

# Effect of Cooperative Learning Technique on Achievement in Mathematics among X<sup>th</sup> Grade Students

## Abstract

Cooperation is working together to accomplish shared goals. Within cooperative activities, individual seeks outcomes that are beneficial to themselves and beneficial to all. Cooperative learning is the leading new approach to classroom instructions. Research studies have shown that students completing cooperative learning group tasks tend to have higher academic test scores. Higher self esteem greater number of positive social skills and greater comprehension of the content and skills they are studying. Emphasis on academic learning success for each individual and all members of the group is one feature that separates cooperative learning group from other group tasks.

**Keywords:** Cooperative learning, Academic Learning, Group Task.

## Introduction

Cooperative learning is the instructional use of small groups so that students work together to maximize their own and each other's learning. The idea is simple. Class members are organized into small groups after receiving instruction from the teacher. They then work through assignment until all group members successfully understand and complete it. Cooperative efforts result in participants striving for mutual benefit so that all the group members gain from each other's efforts (Your success benefits me and my success benefits you). Recognizing that all group members share a common fate (We all sink or swim together here), knowing that one's colleagues (We cannot do it without you), and feeling proud and jointly celebrating when a group member is recognized for achievement (We all congratulate you on your accomplishment). In cooperative learning situations there is a positive interdependence among students' goal attainments. Students perceive that they can reach their learning goals if and only if the other students in the learning group also reach their learning goals (Deutsch, 1962; Johnson & Johnson, 1989). A team member's success in creating a multi-media presentation on saving the environment, for example, depends on both individual effort and efforts of other group members who contribute needed knowledge, skills, or resources. No one group member will possess all of the information, skills, or resources necessary for the highest possible quality presentation. In 1991, R.T Johnson published the five elements essentials for effective group learning, achievements and high order social personal and cognitive skills. These elements are:

## Elements of Cooperative Learning

### Positive Interdependence

Teacher must structure learning tasks so that students come to believe that they sink or swim together – that is their access to reward is as members of an academics team where in all members receive a reward or no member does. Essentially, task are structured so that students must depend upon on another for their personal, teammates and group's success in completing the assigned tasks and mastering the targeted content and skills.

### Face to Face Interaction

Students need to arrange themselves so that they are positioned and postured to face each other for direct eye to eye contact and face to face academic conversation.

### Positive Social Interaction Behavior and Attitudes

To work together as a group, students need to engage in such interactive abilities as leadership trust-building, conflict – management constructive criticism, encouragement negotiation and clarifying. Teachers may need to describe the expected social interaction behavior and

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attitudes of students and to assign particular students specific roles to ensure that they consciously work on these behaviors in their group.

#### **Access to Must Learn Information**

Teacher must structure the tasks so that student have access to and comprehend the specific information that they must learn. The content focus of learning tasks must be aligned directly with the specific outcome objectives and test items that will be used to measure their academic achievement.

#### **Individual Accountability**

The reasons why teachers put students in cooperative learning group is so all students can achieve higher academic success individually than they were to study alone consequently, each must be held individually responsible and accountable for doing his or her own share to the work and for learning what has been targeted to be learned.

#### **Heterogenous Group**

Teacher should organize the three-from or five member group so that student are mixed as heterogeneous so possible, first according to academic ability and their on the basis of ethnic background, race and gender. When groups are maximally heterogeneous and the other essential elements are met, students tend to interact and achieve in ways and at levels that the rarely found in other instructional strategies.

#### **Equal Opportunity for Success**

Every student must believe that he or she has equal chance of learning the content and abilities and earning the group rewards for academic success, regardless of group he or she is in. In other words, the student must not feel penalized academically by being placed in particular group.

#### **Opportunities to Complete Required Information Processing Tasks**

For students to be successful each must complete a number of internal information processing tasks aligned with together, objectives such as comprehending translating, making connections assigning meanings, organizing the data, the accessing the relevancy and uses of information they study. Assigned group tasks direct student to complete the relevant internal processing task they need to complete.

