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The Effect of Jigsaw Teaching Method on Sixth Grade Student's Academic Achievement: A Semi-Experimental Study.

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ABSTRACT

The purpose of current study was to investigate effect of Jig saw teaching method on male student's academic achievement at sixth grade of elementary school in Shoosh city located in the south of Iran . This research was conducted by semi-experimental method and using pre-test and post – test designs . Total number of 120 students of sixth grade from two elementary schools i.e khayam and Bahonar were considered as statistical society which were categorized into two groups of test and control through simple random sampling method. Data collecting tool was a academic achievement standard test including some lessons such as mathematics, empirical science, and sociological science . In order to analyzing data descriptive and inferential statistics methods including Ancova univariable covariance analysis were used. Findings showed that students who trained by Jig saw method had a better educational progress than students trained with traditional teaching methods.

Keywords: Teaching method, Jig saw, Academic achievement

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INTRODUCTION

The main purpose of teaching is to providing suitable environments for process interaction and they of students' learning pattern of teaching describes learning environment and important tools for opening the way of organizing education for exploiting various kinds of intelligence and increasing learning (Yar Yari, 2008).

Using traditional teaching method may cause wasting facilities and forces and every effort leads to failure. Therefore, development of education and it's evolution needs identifying education process and being aware of new methods of performing it (Pakdel, 2003). Result of a good teaching is learn for learn. in which a student who is knowledgeable and self – acquired and can develop ways of learning well and acquiring education by themselves. So patterns of teaching are of main elements of education process which have a effective role in efficiency of education system. The way of teacher's teaching has a great impact on learning (Aghayari, 2004). The methods of teaching and learning are the most effective and weighty elements in teaching programs. Accordingly, one of the main steps in reaching to an active and creative breeding is to avoid traditional methods and using active methods of teaching on thinking skills in teaching learning process (Rasuli, 2012).

Today, topic of active learning and learner has a special place in educative discussions. Collaborative pattern of teaching in developing new educational system is very important. Many various patterns are introduces for collaborative learning of which Jigsaw pattern is the most important. This approach was first developed by Aronson et al (1978) and now it is introduced as a collaborative learning methods with new applications. With this method, students get skilled in some parts of lesson topics which are bound to learn them, and then transfer their knowledge to other members of their group. The advantage of Jigsaw is that though results of one student's effort is different from another student, but all students with different capabilities will be given the same responsibilities usually students are grouped into some teams for studding some chapters of textbook, then every member of the team studies a part of a chapter and teaches it to other members of the group (Keramati, 2002).

Jigsaw's classes in addition to educational progress and safety, helps to develop cooperation and intimacy among students, and also helps to transferring knowledge to students at the class with a goal oriented pattern and developing their skills. In this educational system, students learn to love each other and the place where they learn more and gain high self – respect and learn social skills more effectively and apply them (Shekari, 2012). Fennel (1992) conducted a research on 208 students who were trained by collaborative method of Jigsaw, he found that students perceived Jigsaw method as a useful and pleasurable experience (Slavin et al, 1995). Also, Jigsaw method can affect student's opinion about school. Aronson, (2000) stated that students trained with Jigsaw method had lower absence than other students.

Today Jigsaw method has increasing use at academic level. Jigsaw collaborative method is being used at polytechnic institutes of Mexico for instructing various majors. according to obtained results, this method can meet student's actual needs. Collaborative pattern is used at Jigsaw – based classes. This pattern is exactly look like a puzzle. every student's participation like pieces of a puzzle is necessary for completing and understanding final result. if every student's role is fundamental, so presence of every student is also necessary and this is exactly why this strategy is effective (Qaffari & Kazempour, 2011).

Several researches in Iran have specified key and important role of teacher in activating collaborative pattern in teaching – learning method.

