

## CO-OPERATIVE LEARNING: STRATEGY FOR LEARNING OF SCIENCE

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### **Introduction:**

Slavin (1992) stated that cooperative learning refers to instructional methods involving small heterogeneous groups working together, usually toward a common goal. He added that this approach to learning involves changes to both task structure and incentive structure. The task structure refers to the ways in which the teacher or students set up activities designed to result in student learning where a cooperative structure involves students working together to help one another. The incentive structure moves away from a competitive one in many classrooms to a cooperative one so that the success of one student is positively related to the success of others. Johnson and Johnson (1994a) highlighted the importance of how students interact, arguing that it can affect learning, liking of school and other students, as well as self-esteem. Abu and Flowers (1997) added to this, stating that cooperative interactions provide students with the skills needed for working with others outside of the school setting. As Johnson and Johnson (1994b), pointed out, however, it is not enough to just put students in groups and tell them to work together for cooperative learning to work. How such groupings are structured will largely determine whether or not they will be more effective than competitive or individualistic groupings. Cooperative learning is important for creating inclusive classroom environments that meet the needs of all students because it takes the heterogeneity into account, encouraging peer support and connection. Given that most classrooms are heterogeneous, it only makes sense to use an approach to teaching and learning which accounts for this heterogeneity.

Science is both a product and process, science as product to the individual corresponds to the importance of quantum of scientific information at the disposal of the individual.

The modern teaching concept holds the view that it is more learner – centered and learner – driven. Education has been undergoing a slow evolution from teacher – centered system to a learner – centered system and this demands changes in the instructional process and materials used for making the process more effective. Science is a system of acquiring knowledge. This system uses observation and experimentation to describe and explain natural phenomena. The term science also refers to the

organized body of knowledge people have gained using that system. Less formally, the word science often describes any systematic field of study or the knowledge gained from it. Science is not equipped to evaluate supernatural explanations for our observations; without passing judgment on the truth or falsity of supernatural explanations, science leaves their consideration to the domain of religious faith. Because the scope of scientific inquiry is consciously limited to the search for naturalistic principles, science remains free of religious dogma and is thus an appropriate subject for public-school instruction.

### **Need of the Study**

The recent research in science education has focused on instruction specific science content specific instructional strategies and how they are related to science learning context and instructional outcomes. In the present scientific and technological age, the conventional teaching method are not sufficient to arouse interest among the student and do not meet up to the intellectual, psychological and emotional needs of the students in the new millennium. The methods of teaching science need to be changed. The modern teaching concepts hold the view that it is more learner-centered and learner driven education has been undergoing a slow evolution from teacher-centered system to a learner-centered system and this demands changes in the instructional strategy and material used for making the process more effective.

The understanding of different learning styles has brought to the consciousness that each individual is different, and any one method of teaching will not be equally effective for all the students. If a curriculum is to be effective in the classroom, it must contain different ways of motivating the students, different ways of presenting sequences, and different opportunities for some students to sip parts while others work their way through different ways of putting things. Keeping in mind the above mentions factors the researcher felt it is appropriate to make use of cooperative learning as a strategy for teaching of science included in the IX standard science syllabus of Maharashtra state Board of secondary and higher secondary education.

Science is for all students. Learning science is an active process and students learn best when they are actively involved in this process. Learning science is something students do, not something that is done to them. Students should develop an understanding of what science is, what science is not, what science can and cannot do, and how science contributes to culture. There can be different ways of teaching and learning science. Science is at its best when students are themselves involved in the active process.

Therefore all students cannot learn the science by the same way or by same method and it is also required to teach the science by following different methods together so make it more effective way of learning science. So researcher was keen in understanding the effectiveness of cooperative learning using strategy specially the jigsaw method to make them understanding of science in the effective manner.

**Title -**

**“Effectiveness of Co-operative Learning as a Strategy for Learning of Science”**

**Operational definition-**

**Cooperative learning:** A plan made for the students of 9<sup>th</sup> std to work together to understand and achieve mastery over certain selected scientific concepts.

**Strategy:** In present research the use of Jigsaw techniques of co-operative learning forms the strategy in the present research.

**Effectiveness:** In the present study the effectiveness means feasibility and impact of instructional strategy programme taken up by the researcher for understanding of selected science concepts.

**Effectiveness:** It will be gauged in terms of achievement of students in science, and attitude of the students towards the cooperative learning strategy.

**Science:** Science is a systematic body of knowledge obtained, tested and verified through the scientific method and concerned with the physical world and its phenomenon which can serve the purpose in daily life and also as a vocation or profession.

**Aim of the Study**

1) To study the effectiveness of co-operative learning strategy in terms of achievement of students in science test.

**Objectives of the Study**

- 1) To compare the pre-test achievement scores the control and experimental group.
- 2) To compare the post-test achievement scores the control and experimental group.

**Hypotheses –**

1. There is no significant difference in the pre-test achievement scores the control and experimental group.
2. There is no significant difference in the post-test achievement scores of the control group and the experimental group.

