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## Effects of Cooperative Learning on Students' Academic Achievement

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### Abstract

Following study is an effort to determine effect of cooperative learning method on students' achievement in subject of Education. Quasi experimental design, with pre/post test of control and experimental group was used for this purpose. Sample consisted of 63 female students enrolled in grade 12 of a public college. On the basis of scores in pre-test, students were then divided in experimental and control groups. Multiple cooperative learning activities including STAD, TGT and Jigsaw II were performed for 8 weeks with experimental group. Afterwards post test was administered on both groups in order to identify difference in achievement. Independent sample t-test was applied to find difference between two groups before and after intervention. The results showed that there was a significant difference in scores of control and experimental group in post-test. Paired sample t-test was run to compare effect of intervention on achievement scores of experimental group. The results showed that there was significant difference between scores of experimental group before and after intervention ( $p=.000$ ). It can be concluded from results that cooperative learning activities had a positive effect on academic achievement of students enrolled in the subject of Education.

**Keywords:** *Academic Achievement, Cooperative Learning, Jigsaw II, STAD, TGT*

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## Introduction

Major aim of teaching learning process is achievement in terms of grades, as it is sole measure of learning in many cases. To achieve this target teachers use diverse teaching methods, including lecture, discussion and demonstration. Among all these most widely accepted and practiced is lecture method (Harman & Nguyen, 2010). Albeit of its popularity, it also faces criticism by many researchers stating leading towards assumption that it do not help in deep understanding of the concepts. This has resulted in more emphasis on teaching through diverse methods in order to improve learning and understanding. One of these is cooperative learning method, which presumes that team effort of students towards single goal of learning a particular aspect result in more understanding than solo efforts. This method, although have many salient features for improving teaching-learning process, however, is not practiced normally due to many reasons including time and energy required to manage its activities. In addition to this, previous research studies that have tried to prove its significance in terms of learning had chosen the field of science and relevant areas. In the field of arts, humanities and social sciences it has not gained much popularity. Following study has aimed to explore effect of cooperative learning activities on academic performance of students in the subject of “Education”.

This study is significant in local context, as previous studies carried out in this aspect either deal with population of schools with science subjects or prospective teachers, while this study is an effort to prove that same phenomenon when applied at higher secondary level in the subject of Education, is fruitful too. In fact, it is general perception about theoretical subjects like “education” that it can better be taught by given lectures or in worst cases just by book reading (as experienced, observed and investigate by the researcher herself in colleges). So this study is an effort to give new dimension by providing positive results of cooperative learning activities on performance of students. This study will provide an insight to teacher educators, who can use its results to develop attitude towards using cooperative learning methods in prospective teachers.

Cooperative learning can be defined as a teaching method that involves students in learning process in order to understand and learn content of the subject (Slavin, 2011). Traditional class activities create a win-win situation, where one can only succeed if other loose, while cooperative learning is direct opposite to it, here conquest of all is success of all. Cooperative learning has edge over other teaching methods in terms of its effectiveness for improved cognition, social skills and motivation. Two major attributes that have distinguished cooperative learning from traditional learning include interdependence (positive) as well as accountability as each member of group is important for success (Slavin, 1990). Its competence in terms of augmenting academic achievement has been proved many research studies (McMaster & Fuchs, 2002; Johnson, Johnson & Stanne, 2000, Nichols, 2002, Winston, 2002). Cooperative learning also improve positive attitude towards learning (Johnson & Johnson, 2008), improved social relations (Johnson & Johnson, 2005), in addition to high self-esteem and cohesiveness (Sahin, 2010). Cooperative learning can be also stated in terms of instructional strategy in which students work together to achieve learning target (Abrami, Poulsen & Chambers, 2004). It is also presented by Pollock, Patton and Serna (2001) that the cooperative learning method when used as a teaching activity, improves motivation, class participation and academic achievement of students.

