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Effectiveness of Cooperative Learning (Jigsaw Technique) on the Knowledge Level of Cognition in the Subject of English at Secondary Level

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Abstract

This experimental research explored the effectiveness of cooperative learning (jigsaw technique) on the knowledge level of cognition of students in the area of English at secondary level. The objectives of the study were: (i) to determine the effectiveness of jigsaw cooperative learning on enhancing the knowledge level of cognition of students; (ii) to examine the effectiveness of jigsaw cooperative learning on enhancing the knowledge level of cognition of the high achievers; and (iii) to explore the effectiveness of jigsaw cooperative learning on enhancing the knowledge level of cognition of the low achievers. Total 674,461 students studying at secondary level in the province of Khyber Pukhtunkhwa were the general population of the study. Forty eight students of 9th class studying in Shaheen Public High School Pir Piai District Nowshera, Khyber Pukhtunkhwa (Pakistan) were taken as sample of the study. Data were collected from the sampled population through teacher made pre-test, post-test. Obtained results of Pre & post tests were analyzed by using mean, SD, t-test and one-way ANOVA. It was found that cooperative approach jigsaw strategy was more effective than traditional grammar translation way for developing students' knowledge level of cognition in the subject of English. Following recommendations were made: (i) inculcation of cooperative way of learning for policy makers; and (ii) guidance programs may be arranged to in-service teachers to use cooperative learning strategies effectively in classroom. The study will help the teachers to use some new trends of cooperative learning techniques in class room teaching.

Keywords: Cooperative Learning, Cognition, Jigsaw, English

Introduction

In present age the importance of English can't be ignored because it is a way of communication and without knowing English one can't remain aware of the worldwide information. Living in the world of electronic media raises the importance of English language more and more. Every person related somehow to the world affairs knows the intense importance of English. It is a tool or a way of communication with the globe and its importance is increasing day by day. English is extremely important in today's era. Besides our local dialect we require a general language which fulfils our need to be in touch with the globe. In fact vast majority of people in the globe understand this language. For better communication expertise in English language is necessary (Sesha, 2014).

To be good in English is the need of Pakistani students, parents and job providers (Rahman, 2002). In case of Pakistan its value cannot be ignored. It holds a position of official language, in addition serves as a tool of instruction in high cadre institutions (Rahman, 2001). Furthermore Education Policy (Govt. of Pakistan, 2009) too recommended English as a subject from grade-1. In addition from class-5 the policy recommended utilizing English as a Channel for instruction both for the subjects of Science & Mathematics. Looking to the need of English government of Pakistan considered it necessary from class-1(Govt. of Pakistan, 2006).

Teaching as well as learning of English as a foreign language is not an easy job in Pakistan. Majority of the students failed to obtain the essential potential (Govt. of Pakistan, 1998-2010).While learning English Pakistani students face many hurdles like the use of traditional Grammar Translation

Method and old-fashioned traditions of instruction (Akram & Mahmood, 2007). Cooperative approach is suggested as one of the effective strategy for class-1 to class-12 (Govt. of Pakistan, 2006). Nan (2014) stressed that cooperative environment should be produced by the English teaching teachers for active learning during class instruction. Furthermore stress has been given on enhanced interaction among the three elements i.e. subject, teacher and student.

Objectives:
1. To determine the effectiveness of jigsaw cooperative learning on enhancing the knowledge level of cognition of students.
2. To examine the effectiveness of jigsaw cooperative learning on enhancing the knowledge level of cognition of the high achievers students.
3. To explore the effectiveness of jigsaw cooperative learning on enhancing the knowledge level of cognition of the low achievers students.

Hypothesis of the Study:
H_01: There is no significance of difference on knowledge level of the pre-test between experimental and control group with respect to cognition.
H_02: There is no significance of difference on knowledge level of the post-test between experimental and control group with respect to cognition.
H_03: There is no significance of difference on knowledge level of the pre-test between experimental and control group high achievers with respect to cognition.
H_04: There is no significance of difference on knowledge level of the post-test between experimental and control group high achievers with respect to cognition.
H_05: There is no significance of difference on knowledge level of the pre-test between experimental and control group low achievers with respect to cognition.
H_06: There is no significance of difference on knowledge level of the post-test between experimental and control group with respect to cognition.
H_07: There is no significance of difference on knowledge level between experimental and control group with respect to cognition on one way ANOVA.