Aghayari (2004) compered collaborative teaching method (Jigsaw) and traditional teaching method and student's academic achievement at fifth grade, and results showed that there was a significant difference between traditional methods and Jigsaw and this type of collaborative method caused student's progress in History and geography courses. Investigating foreign surveys provides a suitable framework for understanding application of collaborative teaching method. and shows it's importance and necessity in learning process. Dollard and Mahoney (2010) dealt with effect of using Jigsaw method on educational courses of new sciences in high school. Obtained results by control and test groups are essentially the same and in general, student's tendency was higher for this method

than previous method. Although test group stated that they felt more importance and have higher chance for participating in class. It is suggested that before collecting data, instructing student continues one to two weeks in order to use Jigsaw method. Hanze & Berger (2007) also found in a research that Jigsaw which is a collaborative learning method caused academic achievement and growing social skills of students through increasing feedings of qualification and competence in students relative to direct instruction and lecture. In summary, a thousands of miles journey starts with first step and the first step for reaching progression and development is to enjoy a powerful educational systems. Continuing activity of education system today with traditional teaching methods which breeds students passive and obedient is not possible and this in the shadow of developing education system and moving toward active teaching method. therefore, with respect to positive effect of group teaching methods on growth and promotion of education quality and considering their importance and necessity in learning process, current study has dealt with effect of Jigsaw teaching method on sixth grade male student's educational progress in shoosh, to identify weather group teaching method of Jigsaw affects student's educational progress?

Thus, this study aims to test following hypotheses:

- Teaching method (Jigsaw)has positive effect on sixth grade male student's academic achievement in mathematics.
- Teaching method (Jigsaw)has positive effect on sixth grade male students' academic achievement in empirical science.
- Teaching method (Jigsaw) has positive effect on sixth grade male students' academic achievement in social science in Shoosh.

RESEARCH METHOD

The research method was semi – experimental. Membership in two groups was done naturally and without researcher's hand.

One can say that if difference or differences in student's educational progress are observed, these differences should be due to differences of teaching method.

Studied statistical population includes all sixth grad male students of elementary schools of shoosh at academic year 2013- 2014 which was selected using purposeful method of khayami and Bahonar schools with respect to homogeneity base on sexuality variables, level of literacy, and teacher's background in teaching. total number of 120 students of four classes of sixth grade were considered as statistical population. Students were categorized into two groups of test and control using simple random sampling method . number of students at every of two classes were 60 people. data collecting tool was performed educational progress tests including mathematics (this test contain 25 number of four – option questions from there chapters of the textbook .) empirical science (This test contains 40 questions which are four – options from 10 lessons of text book), and also social science (40 questions in four – option form of six chapters of the text book). In order to determine content and nominal justifiability of these test. Question were provided and were given to experienced experts and teachers and necessary changes and corrections were made according to their opinion. Cronbakh Alpha coefficient was used measuring stability.

Table 1: stability coefficients of measurement tools

Stability coefficients	Statistical index
Cronbakh Alpha	Measurement tools
0/87	1- Academic achievement test of mathematics.
0/92	2. academic achievement test of science .
0/95	1. academic achievement test of Social sciences.

Method of conducting research:

After selecting control and test group teacher. Corresponding pre – tests were performed simultaneously for two groups. Then test group will receive needed instructions for 24 sessions (about 2 weeks) subject to independent variable (group teaching method of Jigsaw). Following steps are done in current study to explain how to perform this method:

Step 1) Topic Selection: At first session teacher specifies respective chapters and lessons.

Step 2) grouping students: In this step, teacher with respect to topics of lesson grouped students to 6 category of 10 people. Then teacher gave responsibility of investigation about every of topics to one of members of the group. (it's worth mentioning that in this step, teacher performed respective pre – test of each lesson). Table 2 shows topics of lessons, and grouping students base on number of topics of lessons.

Step 3 Subjective study: in this step students with teacher's guidance are due to investigate about noted topic within three weeks with using library references and Internet and they should report their questions and results of their researches to the teacher.