#### **A Clear Set of Specific Student Learning Outcome Objectives**

Cooperative learning and cooperative learning groups are means to an end rather than an end in them. Therefore teacher should begin planning by describing precisely what students are expected to learn and be able to do on their own well beyond time end of the group task and curriculum unit. Regardless of whether these out comes emphasize academic content, cognitive processing ability or skills teacher should describe in very unambiguous language the specific knowledge and abilities students are to acquire and then demonstrate on their own.

#### **Sufficient Time is spent learning**

Each student and group should be provided the amount of time needed to learn the targeted information and abilities to the extent expected without students spending sufficient time learning, the

academic benefits of cooperative learning will be limited (Stahl 1992). Many of the positive affective social skills and attitudes and academic benefits of cooperative learning tend to emerge and be retained only after students have spent four or five weeks together.

Cooperative learning, although not the easiest way to teach, can revitalize students and faculty by providing a structured environment of sharing some of the responsibility of learning. Cooperative learning method includes many techniques. Some of these are:

1. Learning Together
2. Teams-Games-Tournaments
3. Group Investigation
4. Constructive Controversy
5. Jigsaw Procedures

Schul (2011) discuss cooperative learning techniques. Well-known cooperative learning techniques are the Jigsaw 1, Jigsaw 2 and Reverse Jigsaw, learning together. Jigsaw-Students are members of two groups': original groups and expert group. In original heterogeneous group, students are assigned a different topic. Once the topic has been assigned the students leave the original group and group with the other students with their original topic .In the new group students learn the material together before returning to their home group. Once back in their original group students are accountable for teaching him or her assigned topic. Jigsaw II (1980) is Robert Selwyn's variation of jigsaw in which members of the original group are assigned the same material but focus on separate portions of the material. Each member must become experts on his or her assigned portion and teach the other members of original group. Reverse Jigsaw the variation was created by Timothy Hedeem (2003). It differs from the original Jigsaw, during the teaching portion of the activity. In this process, students in expert group teach the whole class rather than return to their original groups to teach the content.

#### **STAD (Student Teams Achievement Decision)**

Students are placed in small groups. The class in its entirety is presented with a lesson and students are subsequently tested. Individual are graded on team's performance. Although the test are taken individually students are encouraged to work together to improve the overall performance of the group. Cooperative learning method is a technique developed by D.W Johnson. The most important properties of these techniques are excellence of the group goal and sharing the opinioned materials, division of labor and group reward. When this technique is applied following option must be given place.

1. Determining of instructional objects
2. Deciding the group size
3. Dividing the students into group
4. Arranging of the class
5. Planning of education material to provide dependence
6. Giving the roles to the group members in order to provide dependence
7. Explaining the academic work

8. Individual evaluation
9. Providing cooperation among the groups
10. Determining the required behaviour for success
11. Guiding the students behaviour
12. having students come together for being able to teach cooperation
13. Finishing the lessons

Thus cooperative learning is seen as powerful tool to motivate Learning and have positive effect on classroom climate which leads to encourage greater achievement to faster positive attitude, high self-esteem to develop collaborative skills and permute greater social support.

#### **Aim of the Study**

The present study day teaching of mathematics in India is not satisfactory. Although mathematics enjoys a unique position in the school curriculum and is thought necessary for the study of other subjects and in our daily life, still the teaching of mathematics in our schools is in a chaotic state today. Most of the students fail to grasp the spirit of the subject and often unable to apply their knowledge to advanced work or to practical problems. The present syllabus, teacher, text- books, examination systems and methods of teaching are responsible for the failure of most of the students in mathematics. Cooperative learning provides a social support mechanism for the learning of mathematics. Small group provide a forum in which student ask question, discuss ideas, make mistakes, learn to listen other's ideas, offer constructive criticism and summarize their discoveries in writing. More over mathematics problems are ideally suited for group discussion because they have solutions that can be objectively demonstrated. Students can persuade one another by the logic of their arguments Students in group can help one another discuss basic facts and necessary computational procedures in the context of game, puzzles the discussion of meaningful problem students in group can handle challenging situation that are well beyond the capabilities of individual at that development stages.

#### **Review of Literature**

Duxbury and Tsai (2010) conducted study on effect of cooperative learning on foreign language anxieties and cooperative learning should have no relationship in US School and positive relationship in Tai Warner School.