Statement of the Problem:
Cooperative learning is considered a very useful learning way because it is based on mutual cooperation and interaction. This study also aims to find out the influence of jigsaw cooperative learning in increasing the knowledge level of students.

Significance:
This study will help the teachers who are desirous to use cooperative learning in their classes. It will also help the researchers and educators to conduct further research on the jigsaw technique and to enlarge the span of knowledge.

Review of Related Literature
Cooperative Learning:
In cooperative approach multiple ranges of students having different level of abilities work on a common task to get better insight of a subject is considered a befitted approach (Siegel, 2005). In cooperative learning approach small groups of learners, having varied ability levels, use variety of activities to develop understanding about a topic (Dyson & Casey, 2012). Cooperative learning is based on five necessary fundamentals i.e. constructive dependency, promotion in contact with one another, personal responsibility of the task, improved interpersonal and social skills and value of group work (Johnson & Johnson, 2008). Only working in groups, without cooperative learning environment is not cooperative learning. An environment is rightly called a cooperative learning in which the key elements of cooperation are followed and benefited (Curscedieu & Pluut, 2013). Cooperative culture is a teaching culture where learners get learning in small structured groups. In these small structured groups' diverse level of students with diverse competence in use manifolds educational activities to boost their learning (Dyson & Casey, 2012). In words of Woolfolk (2004) such setting is cooperative learning setting where students make efforts in varied aptitude groups. They are rewarded on group achievement.

Strategies:
Some of the strategies have touched the height of popularity including STAD and TGT. Division of students in heterogeneous groups looking to their learning approach is the maxim of making groups where students provide support for the learning of others group members (Slavin, 2010).

Traditional Learning and Cooperative Learning:

In traditional learning setup learners try hard to beat their fellows. In such setting they work hard to win the race but there is no competition in cooperative setup. On the other hand self accomplishment is one of the main purposes of traditional approaches but in cooperative approach learners support one another in an interactive way for better performance (Brown & Mcllroy, 2011). In comparison with lecture method, cooperative methods were found more results oriented for higher cognition and for achievements and retention levels (Tran, 2014).

Cooperative Learning in Language Teaching:

Researchers who conducted researches on teaching English as foreign language considered that suitable teaching and learning way of instruction In which learners interact and hence raise students academic gain as well as support their language development. Cooperative approach is not only the name to get the necessary skill of the language but to provide essentials opportunities for learners with regard to performance (Naziha, 2011).

JIGSAW Model:

The Jigsaw model is a cooperative approach which enhances attitudes, performance, and attendance of students. It reduces test related anxiety and makes students enough active participants in learning environment (*Huang et al.,* 2011). According to Al-Salkhi (2009) in jigsaw model small groups ranging from four to five participants of heterogeneous nature are made. In this model at the very first stage every member works on a specific given task. At second phase same task members gather in another transitory group for deep discussion on the task. In third phase of the model all the members return to their original groups and share what has been learnt in the due course. At the end of the whole process an individual test is conducted. Group position is determined on Individual score of the members.

Usually jigsaw is a strategy that helps students to become experts on the given materials and then update their own groups. Jigsaw activity starts with a general topic. The material gets further division into more topics. To each participant a sub topic is handed. Individuals work on their topics individually. They can use notes and books as supportive materials. After that students having the same sub-topic then get together into expert groups. Here in expert groups they share their knowledge about the topic. In next cycle the students again join their home groups and are considered accountable regarding their topic. At the end the teacher supports the students regarding difficulties (Koppes, 2002).

Steps in Jigsaw:

Aronson (2008) enlisted ten important steps for jigsaw activity. These steps includes; a) division of students into heterogeneous groups of five or six (b) appointment of group leaders (c) divisions of lesson into further division (d) specific work task to each individuals (e) allotment of reading time for given materials (f) Formation of short term expert groups (g) Stage of rejoining original groups (h) presentation of specific section to their groups (i) intervention of teacher in case of hurdles (j) quiz competition.