### **Delimitation of the Study**

The study is delimited in term so critically evaluating a cooperative learning strategy involving only basic concepts elements, compounds and mixtures, types of mixtures, solution, suspension and colloidal solution, Rutherford scattering experiment, distribution of electrons, electronic configuration of elements, isotopes and theirs application, laws of chemical combination the atom , molecule and molecular mass and mole concept and valency.

The study if delimited to only std IX students. The study is delimited to school affiliated to Maharashtra State Board of Secondary and Higher Secondary Education Board Pune (divisional board Mumbai).

The study is delimited to two division of students only would form the experimental group and other would form the control group.

### **Significance of the Study**

The topic under study will be of great significance to the teachers as well to the students to develop one more strategy from teaching and learning of science. Hence it would be make a contribution to the field of the education. The finding of the study would enable the teacher to use different technique of teaching of science with the help of students. This study will also help to understand the opinion of the teachers towards the cooperative learning strategy. Cooperative learning builds the bridges between the learner and the concepts to be learnt. The present study will help students to learn science through various activities.

### **Review of literature and research**

**Masao Mizuno (2011)**. Has studied the ` Effectiveness of Cooperative Learning for Fostering Knowledge Construction in Japanese High School` From this study it can be illustrated that Japanese students` cognitive abilities and emotional intelligent skills for building knowledge have been developed through cooperative learning in Japanese language lessons. **Muraya, D. (2011)**. Has studied 'The Effects of cooperative learning approach on biology mean achievement scores of secondary school students' in Machakos District, Cooperative learning approach resulted in significantly higher mean achievement scores compared to regular teaching method and gender had no significant influence on achievement. It was concluded that cooperative learning approach is an effective teaching approach which Biology teachers should be encouraged to use. **Ebrahim,A. (2012)**. Has studied 'The effects of two methods of teaching--teacher-centered and

cooperative learning-on students' science achievement and use of social skills.' Analysis of the achievement test scores and the social skills survey responses revealed that cooperative learning strategies have significantly ( $p$  greater than 0.05) more positive effects on both students' achievement and social skills than teacher-centered strategies. These results provide an evidential base to inform policy decisions and encourage and persuade teachers to implement cooperative learning methods in Kuwaiti classrooms. **Meling, V. (2012)**. Has studied 'The Distance learning has facilitated innovative means to include Cooperative Learning (CL) in virtual settings.' This study, conducted at a Hispanic-Serving Institution, compared the effectiveness of online CL strategies in discussion forums with traditional online forums. Quantitative and qualitative data were collected from 56 graduate student participants. Quantitative results revealed no significant difference on student success between CL and Traditional formats. The qualitative data revealed that students in the cooperative learning groups found more learning benefits than the Traditional group. The study will benefit instructors and students in distance learning to improve teaching and learning practices in a virtual classroom.

#### **METHODOLOGY OF THE STUDY**

Method –Experimental method with a **quasi-experimental design**

**The pre-test – post-test non equivalent groups design**, which is described as follows:

$O_1$  X  $O_2$

$O_3$  C  $O_4$

Where, X: Experimental group C: Control group

$O_1$  and  $O_3$  - Pretest scores

$O_2$  and  $O_4$  – Posttest scores

The difference of the means of  $O_1$  and  $O_3$  scores and the difference between the mean of  $O_2$  and  $O_4$  scores are tested for statistical significance

#### **SAMPLE OF THE STUDY**

In the present study, the researcher made use of purposive random sampling technique the school selected for the present study was private unaided English medium school affiliated to Maharashtra State Board of Secondary and Higher Secondary Education, divisional board Mumbai. The school is located in thane district at Mumbra city.

#### **GROUPEQUIVALENCE**

Both the groups of the study where from the same locality, with same number of male and female students nearly about same academic achievement which was look in by their previous class

performance, all of the student of the study belong to the age group of 14-15 years so the maturity level was also same.

**TOOLS FOR DATA COLLECTION**

Instructional Module on cooperative learning was prepared by the researcher with the help of his guide.

**DATA ANALYSIS**

**Table 1. Showing Pre-test Achievement Scores of Control and Experimental Group**

N	Mean	Median	Mode	SD	Skewness	Kurtosis
40	12.92	12.5	12	3.97	0.47	0.37
40	12.7	12.5	10	2.81	0.29	0.61

**Table 2. Showing Post Test Achievement Scores of Control and Experimental Group**

N	Mean	Median	Mode	SD	Skewness	Kurtosis
40	24.2	24	22	3.63	0.646	1.90
40	29.76	30	30	2.71	-0.74	4.09

(a) **There is no significant difference in the pre and post-test achievement scores of the control group**

**Table 3. showing t ratio of Pre-test and Post test Achievement Scores of Control Group.**

Test	N	df	Mean	Sd	Table Evaluation		t-value	l.os
					.05	.01		
Pre-test	40	78	12.92	3.97	1.99	2.64	9.4	S
Post Test	40		24.2	3.63				

From the above table it can be seen that for  $df= 78$  the tabulated value are 1.99 and 2.64 at 0.05 and 0.01 levels of significance respectively. The obtained value of  $t$  is 9.4, which is more than the tabulated value at both levels of significance. Hence the hypothesis is rejected at both the levels of significance.

