' attitude towards mathematics than the conventional approach to teaching mathematics. In so far as gender groups are concerned, the present study found that the differential gains in attitude towards mathematics made by the girls and boys groups from the cooperative learning strategy was not large enough for it to be statistically significant.

Hence, it can be said in conclusion that the findings of the present study have upheld the findings of earlier studies that cooperative learning has a positive influence on the attitude of students towards mathematics.

## RECOMMENDATIONS

- Similar study on effect of cooperative learning strategies for other subjects as well as different levels of school education may be undertaken, to enhance the learning process.
- A comparative study can be undertaken with respect to the effectiveness of different techniques of cooperative learning. It can be studied whether any one technique is more effective than another one
- Research maybe conducted to study the level of concept retention of students undergoing cooperative learning and traditional method of teaching.
- Studies on effect of cooperative learning strategies on different variables like motivation, critical thinking, problem solving, decision making etc can be undertaken.

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