Benefit of Jigsaw in Learning English:

Leaders related to education, teachers as well as researchers are fascinated by cooperative type of education (Nan, 2014). Teachers who support Jigsaw think that every student holds the ability to play the role of knowledge disseminator. In expert team learners get encouragement from their colleagues. When they returned to their original teams they have attained enough encouragement to share their expertise got from the experts. This sort of jigsaw model helps students in interactions and enable them to accept others contributions (Aronson, 2005). According to Meng (2010) jigsaw is one of the best technique in teaching English reading skills. It is obvious that jigsaw also raises students' interest, motivation and reading ability. Most importantly Jigsaw technique on the other hand focuses on the communicative aspect of learning a language (Brown, 2007). In jigsaw students explains the material to their peers so they become more fluent in English (Aronson, 2008).

Mbacho (2013) investigated the effects of jigsaw cooperative technique on students' achievement in mathematics in the country of Kenya. Study findings indicated that those who got treatment through Jigsaw technique performed better than those who got instruction through conventional methods.

Mengduo and Xiaoling, (2010) investigated the role of Jigsaw-2 technique in teaching of English language. Motivation and reinforcement for participation on the part of jigsaw group were

found in the study results. Furthermore Jigsaw technique was found to be encouraging technique for gaining self-esteem and intrinsic motivation.

Aziz & Hossain (2010) conducted a research to evaluate the effects of cooperative approach and conventional teaching method on mathematics achievements. The results of the study showed a significant variation in favour of the treatment group after cooperative learning treatment. The findings indicated that cooperative learning students significantly outperformed than conventional learning students.

Tanel & Erol (2008) conducted an experimental research in which comparison was made between the effectiveness of jigsaw technique and a conventional method. The study was conducted in the country of Turkey at a university level physics course. The results provided significant proofs in favour of jigsaw technique.

Method and Procedure
Population:
All the 674,461 students (Govt. of KPK) of secondary level in the province of Khyber Pakhtunkhwa of Pakistan were the population of this experimental study.

Sample:
For the purpose of experimentation 48 students of class 9th of Shaheen Public High school of Pir Piai district Nowshera of Khyber Pakhtunkhwa were taken as a sample.

Design:
Looking to the nature of the study pre-test, post-test equivalent group design was used for the procedure of data collection.

RE	O1 T O2
RC	O3 O4

dRE	O2 - O1
dRC	O4 - O3

D= dRE - Drc

Delimitation:
This experimental study was confined to:
1. Knowledge level of cognition of Bloom's Taxonomy of Learning.
2. Shaheen Public High School Pir Piai, District Nowshera.
3. Only to the 9th class students studying in Shaheen Public High School.
4. To the Following units of class 9th English.
    (i).   The Two Bargains
    (ii).   A Visit to Swat Valley
    (iii). Avalanche
    (iv).   The Farm
    (v).   A New Microbe

Instruments:
Pre and post tests were employed as research instruments in the present experimental study.

Validity/reliability:
Content validity of both the pre and post tests were assessed and assured by the supervisory committee, two senior English teachers and a language expert. Internal consistency of the tests was insured by split-half (odd-even) method after conducting the pilot testing and was found satisfactory.

Procedure/Treatment:
In the beginning the sample students were appeared in the pre-test. After the pre-test the students were divided into two groups by the technique of pair random sampling. Through median the experimental group students were further divided into high and low achievers. For jigsaw technique the experimental group students were further divided into six equivalent sub-groups. Each team was consisted on four students having their own names i.e. team A, team B, team C, team D, team E and team F. For more ease to execute jigsaw technique group leaders were also appointed for all the groups. To each student was also given a name so that they may easily constitute experts groups during jigsaw activity. Two different teachers were employed for the treatment.

Following five chapters i.e. The Two Bargains, A Visit to Swat Valley, Avalanche, The Farm and A New Microbe from class 9th English text book (recommended by the province of Khyber

Pukhtunkhwa Text Book Board Peshawar) were selected for the purpose of experimentation. The experiment lasted for seven week during that period, the teachers of both the groups taught to the assigned groups for 40 minutes on each working day. The teacher of experimental group gave instruction to the group by jigsaw cooperative arrangements and the teacher of control group applied the conventional grammar translation method. After the seven week treatment a teacher made post-test was given to both the groups for the purpose of comparison.

Jigsaw Activity:

The jigsaw activity was based on four steps in this study. In the first step the students individually worked out on the given assignment in parent groups. In the second step the students of the same assignment would form the expert groups and would get expertise on the specified task. In the third step the students would return to their parent groups and would share their expertise with the team members. Taking individual test on the given assignments was the fourth step. On the next day the teacher would announce the position of teams after marking the quizzes/tests of students.