Cooperative learning has been used many researchers as instruction strategy with positive and improved results. A few studies have been carried out in local context also, for example Iqbal (2004) conducted a study the examine the effect of cooperative learning on academic achievement on secondary school students in the subject of mathematics, he reports that there was a significant difference between the achievement scores of the students taught by the cooperative and traditional method. The students who were taught by the cooperative method show high scores. Similarly Bibi (2002) and Siddiqui (2003) has carried out their research by using cooperative learning for improving performance of ESL learners, the results were positive. Similarly, study carried out by Arbab (2003) for two weeks on general science students also proved that students taught with cooperative learning method has improved results than control group. Additionally Kousar and Perveen has presented in two separate studies on 7<sup>th</sup> and 8<sup>th</sup> graders in 2003 that students who were taught social studies with cooperative learning method have scored high grades than others. It is clear from above citation that research on cooperative learning in local context had been carried out either in science subject, English language learners or on school students, this study is different in both aspects; one it has dared to chose subject of “education” which is considered an arts subject and is taught generally through lecture method, two the participants of the study is college students, who are usually not taken as sample due to multiple reasons, including burden of course work and short time.

There are dozens of strategies that can be used by the teachers under umbrella of cooperative learning process, some of them have gained more popularity than others, including; Student Teach Achievement Division (STAD), Jigsaw II and Teams-Games-Tournaments (TGT). Essence of all cooperative learning activities is that in each case the students are divided in heterogeneous groups

based on their learning capability, where they support each other for learning (Slavin, 2010). A brief description of activities along with evidences from research about their effectiveness is given below;

### **Jigsaw II**

It is a team activity, where one type of the members are responsible for mastering their own part of material, while experts are responsible for teaching their material to other members of the group. Only difference between Jigsaw I and II is that the expert takes test before returning to home group (Şahin, 2010). After this the scores of each member are produced on the basis of tests, and then accumulative score of whole team is calculated with reference of individual scores. The research has also supported usefulness of Jigsaw II method for improving academic performance of EFL learners (Gomleksz, 2007).

### **STAD**

This can be termed as most simple form of cooperative learning, where teacher give material to students and they learn it as group. The groups are test and scored individually and collectively, the team securing high scores is termed as winning one (Arends, 1997). One strategy adopted during cooperative learning as instruction approach is STAD. The research studies carried out by Jolliffe (2005) reported its effectiveness for improving academic achievement and social skills. Similar results have been reported by Vaughan 2002, Jacobs et al. 2003 and van Wyk 2010

### **TGT**

The students are divided in heterogeneous groups, where they play multiple games based on given instructional materials. The scores are given individually and collectively as well, however, only team scores are considered basis for winning and losing (DeVries, Edwards & Wells, 1974).

## **Significance of the Study**

The introduction of this strategy for this subject will help in improving learning and academic achievement of the students. This will also help in making this subject more interesting rather it was considered earlier by the students. Secondly the empirical evidences for support of cooperative learning strategy in subject of education at intermediate level are unknown. Without knowing the empirical evidences it is more unlikely to convince teachers to use this instructional methodology for teaching the subject of education at higher secondary school level.

### **Objective**

This study aimed to examine the effect of cooperative learning on academic achievement of students at secondary school level.

### **Hypothesis of the Study**

H<sub>01</sub>: There is no significant mean scores difference between the achievement scores of control and experimental groups after intervention.

## **Material, Method and Procedures**

### **Research Design**

A quasi-experimental design was used with cooperative learning as instruction model and traditional lecture method groups. This is considered as true experimental design because of its resistance to common threats to internal validity (Campbell & Stanley, 1963). The systematic description of the design is described in Figure 1.

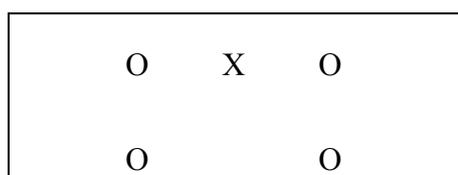


Figure 1. Pretest-posttest control group design

This design was selected on the basis of nature of the problem and the study hypotheses. The study design consists of two groups: treatment group (32 students) and control group (33 students). After exposing the experimental group with treatment of cooperative learning while providing traditional experience to control group the posttest was administered.