**Conclusion:** There observed 't' value is 9.4 which is more than table value so the null hypothesis is rejected. **There is significant difference in pre-test and post test score of control group.**

#### Discussion

There is a significant difference in the pre-test and post-test scores of control group. The probable reason behind this could be that the students in the pre-test had not been taught the content. They had to rely on their on their previous knowledge regarding the questions asked. May owe to lack of practice their performance in pre-test was less. However with the post-test, the students had considerably more knowledge and practice regarding the selected units of science since they were taught them by the researcher. The practice thus may have affected the results as evident from the mean of post-test being comparatively more.

**(b) There is no significant difference in pre-test achievement scores of control group and experimental group**

**Table 4. Showing t ratio of Pre-test Achievement Scores of Control and Experimental group.**

Group	N	df	Mean	Sd	Table Evaluation		T	Los
					.05	.01		
Control	40	78	12.92	3.97	1.99	2.64	0.37	NS
Experimental	40		12.7	2.81				

From the above table it can be seen that for  $df= 78$  the tabulated value are 1.99 and 2.64 at 0.05 and 0.01 levels of significance respectively. The obtained value of  $t$  is 0.37, which is less than the tabulated value at both levels of significance. Hence the hypothesis is accepted at both the levels of significance

**Conclusion:** There is no significant difference in pre achievement score of control and pre achievement of experimental group the observed value of  $t$  was 0.37 which is less than 1.99 at 0.05 and 2.64 at 0.01 level of significance hence the null hypotheses is accepted. **There is no significant difference in pre-test achievement scores of control group and experimental group**

**Discussion:** There is no difference in the scores obtained by the pre-test scores of control and experimental group. This also means that understanding level of both the group at the pretest was the same. The probable reasons could be that the maturity level of both the group was same. Both the group had been exposed to the topics in their previous standard. So may be due to lack of recollection both groups showed same scores.

**(C) There is no significant difference in the Pre-test and Post Test Achievement Scores of the Experimental Group.**

**Table 5. Showing t ratio Pre-test and Post-Test Achievement Scores of the Experimental Group.**

Test	N	df	Mean	Sd	Table evaluation		t value	l.os
					.05	.01		
Pre-test	40	78	12.7	2.81	1.99	2.64	27.69	S
Post-test	40		29.76	2.71				

From the above table it can be seen that for  $df=78$  the tabulated value are 1.99 and 2.64 at 0.05 and 0.01 levels of significance respectively. The obtained value of t is 27.69, which is more than the tabulated value at both levels of significance. Hence the hypothesis is rejected at both the levels of significance

**Conclusion:** The observed t value is more than the tabulated value of t from the table which shows that **there is significant difference between pre-test and post test achievement scores of experimental group.**

**Discussion:**

This shows that there was some effect of the module of cooperative learning strategy on the students after the treatment was given to them the other reason could be that they would have practiced more looking since the new way of learning science was innovative for them so they may have given more attention towards it. Students already knew traditional method, since cooperative learning strategy was innovative so they more concentrated more on the topic. And secondly it may have been easy to understand and involved interest and curiosity.

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(d) There is no significant difference in the Post-test Achievement Scores of the Control Group and the Experimental group

**Table 6. Showing t ratio of the Post Test Achievement Score of Control Group and Experimental Group.**

Group	N	df	Mean	Sd	Table Evaluation		t	l.os
					.05	.01		
Control	40	78	24.2	3.63	1.99	2.64	7.77	S
Experimental	40		29.76	2.71				

From above the table it can be seen that for  $df=78$  the tabulated value are 1.99 and 2.64 at 0.05 and 0.01 levels of significance respectively. The obtained value of  $t$  is 7.77, which is more than the tabulated value at both levels of significance. Hence the hypothesis is rejected at both the levels of significance

**Conclusion** There is no significant difference in post test achievement of control and experimental Group the observed  $t$  value is 7.77 which is more than 2.02 at 0.05 level and 2.64 at 0.01 level of significance, hypothesis is rejected at 0.01 and 0.05 levels.

**Discussion** The reason for the difference between the post score of control and experimental group can be probably the traditional method of teaching the units proved not to be as impactful as cooperative learning strategy. Another reason could be that due to previous experience and knowledge regarding the learning of science with the traditional regular method, the students of experimental group may have took interest in learning of science by means of the cooperative learning strategy. There may be development of confidence in experimental group in using cooperative learning strategy. It may have helped them learning of science to a better way. The may be probable factors for performing well by experimental group, it may be interest in learning by new method other than ordinary method which they used to.

#### MAJOR FINDINGS OF THE STUDY:

1. There is significant difference in pre-test and post test score of control group
2. There is no significant difference in pre-test achievement scores of control group and experimental group

3. There is significant difference between pre-test and post test achievement scores of experimental group.
4. There is a significant difference in the Post-test Achievement Scores of the Control Group and the Experimental group

**EDUCATIONAL IMPLICATIONS OF THE STUDY:**

- 1) Training programme on cooperative learning strategy with practical demonstration is essential for all the level of teachers.
- 2) In service programme should be conducted on cooperative learning strategy.

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