Data Collection:

Data were collected from the sampled population through teacher made pre and post tests.

Analysis of Data:

Looking for difference after the application of jigsaw pre and post test data was analyzed through Mean, SD and t-test at alpha level of (0.05). For in-depth analysis one-way ANOVA was also used.

Analysis and Interpretation of Data:

The base of this research was to look into the effect of cooperative approach (jigsaw technique) and conventional grammar translation method in the subject of English. Here in this section presentation, interpretation and analysis of data are presented.

H_01: There is no significance of difference on knowledge level of the pre-test between experimental and control group with respect to cognition.

Table 1: Significance of difference on knowledge level of the pre-test between experimental and control group with respect to cognition.

Groups	N	Tests	Mean	SD	t-calculated value	t-table value
Experimental	24	Pre-test	5.83	0.502	0	1.671
Control	24		5.83	0.491		
	α=0.05			Df=46	Not significant	

Table No-1 of the study clearly shows that tabulated value of t is greater than calculated value of (t) thus the above null hypothesis is retained. Figure No-1 of the study gives a vivid picture of the two means.
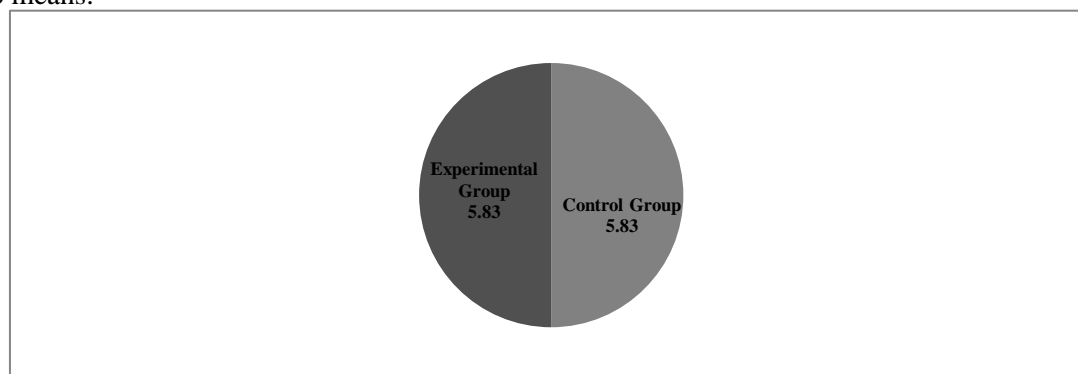

Figure 1: EG and CG mean scores on knowledge Level of pre-test.

H_02: There is no significance of difference on knowledge level of the post-test between experimental and control group with respect to cognition.

Table 2: Significance of difference on knowledge level of the post-test between experimental and control group with respect to cognition.

Groups	N	Tests	Mean	SD	t-calculated value	t-table value
Experimental	24	Post-test	14.46	0.598	6.479	1.671
Control	24		9.33	0.516		
	α=0.05			Df=46	Significant	

Table 2 shows that calculated value of t is greater than the table value therefore the null hypothesis $H_0 2$ is rejected that there is no difference between the mean scores of experimental and control groups with regard to achievements in knowledge level of cognition on post-test. The difference in means can be seen in figure No-2 of the study.
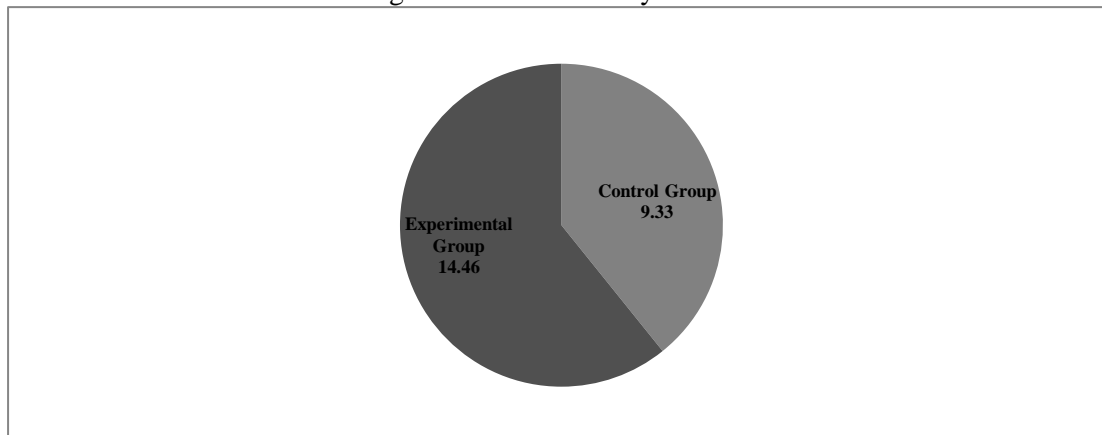