The quasi experimental design with pre- and post test post test have many inherent weaknesses. There are many threats to internal validity like maturation, history, instrumentation, and regression etc (Campbell & Stanley, 1963). These problems always occur when intact group is used instead of random sampling. However as both the groups were not significantly different as shown by table 1 and the instruction was started simultaneously for both groups so it can be assumed that influence of instrumentization can be ruled out. Similarly eight weeks are not long enough to create maturity. To control the effect of history both the groups were taught in two consecutive periods. To rule out the John Henry Effect single teacher taught both classes.

### Sample

The sample of study consisted of all twelfth grade students enrolled in subject of education in a public college of a metropolitan city. This study was carried out in a female college, so there was no diversification in terms of gender. Age range of sample was from 16-19 years old. Initially control and experimental group were studying in same class; they were split in two groups on the basis of pre-test score. At this stage systematic sampling technique was used, and every second member from list of scores was included in control group, as Figure 2.

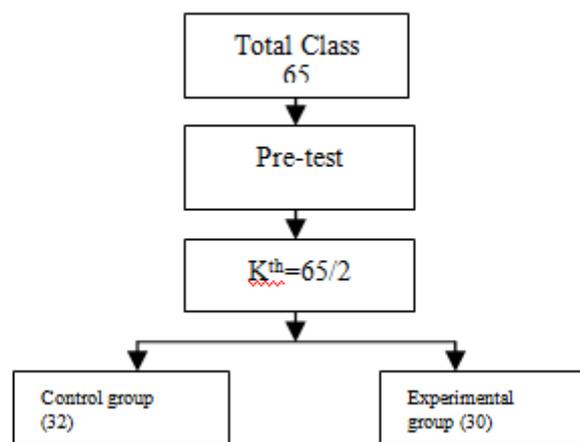


Figure 2. Systematic sampling for control and experimental group

Although systematic sample has been considered as simple form of random sampling technique (Gay, 2012), however, this was best available technique to select sample of the study as one cluster was divided in two groups. This method was also considered suitable for maintaining homogeneity to a certain extent. Although one of the shortcomings of systematic sampling is that every  $k^{\text{th}}$  member is determined, when first  $K^{\text{th}}$  member has been selected (Gay, 2010). However, as the students were arranged roll number-wise, while there marks were given on basis of test, so there were little chances of accumulation of high or low graders on one side of the pool. This has helped in avoiding predetermination of  $k^{\text{th}}$  number to a certain extent.

Final sample of the study comprised of 65 students of grade 12 enrolled in subject of education in second shift. The sample composed of experimental (N= 30) and the control group (N= 32). The experimental group consisted of 32 students minus two while the control group consisted of 33 minus one student. These three students left the class due to their personal reasons.

### Instrument

As there is no standardized test available for the subject of education at intermediate level so as to measure the academic achievement of the sample after the experiment a test was designed by the researcher herself. Initially, the test contained 50 multiple choice questions. Content of the instrument

was validated with the assistance of expert teachers and examiners of the subject of education. The instrument was pilot tested on the students of a college to determine its usability. The Kuder-Richardson coefficient of internal consistency for the instrument was 0.84. Finally 30 items were selected for test, same test was used for pre and post-test.

### Procedure

In order to deal with the potential pre-existing differences in overall ability between the treatment and control groups a pre-test was conducted. Then, students were divided into two groups on the basis of these scores. For controlling the effect of teacher quality both the groups were taught by the researcher herself. Both groups were taught two units using the same content outline as per given in the book. However the students in cooperative learning group completed learning activities in small heterogeneous groups while the students in the control group were taught through traditional method over a period of eight weeks.

### Intervention strategies

The content was taught to the experimental group through multiple activities and quizzes. Seven activities were designed in order to provide cooperative learning experience to them. Each of these was followed up by a quiz in order to evaluate group and individual performance after participating in each activity. Almost all activities were performed in groups. Total number of participants was thirty, so five groups containing six members each were formed for each activity. To assure random selection for sake of heterogeneity in groups was the five groups were made by assigning one alphabet (a-e) to each individual. Afterwards each “a” went to group 1, “b” went to group 2, each “c” joined group 3 and so on (as Figure 3). This has helped in gathering friends and/or same level of competence in same group. Activities were designed by keeping in view, STAD, TGT and Jigsaw. Following diagram shows experimental procedure in detail.