John and Ling Ling Tsai (2010) conducted study on effects of cooperative learning on foreign language anxiety. The result showed that foreign language anxiety and cooperative learning showed on relationship US school and a positive relationship in Taiwanese Schools

Lavasanina (2011) studied "The effect of cooperative learning on mathematics anxiety and help seeking behavior" present study is surveying effectiveness of cooperative learning over mathematics anxiety and help seeking behavior of first grade of high school girl students. Sample of 40 students belonging to two schools analysis of covariance has been used for data analysis. Results showed that cooperative learning method in

comparative with traditional way. Decrease mathematics anxiety in students significantly.

Parveen and Batool (2012) investigated the effect of cooperative learning on achievement of students in General Science at secondary level. The aim of the study was to explore the effects of cooperative learning on General Science achievement among 9<sup>th</sup> class students. Based upon previous research literature it was hypothesized that significant difference existed between the mean posttest scores of General Science achievement of experimental group and control group. The pretest posttest control group design was chosen for the experiment. The study sample consisted of 36 students of 9<sup>th</sup> class who were equally distributed among experimental group and control group, matched on the basis of their annual examination at general science scores. The dependent variable of General Science achievement was measured through self-constructed 30-items achievement test used as a pre-test as well as post-test. The experimental group was taught through cooperative learning while control group was taught through traditional teaching. The material was used such as lesson plan, worksheets and quizzes, designed to implement cooperative learning methodology. The data was analyzed through mean, standard deviation and t-test and 0.05 was the selected level of significance. The main result of the study was that cooperative learning method is superior to general science achievement of 9<sup>th</sup> grade students.

Howell. (2013) studied "Introducing Cooperative Learning into a Dynamics Lecture Class". Numerous references have suggested that cooperative learning can significantly increase student understanding. Yet, structuring a lecture class to be given over totally to cooperative learning groups is overwhelming to most instructors and many remain unconvinced of its value. In this department, a limited experiment has served to introduce cooperative learning to the students as well as the instructor. Though a series of cooperative problem solving exercises, "lecture" classes become more active learning environments..

Lao.Kwong,Chong and Wong (2014) studied Co-operative learning approach to enhance teamwork skills.Findings of the study reinforce the effectiveness of cooperative learning of behavioral change.The findings further indicated that students were willingness to help out team members to achieve a common goal.

Mashhadi and Gazorkhani (2015) conducted a study by employing experiential degn on a sample of 100 prospective teachers of teacher training centre employing probability sampling technique.Result showed the noteworthy difference between the test performance of both the groups.Experimental group performed better than control group.

Chen and Liu(2017) conducted study to know the impact of cooperative learning on CHC students' Achievements and its changes over the past decade.Specially the positive findings have risen from 47.2% to 86.9% whereas negative and null change studies fall considerably.

After reviewing the related literature we can say that most of the studies have been conducted to see the effectiveness of cooperative learning technique on academic performance in various areas and majority of them have reported that cooperative learning enhance achievement of student but very few studies have been conducted to see its effect on the achievement of students in the field of mathematic especially with the use of cooperative learning technique.

**Objectives of The Study**

1. To compare mean gain achievement scores in mathematics of experimental group(taught through cooperative learning technique) and control group(taught through traditional method of teaching).
2. To compare mean gain achievement scores in mathematics at pre and post stages of experimental group.

**Hypotheses**

1. There is no significant difference in mean gain achievement scores in Mathematics of experimental group and control group.
2. There is no significant difference in mean gain achievement scores in Mathematics at pre and post stages of experimental group.

**Delimitation of Problem**

1. The present study will be confined to a sample of 80 students of both boys and girls of X grade.
2. The present study will be confined to secondary school of Amritsar city.
3. The school affiliated to P.S.E.B will be involved in the study.

**Reasearch Design**

The present investigation falls in the domain of experimental research as it includes studying the

effect of cooperative learning techniques on achievement in Mathematics of X grade students.

**Sample**

The sample size will be of 80 students (boys and girls) of X grade from secondary schools of Amritsar. Random purposive of sampling technique will be used.