Step 3) Formation of expert groups: students who investigated on a specific field, ganged up in special groups. Students number 1 form expert group number (1) and a common topic and concept will be given to them. Students number (2) form expert group number (2) and another problem will be given to them to be skilled on it and accordingly the process is the same for students number (3) , (4), etc. (for example. Expert group number 1 must study "measuring length " from mathematics, depth of the earth from empirical sciences and black gold from social sciences) expert groups transferred their knowledge to their teammates and discussed with each other and also tested each other within 4 weeks.

Step 4 Returning members to the groups: In this step students level expert groups and return to their initial groups and present their results to their group for about three weeks. This temporal expert groups completely familiar with topic given to them and make a method for transferring their knowledge to members of their initial groups after expert groups did their works well, initial groups A to F (first to tenth) will be formed again, then students teach topics on which they worked.

Step 5) Subjective test of members of groups and scoring groups: at final week representative of each expert group presents all reports to the class and in final session teacher will test.

In fact, the teacher will perform post – test related to each lesson at this step.

Also, in order to analyzing data methods of descriptive statistics were used including frequency table, percentage and columnar diagram, mean and standard deviation at a inferential level of ANCOVA univariate covariance analysis.

Findings

1) Theory 1: group teaching methods (Jigsaw) have a positive effect on improvement of sixth grade male student's educational progress in Susa.

As observed in table 3, value of F of educational progress of sixth grade students in mathematics at pre – test step 1614/020 which is statistically meaning full at level 0/05, Also value of F in inter group with controlling pre – test is 16/720 which is statistically meaning full. On the other hand, there's a meaning full difference between group who used group teaching method (test group) and group who didn't us group teaching method (control group) (post – test F = 16/720 and meaning fullness level ($P < 0/01$). So we can say with 99% confident that group teaching methods (Jigsaw) could increase educational progress of sixth grade students of Shoosh in mathematics. Than students of control group. This indicates positive effect of group teaching methods (Jigsaw).

Theory 2: group teaching methods (Jigsaw) have a positive effect on educational progress of sixth grade students of Shoosh in empirical sciences.



Table 2: Topics of lessons and grouping students

Percentage and financial mathematics	Allotment	Values of congruency	Congruency table	Show approximate numbers on axis	rounding	Approximate and wetting off	Comparison and measurement of angles	kinds of angle	Calculating the length	mathematics	topic of lesson groups
From past of future	Ways of being healthy	forest	Amazements of leaf	Energy	Designing and constructing	Exercise and strength (2)	Exercise and strength (1)	earthquake	Depth of the earth	Empirical science	
Cloth. From production to consumption	Types of clothes	Properties of seas of Iran	Effective factors in agriculture	Historical places of Esfahan	Culture and Art at era of history	Developing sciences in Islam era	Scientific advances of Muslims	Ways of consuming energy	Black gold (petroleum)	Social science	
Student (A10)	Student (A9)	Student (A8)	Student (A7)	Student (A6)	Student (A1)	Student (A1)	Student (A3)	Student (A2)	Student (A1)	group A	
Student (B10)	Student (B9)	Student (B8)	Student (B7)	Student (B6)	Student (B5)	Student (B4)	Student (B3)	Student (B2)	Student (B1)	group B	
Student (C10)	Student (C9)	Student (C8)	Student (C7)	Student (C6)	Student (C5)	Student (C4)	Student (C3)	Student (C2)	Student (C1)	group C	
Student (D10)	Student (D9)	Student (D8)	Student (D7)	Student (D6)	Student (D5)	Student (D4)	Student (D3)	Student (D2)	Student (D1)	group D	
Student (E10)	Student (E9)	Student (E8)	Student (E7)	Student (E6)	Student (E5)	Student (E4)	Student (E3)	Student (E2)	Student (E1)	group E	
Student (F10)	Student (F9)	Student (F8)	Student (F7)	Student (F6)	Student (F5)	Student (F4)	Student (F3)	Student (F2)	Student (F1)	group F	