Figure 2: EG and CG mean scores on knowledge Level of post-test.

$H_0 3$: There is no significance of difference on knowledge level of the pre-test between experimental and control group high achievers with respect to cognition.

Table 3: Significance of difference on knowledge level of the pre-test between experimental and control group high achievers with respect to cognition.

Groups	N	Tests	Mean	SD	t-calculated value	t-table value
Experimental	12	Pre-test	7.50	2.315	0.432	1.717
Control	12		7.83	1.337		
		α=0.05		df =22	Not significant	

Table 3 shows that the calculated value of t (0.432) at 22 degree of freedom and level of significance (α= 0.05) is smaller than the table value of t (1.717) hence the null hypothesis with regard to achievements in knowledge level of cognition on pre-test is retained. Further depiction is being shown at figure No-3 below.
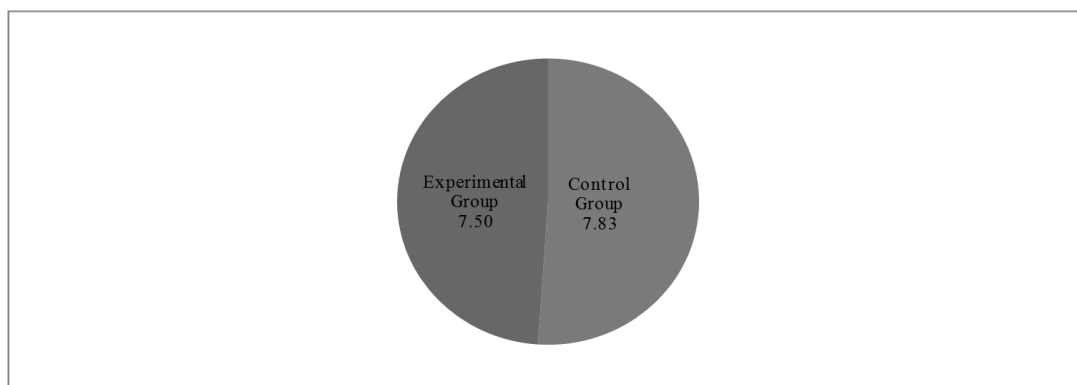

Figure 3: EG and CG high achievers mean scores on knowledge Level of pre-test.

$H_0 4$: There is significance of difference on knowledge level of the post-test between experimental and control group high achievers with respect to cognition.

Table 4: Significance of difference on knowledge level of the post-test between experimental and control group high achievers with respect to cognition.

Groups	N	Test	Mean	SD	t-calculated value	t-table value
Experimental	12	Post-test	16.667	1.557	8.27	1.717
Control	12		10.917	1.831		
		α=0.05		df= 22	Significant[*]	

The data presented in table No- 4 show that the calculated value of t (8.27) at 22 degree of freedom and level of significance (α= 0.05) is greater than the table value of t (1.717). Therefore the

null hypothesis with regard to achievements in knowledge level of cognition on post-test is rejected. Mean scores of both the groups are shown at figure No-4 below.
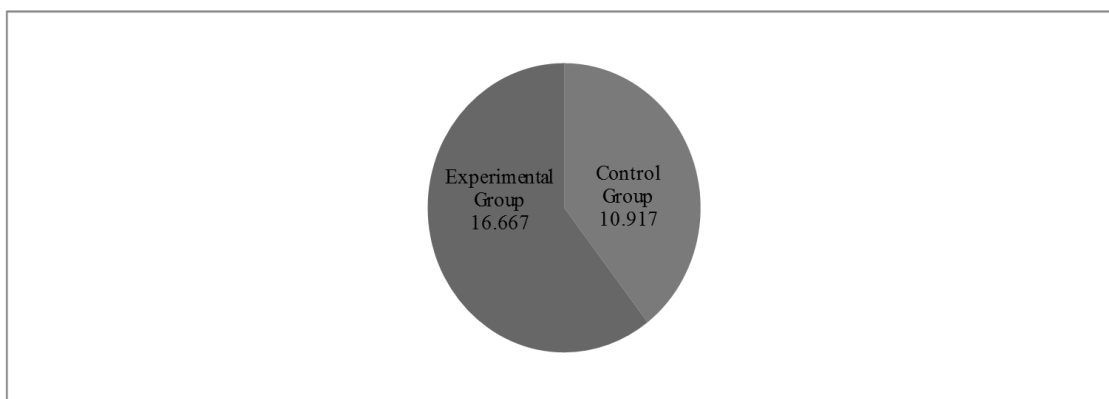