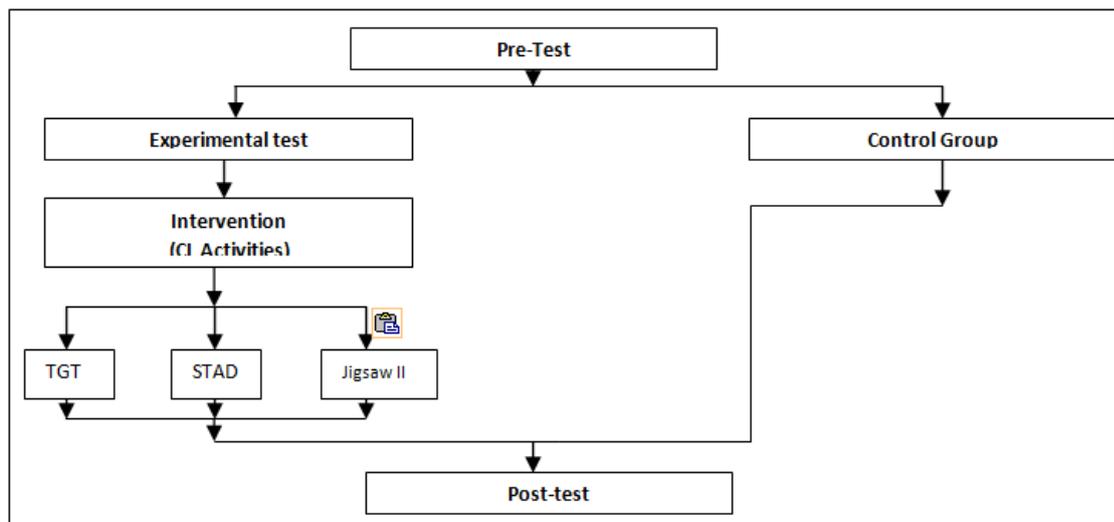


Figure 3. Pre-test-Post-test control group experimental design

Note: TGT=Team Game Tournament; STAD= Student Team Achievement Division

Details of activities are given in following lines, these activities were designed on the basis of three major cooperative learning strategies used in current study including Team Game Tournament, Student Team Achievement Division and Jigsaw II.

### Activity 1

For this activity the students were divided in five groups through selection process as described above. Each group was assigned a sub-topic, from a broad topic, and were asked to prepare display charts explaining it in explicit way. All of these groups presented their work in front of other groups. The quiz was taken in order to check understanding.

### Activity 2

The students were divided in five teams through previous method; they were then given a topic for discussion. The researcher kept on checking the discussion groups, helping them to understand the process. After this a quiz was carried out, in which about thirty questions were asked, five from each group, each member of the group was supposed to answer single question. This rule was made in order to avoid snubbing of shy respondents. The team whose marks were higher announced winner.

### Activity 3

In this activity again each group was given sub-topics of a topic. They were allowed to discuss for 20 minutes. After that one member from each group termed “expert” moved from her group to other and taught them topic, they were assigned. At the end of activity, a quiz card was distributed to each group and again highest scoring group was announced winner.

### Activity 4

For this activity, the students were paired and were asked to teach each other, single topic was assigned to all groups. This part of the lesson consisted of content from history, compelling students to memorize facts and figures. After 20 minutes pairs were exchanged, and were again asked to share knowledge they get. They were then divided in two larger groups and a Fish Bowl Game was played, in which researcher made cards of questions and placed them in a bowl, the bowl moved from person to person with music and stopped as soon as music stopped. The person who have bowl was supposed to pick up a card and answer the question on it. The winner team was announced with higher scores.

## Results

The independent sample t-test was used to measure the mean scores difference between achievement scores of control and treatment groups on pretest. Table 1 shows that there is no significant difference between the two groups ( $p=.825$ ). It means that both groups were on equal level of achievement before intervention.