Table 3: Results of ANCOVA univariant covariance analysis on scores of improvement of educational progress in mathematics for sixth grade students of Susa in two groups of control and test

Exponent of test	Eta ²	Level of meaning fullness	Test F	Means of squares	Degree of freedom	Sum of squares	
1.000	.932	0.001**	1614.020	1388.047	1	1388.047	effect of pre- test
.982	.125	0.001**	16.720	14.379	1	14.379	Inter group
				.860	117	100.619	error
					120	27596.000	total

** meaning fullness at level 0/01
 * meaning fullness at level 0/05

Table 4: Results of ANCOVA univariant covariance analysis on educational progress of sixth grade students of sush in empirical science in two groups control and test:

Exponent of test	Eta ²	Level of meaning fullness	Test F	Means of squares	Degree of freedom	Sum of squares	
1.000	.800	0.001**	468.125	1227.892	1	1227.892	effect of pre- test
.608	.042	0.026*	5.076	13.315	1	13.319	Inter group
				2.623	117	306.891	error
					120	28941.000	total

** meaning fullness at level 0/01
 * meaning fullness at level 0/05

As observed in table 4, value of F educational progress of sixth grade students of Shoosh in empirical science related to pre – test step is 486/125 which is statistically meaningful at level of 0/05. Also, value of intergroup F for pre – test step is 5/076 which is statistically meaningful. On the other hand, there’s a meaningful difference between group who used group teaching method (Jigsaw) (test group) and group who didn’t use Jigsaw method (control group). (F = 5/076 at post – test and level of meaningfulness P < 0/05). With 95% confident we can say that group teaching methods (Jigsaw) could increase educational progress of sixth grade students of Shoosh in empirical science than control group which indicates positive effect of group teaching method (Jigsaw).

Theory 3: group teaching methods (Jigsaw) have positive effect on sixth grade student’s educational progress in social sciences.

Table 5: Results of ANCOVA univariant covariance analysis on sixth grade student’s educational progress in social sciences and two groups of control and test.

Exponent of test	Eta ²	Level of meaning fullness	Test F	Means of squares	Degree of freedom	Sum of squares	
1.000	.676	0.001**	244.517	945.094	1	945.094	effect of pre- test
.903	.084	0.001**	10.782	41.674	1	41.674	Inter group
				3.865	117	452.223	error
					120	32475.000	total

** meaning fullness at level 0/01
 * meaning fullness at level 0/05

As it’s observed in table 5, value of F of educational progress in social science for sixth grade students of susa related to pre – test step is 244/517 which is statistically meaningful at level of 0/05. Also, value of F of intergroup with control of pre – test is 10/782 which is statistically meaningful. On the other hand, there’s a meaningful difference between group who used group teaching method (test group) and group who didn’t use it (control group) (post – test step F = 10/782 and level of

meaningfulness $P < 0/01$). So we can say with 99% confident that group teaching methods (Jigsaw) increased educational progress in social science for sixth grade students of Susa than control group which indicates positive effect of group teaching method (Jigsaw).