Figure 4: EG and CG high achievers mean scores on knowledge Level of post-test

H_0 5: There is no significance of difference on knowledge level of the pre-test between experimental and control group low achievers with respect to cognition.

Table 5: Significance of difference on knowledge level of the pre-test between experimental and control group low achievers with respect to cognition.

Groups	N	Test	Mean	SD	t-calculated value	t-table value
Experimental	12	Pre-test	4.17	1.115	0.684	1.717
Control	12		3.83	1.267		
		α=0.05		df=22	Not significant	

The data presented in table 5 proved that the mean of experimental students is 4.17 and the mean of control group is 3.83. Thus the mean of experimental group is not higher than the mean of control group. Furthermore t-test calculation did not show the difference therefore the above hypothesis is accepted. Figure 5 further explains the difference.
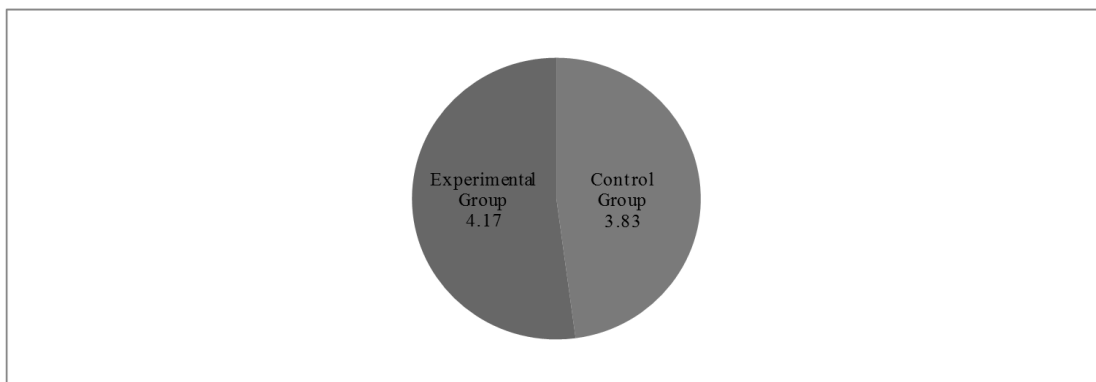

Figure 5: EG and CG low achievers mean scores on knowledge portion of pre-test

H_0 6: There is no significance of difference on knowledge level of the post-test between experimental and control group low achievers with respect to cognition.

Table 6: Significance of difference on knowledge level of the post-test between experimental and control group low achievers with respect to cognition.

Groups	N	Test	Mean	SD	t-calculated value	t-table value
Experimental	12	Post-test	12.25	2.221	5.051	1.717
Control	12		7.75	2.137		
		α=0.05		df=22	Significant[*]	