**Tools**

1. A self-constructive achievement test in mathematics is used to collect data. The investigator in the subject of mathematics will conduct Pre test and post test on control group and experimental group.
2. Lesson plans based on co-operative learning technique.
3. General test of intelligence by Dr. GC Ahuja (2005).

**Statistical Techniques**

**Descriptive Statistics**

Descriptive statistics mean was used to compare groups on intelligence scores and pre test scores.

**Inferential statistics**

1. 't'-ratios were calculated to compare the mean scores of experimental and control group.
2. Graphical statistics was used to have a pictorial view of data.

**Analysis and Interpretation of The Data**

**Hypothesis I**

'There is no significant difference in means scores of achievement in mathematics at post stage of experimental group and control group'. In order to test the hypothesis raw scores obtained at post stage of experimental group and control group are analyzed. 'Mean' and 'S.D' of experimental and control group were computed. t test was applied, Results obtained have been entered in Table 1

**Table 1**

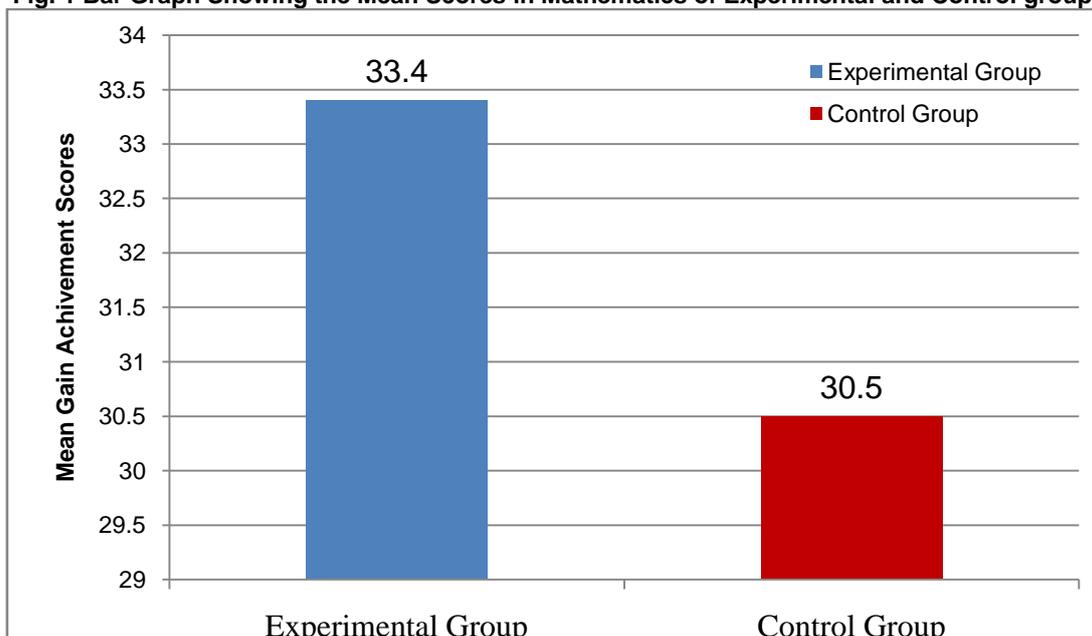
**Showing t-ratio of achievement scores post stage of experimental and control group in mathematics**

Group	N	Mean	SD	S.E <sub>D</sub>	Mean Difference	Df	t ratio	Remark
Experimental	40	33.4	3.56	0.74	2.9	78	3.9	Significant at .01 level
Control	40	30.5	3.14					

Table 1 reveals that mean scores of experimental and control group are 33.4 and 30.5 respectively. The obtained t value 3.9 is significant at .01 level of significance which shows there exists significant difference in achievement in mathematics of experimental and control group. Mean score of experimental group is more than control group, which reveals that

group with cooperative learning technique have higher means scores as compared to group taught with traditional method. Thus first Hypothesis 'There is no significant difference in means scores of achievement in mathematics at post stage of experimental group and control group is not accepted'.

**Fig. 1 Bar Graph Showing the Mean Scores in Mathematics of Experimental and Control group.**



**Hypothesis II**

“There is no significant difference in means scores of achievement in mathematics at pre and post stage of experimental group”.