CONCLUSION

With respect to inferential findings of research about effect of group teaching method (Jigsaw) on student's educational progress (in mathematics, empirical sciences and social sciences): we concluded that group teaching methods (Jigsaw) have positive effect on this lessons. Value of calculated F of mathematics in intergroup with control is $16/720$ ($F = 16/720$). Calculated F of empirical science at post – test level and intergroup is $5/076$ ($F = 5/076$). For academic achievement in social sciences. Value of F at intergroup with control of pre – test so with a 99% confident we can say that group teaching methods (Jigsaw) have increased student's educational progress in such more than students of control group. descriptive statistics also indicated that after performing group teaching methods (Jigsaw). average of score of mentioned lessons for test group considerably increased. Average of score of control group showed meaningful decrease relative to its pre – test. Various researches reported that students who participate in collaborative groups have more educational progress. In this approach results of hundred researches show that groups in collaborative learning situation not only have more positive attitudes but also have more effective learning and better performance in comparison with groups in traditional instruction situation. Hanze & Berger's (2007) results indicated that trained students by collaborative teaching method in comparison with control group gained more better scores. Tajrobekar (2001) pointed to positive effect of collaborative learning on personal and group academic achievement . Kan'ani (1999), stated that teaching by collaborative method is more effective than lecture method in academic achievement. Studies showed that traditional teaching methods (non – active and lecture) decreased academic achievement , formation of student's emotional social and moral changes. In this way Levi (2013), and Parvand (2001) went on the note that teacher's usage of non – active and incompetent methods as an obstacle for learning. Results of research showed that effect of using this pattern on other lessons and grades in addition Results of other research showed effect of collaborative learning on educational progress of mathematics (Veenman, 2000), positive effect of that on student's attitudes toward mathematics and their educational progress. Students in collaborative learning in comparison with those in control group, were more effective and had a purposeful learning and prized geometry. Wahyudi & Treagust (2001) confirmed chemistry, physics (Jonson & Jonson, 1996). Researches clearly showed effect of using this method. using Jigsaw collaborative method in this research with respect to calculated value indicates it's good and considerable effect on teaching mathematics, empirical science and social sciences. What is presented numerically is based on direct in is fractional effects of this method on student's educational progress important point is quality of employing Jigsaw method. this means that incomplete or incorrect performing of this method may lead to negative results. if teachers are not aware of its principals and it's steps of performing it is possible that they do some activities with name of Jigsaw that are far from this method.

Various patterns are introduced in collaborative learning of which Jigsaw is the most important one in which students cooperate in order to reach a specific goal and completely performing this method (Aghayari, 2004). Results of this research show that students trained with Jigsaw method in comparison with students trained with traditional methods have more educational progress. It seems that with respect to students being active in Jigsaw method learning lessons is more effectively done therefore they could gain higher scores while students participated in traditional method due to relying on their own memory, sometimes forget materials, possibility to remaindering those information during test is very low. This result confirm that performing Jigsaw teaching method for increasing student's learning and understanding and promoting their educational progress is very effective on the other hand in Jigsaw teaching method through a more serious participation of learners and enhancing their level of involvement provide more stable background for comprehension and learning is more stable.

Results demonstrated that held classes of Jigsaw in addition to educational progress help to creation of cooperation and intimacy among students and on atmosphere free of any falsity and violent competitions and avoid negative emotional environment. In general one can say that teaching

patterns are important tools for opening way organizing education system in order to use kinds of intelligence and unease student's learning.

Jigsaw collaborative teaching pattern is a suitable teaching approach for using problem – solving, thinking and investigation with respect to program, goals and facilities collaborative patterns structurally are subset of family of social pattern for instructing cooperation. Students play a crucial role in Jigsaw teaching method. Teacher acts a leader and is responsible. For providing circumstances of learning, this method cause students to think, speech, search and teaching (Aghayari, 2004).

From the other side, complex and fast evolutions in educational systems, have made new duties for education system as the most important organization in creating changes. With relying on old and traditional methods we cannot meet these necessities. Therefore it's suggested to teachers to use active teaching methods as a solution for solving educational problems flexibility during teaching and student's interaction with each other which are minimized in traditional methods, are achievable by collaborative teaching method. so using this method in order increase interaction and data transferring is necessary for having an optimal society in which everyone is responsible for his / her life and main goal of it is to live with each other, participation , taking responsibility and development of society education system must undergo some changes and this evolution is possible by employing methods which guarantee learner's participation and involvement in education teachers should have enough motivation for using this method. it seems that most teachers due to lack of enough awareness of advantages of this method, don't employ it, so teachers should receive needed instructions in this regard and education team should support use of this method (Shekari, 2012)

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