The data presented in table 6 indicated that the mean score of experimental group (12.25) is higher than the mean score of control group (7.75). Furthermore t-test at (22) degree of freedom and at (α=0.05) significance level also shows that there is a significant difference between the mean scores of experimental and control group, therefore the null hypothesis H_0 is rejected. Figure No-6 further explains the difference.
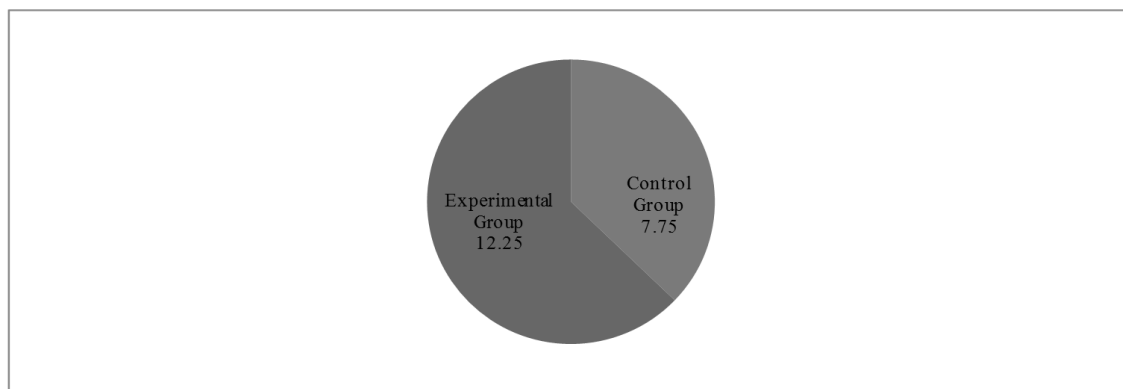

Figure 6: EG and CG low achievers mean scores on knowledge portion of post-test

$H_0$7: There is no significance of difference on knowledge level between experimental and control group with respect to cognition on one way ANOVA.

Table7: Significance of difference on knowledge level between experimental and control group with respect to cognition on one way ANOVA.

Variances	Sum of squares	Df	F-calculated value	p-value
Between the groups	492.3958	3	42.96563	.00001
Within the groups	168.0833	44		
Total	660.4792	47	Significant*	

Results of One-Way ANOVA as shown in table No-7 also verified that cooperative learning (jigsaw technique) was a better technique than traditional grammar translation method for both high and low achievers because F-value is significant at 0.05 levels. Hence the null hypothesis H_0 is rejected in favour of experimental groups.

Discussion:

Cooperative learning strategies have been widely applied in classrooms since long and from literature it is clear that nearly all the studies conducted on cooperative learning showed positive results in all subjects' areas. This study also endured to explore the effects of cooperative approach in the subject of English. A detailed discussion is being made which is as under:

The means score of high achievers of experimental and control group were insignificant at (α=0.05) level of significance, therefore the null hypothesis H_0 is accepted (Table 1). This means that both the groups were similar at knowledge level of cognition before the treatment. But after getting treatment through cooperative learning strategy high achievers of experimental group showed significant results than control group at knowledge level of cognition on post-test, therefore the null hypothesis $H_0$1 is rejected (Table 2). Hence cooperative learning proved to be a better approach for developing knowledge level of high achievers than traditional approach. These results of the study are in line with the results found by Khan (2012) and are against the results found by Ali (2011).

With respect to knowledge level of cognition, low achievers of experimental and control group on pre-test were found of the same level at α=0.05 level of significance. Therefore the null hypothesis H_0 is accepted (Table 3). From these analyses it is clear that low achievers of both the groups at knowledge level of cognition were of the same level before the treatment. But after the treatment significant differences were found at (α= 0.05) level of significance (Table 4). Therefore the null hypothesis H_0 2 is rejected. Hypothesis H_0 2 was discarded in favour of experimental group. Hence cooperative learning proved to be a better approach for developing knowledge level of low achievers than traditional approach. These results of the study regarding knowledge level are in line with the results found by Khan (2012) and are against the results found by Ali (2011).

Conclusions:
1. As a whole the effect of jigsaw cooperative learning technique was found more adept than traditional method of grammar translation in enhancing knowledge of students in the subject of English.
2. Cooperative learning was also found more successful than grammar translation way of teaching for increasing the knowledge level of cognitions of high achievers in the subject of English.
3. Likewise for low achievers Cooperative learning was also found more useful than traditional grammar translation manner for developing knowledge level of cognitions in the subject of English.

Recommendations:
Looking to the positive results of cooperative approach following recommendations were established:
1. The results proved that cooperative approach can provide better results in increasing knowledge level of students. Therefore, inculcation of cooperative way of learning is recommended for policy makers.
2. The results of the study showed that cooperative learning involve students more results oriented. Therefore, it is recommended that English teachers should assume cooperative way for enhancing students' level of involvement in classroom activities.
3. It was found that the teacher was not trained in cooperative learning. The teacher was provided training by the researcher. So, it is recommended that guidance programs may be arranged to in-service teachers to use cooperative learning strategies effectively in classroom.

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