Table 1. Independent Sample t-test for Pre-test of Students' Achievement

Variable	N	mean	df	t-value	p
Experimental group	30	14.27	60	.188	.852
Control group	32	14.06			

Table 2. Independent Sample T-Test for Post-Test of Students' Achievement

Variable	N	mean	df	t-value	Sig.
Experimental group	30	18.57	60	13.98	.000
Control group	32	16.31			

\*  $p<0.05$

Table 3. Paired Sample t-test for Pre-test and Post-test

	Mean difference	SD	T	Sig. 2-tailed
Pair1 Pretest-pos-test	-4.300	1.84	-12.792	.000**

\*\*  $p<0.01$

A paired sample t-test was conducted to compare the effect of intervention on achievement scores of experimental group. The table shows that there was a significant difference in achievement scores of pretest ( $M= 14.27$ ,  $SD= 4.291$ ) and post-test ( $M=18.57$ ,  $SD=3.471$ ),  $t(60)=-12.792$ ,  $p=.000$ .

## Discussion

The study was carried out to explore effect of cooperative learning on academic achievement in the subject of social sciences. In local context it was a unique experiment, as the chosen subject has been taught through lecture or book method. To gain sound results the students were divided in two

groups, experimental and control through a systematic procedure. The one group went through interventions; a post test was administered to see the difference between two groups. The results indicate that cooperative learning when using as instructional strategy has positive effect on students' academic achievement. These results are in consent with previous research studies, for example Shimazoe & Al-drich (2010); Ainley (2006); Thurston et al., (2010) e.g. Similar results has been given by Melihan and Sirri (2011) who accomplished that cooperative learning is more effective in comparison to traditional methods for improving academic achievement. These results are supported by research studies carried by Gillies, 2006; Hennessy & Evans, 2006; Johnson, Johnson & Stanne, 2000; Bukunola & Idowu, 2012; Şimşek, 2012). Sambo (2003) conducted an experimental study with same objectives and presented that the mean score of experimental group was better than control group; conditionally the results are not influenced by external factors. The core ingredient of cooperative learning is that students work in a group, trying to achieve shared target, thus adding value to the success of group. This component helps students in many other ways, for example, in improving their self-concept, self confidence (Zakaria, Solfitri, Daud and Abidin 2013), polishing social skills and increased classroom participation.

Although these results are supportive, but it is fact that study was unable to control excitement of student for participating in an activity that is different from routine class activities. So the students have raised motivation level other than control group, who were taught with simple lecture method as per routine. Another reason of exhilaration of groups was their competition to win from others and perform better. Third reason for supporting results of the study might that students were working in highly cooperative groups, helping each other to perform better during class activities. The research studies carried out by Dyson, 2002; McHale, 2002; Güne, 2007; Goudas & Magotsiou, 2009. Although this is true essence of cooperative learning, however, it can serve as a eternal factor that influence the results during experimental study. Another important factor that might have contributed in getting supportive results was that these students were exposed to such treatment for the first time so excitement and joy of doing something different from routine classes might have boosted their passion to perform. The same results has been presented by Bayraktar (2011), who conducted research study in his gymnasium class and found very supportive results. Another reason could be timing of the intervention, the students were working hard as just after intervention, there midterm examination were due, so this might be another reason for getting supportive results as students were working hard. As the target to improve academic achievement was accomplished, so these aspects can be ignored as indispensable elements.

### **Recommendations**

These results suggest that teachers in the field of education should give a serious and favorable consideration to this approach. The following suggestions can be made on the basis of above results:

1. The cooperative learning approach has been used effectively in mathematics and science (Killen, 2007). Now the results of our study have proved its effectiveness in subject of education. So, cooperative learning method is strongly recommended to be used in social science as well.
2. Additional research should be conducted on large sample to increase the generalizability of the findings to the subject of education.
3. Future research should also focus on comparisons between different models of cooperative learning.
4. Cooperative learning intervention should be given for a long time period to observe its effectiveness.

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