In order to locate the significance difference in means scores of achievement at pre and post stages of experimental groups. t-value was calculated.

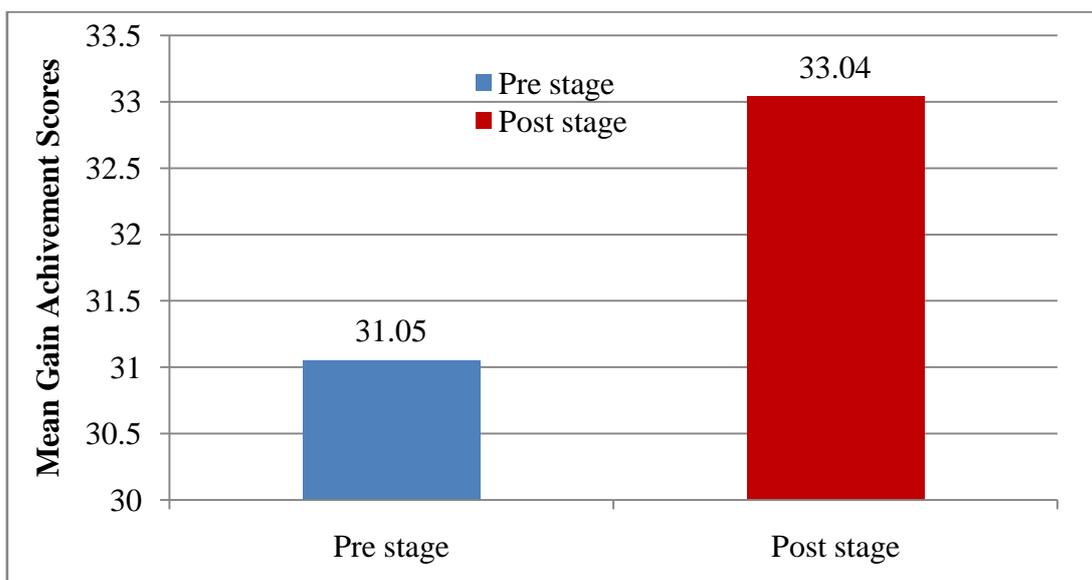
**Table 2 :Showing t- ratio of means scores of achievement in mathematics at pre and post stage of experimental groups**

Groups	N	Mean	SD	S.E <sub>D</sub>	Mean difference	df	t	Remarks
Pre stage	40	31.05	4.2	0.8	2.36	39	2.98	Significant at .01 level
Post stage	40	33.4	3.56					

Table 2 reveals that means scores of achievement in mathematics at pre and post stages of experimental groups are 31.05 and 33.4 respectively means difference is 2.35 and t calculated is 2.98 which is significant at .01 level. There exists significant difference in achievement of student in

mathematics at pre and post stages of experimental groups .So, the hypothesis II there is no significant difference in means scores of achievement in mathematics at pre and post stage of experiment group is rejected.

**Fig. 2 Bar Graph showing the mean scores in mathematics of experimental group at pre and post stage**



**Educational Implications**

Cooperative learning techniques plays as important role to improve the achievement of students in mathematics because.

1. It makes the students active participants of an educational process.
2. It can be used with all categories of students like, high, average and low intelligence students.
3. It increases the concentration of students in mathematics.

So teacher should use cooperative learning techniques in teaching mathematics in the classroom which can make her task more easy and students can achieve better in mathematics. Thus cooperative learning is seen as powerful tool to motivate Learning and have positive effect on classroom climate which leads to encourage greater achievement to faster positive attitude, high self-esteem to develop collaborative skills and permute greater social support. The present study day teaching of mathematics in India is not satisfactory. Although mathematics enjoys a unique position in the school curriculum and is thought necessary for the study of other subjects and in our daily life, still the teaching of mathematics in our schools is in a chaotic state today. Most of the students fail to grasp the spirit of the subject and often unable to apply their knowledge to advanced work or to practical problems. The present syllabus, teacher, text- books, examination systems and methods of teaching are responsible for the failure of most of the students in mathematics.

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