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The Comparison between the Effect on Jigsaw 2 and Traditional Teaching Methods on Educational Achievement

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Abstract: The present study was carried out to investigate the effect of learning by jigsaw 2 methods on educational achievement. This quasi-experimental research included pre-test and post-test with control group. The research population was comprised of all high school boys and girls studying in Bandar Abbas. The research sample contained 30 high school first-grade girls and 30 high school first-grade boys in experimental groups and the same number in control groups. In the experimental groups, jigsaw cooperative method was used for a course of 8 sessions, while the control groups received traditional method. Data were analyzed with ANOVA. The results revealed that training by jigsaw 2 method caused increased educational achievement in experimental groups, which was significant at error level of $p<10.001$. In addition, teaching through jigsaw 2 resulted in increased educational achievement in the boys experimental group, which was significant at error level of $p<0.01$. The same applied to girls experimental group at error level of $p<0.01$. Therefore, jigsaw 2 technique was more efficient than traditional method in teaching mathematics. Additionally, those who were trained by jigsaw 2 showed greater educational achievements.

Keywords: Cooperative Learning, Educational Achievement, Students

INTRODUCTION

Education in each country plays an important effect on individual and social behaviors of people. Indeed, educational activities of every country are the investment by a generation on the next, aiming human development. Given this significant part in the society [1], plus disability of traditional teaching methods in fulfilling that primary mission, according to several studies [2], turning to novel teaching methods are unavoidable. Jigsaw cooperative teaching method is one of the techniques that can be used to improve educational and social performance of the learners.

Active teaching methods are those that empower students' activities and convert learning into a bidirectional flow [3]. Therefore, teacher should engage learners with the contents and teaches them ways of learning, instead of just confining to transmission of information. Occasionally, teachers teach a great amount of material, but students cannot perform even a bit of what was taught. What is the reason? Why sometimes could not the learners bring back even a small

part of subject fully explained to them? Why do the students strain their memory instead of conceptually comprehend the materials? To answer, it can mainly be attributed to negligence by the teachers in teaching-learning methods, i.e. failure to employ the active methods.

Cooperative learning causes that students learn most of the materials from each other. Planning and cooperation in group not only help students in social growth but also contribute to cognitive growth of them. Principally, being accepted in a group is a significant factor in self-esteem development. Cooperation in a group encourages the students to listen to other's ideas, discuss about different topics and subjects, learn to make judgment about surrounding phenomena, and finally take a responsibility. In this work group, individuals with different abilities work together, and by this way disappointed and unsuccessful students can be placed in the groups with positive attitudes. In this case, patience is necessary as expansion of reason of the students' cooperative learning is a long-term process and requires experience.

Aronson [4] emphasizes that in the jigsaw method, the students are encouraged to listen, cooperate, and exchange their thoughts. For success in a common objective, the group-members should work together as a team. Learning by each member depends on the others, and group and individual objectives strengthen and supplement each other .

Today, jigsaw pattern has ever increasing application at the academic level. For example, in polytechnic institutes in Mexico, it is decided to use jigsaw cooperative pattern for instructing different fields of science. Based on the results from the questionnaire on cooperative pattern, filled by the instructors and researchers in this university, using this technique meets the actual needs of the students .

The importance of cooperative teaching pattern is remarkable in developing Iran's new educational system. The cooperative teaching patterns, like jigsaw, can better fulfill teaching goals of cooperative method [5] .

A study by Hunz and Berger [6] showed that cooperative learning positively affected achievement. Winston [7] concluded that cooperative leaning positively affect the students' attitudes about mathematics and their achievement in it. Nichols [8] in a study examined the effect of a type of cooperative group teaching on the motivation and educational achievement of high school students in geometry class. The results revealed that the students in cooperative learning groups showed greater educational achievement than the students in control groups. Given what was said, the present study seeks to investigate the effect of jigsaw 2 cooperative learning on educational achievement of high school students.

MATERIALS AND METHODS

It is a quasi-experimental research with pre- and post- tests, and control group. The research population was comprised of all high school boys and girls studying in Bandar Abbas. The research sample contained 30 high school first-grade girls and 30 high school first-grade boys in experimental groups and the

same number in control groups. In the experimental groups, jigsaw cooperative method was used for a course of 8 sessions, while the control groups received traditional method. For data collection, two researcher-made tests, as pre- and post- tests, were used. To analyze data of the research, ANOVA was employed.

RESULTS

Table 1 represents the mean and standard deviation of participants' educational achievement scores.

Table 1. The mean and standard deviation of the participants' educational achievement score

Variable	Group	Gender	Pre-test		Post-test	
			Mean	SD	Mean	SD
Educational Achievement	Experimental group	Boys	15.90	2.79	17.40	1.36
		Girls	15.73	2.61	16.56	2.83
		Total	15.80	2.71	17.53	1.18
	Control group	Boys	15.70	2.67	16.20	2.21
		Girls	15.98	2.53	16.33	1.32
		Total	15.85	2.55	16.45	2.08

Results from Levine test are provided in Table 2.

Table 2. The results from Levine test to evaluate the homogeneity of variance

Variable	F	Df1	Df2	Sig
Educational achievement	15.85	2	118	0.14
Boy's educational achievement	4.48	2	58	0.13
Girl's educational achievement	11.31	2	58	0.07

As seen in the table, the result of variance homogeneity from Levine tests is not significant with respect to the variable "*educational achievement*". Consequently, it is fine to use ANOVA in this study. The results from ANOVA are presented in Table 3.

Table 3. summary of the results from ANOVA

Variable	Changes source	MR	F	Sig	Power
Educational achievement	Pre-test	145.52	88.33	0.001	1.000
	Education	36.81	22.34	0.001	0.997
Boys' educational achievement	Pre-test	64.52	42.25	0.001	1.000
	Education	11.25	7.37	0.009	0.761
	Pre-test	81.80	45.25	0.001	1.000

Girls' educational achievement	Education	27.26	15.08	0.001	0.968

The results presented in the table shows that teaching jigsaw 2 cooperative learning causes increased educational achievement in all students at $p<0.001$. It also contributes to enhanced educational achievement in boys and girls at $p<0.01$ and $p<0.01$, respectively. Moreover, the outputs indicate that the effect of pre-test in all three groups are statistically significant ($p<0.001$), which in this research its impact on the results from post-test are controlled.

DISCUSSION

The findings from the study showed that teaching mathematics through jigsaw 2 significantly affects students' educational achievement. These findings are in agreement with those of Gillies [9], Zacharya et al. [10], Hunz and Burger [6]. Moreover, the findings of the present study are in consistent with those of Yaryari et al. [13] and Mashhadi [14].

In addition to the above findings, there are powerful theoretical bases with respect to the effectiveness of cooperative learning. One the most novel educational theories that contributed to development of educational systems in recent years are Vigotsky's view. In this perspective, the learners learn on their own. Therefore, attempts to passively provide learners with information do not result in deep and dynamic acquisition. The students should themselves form knowledge in an active process. In addition to Vigotsky, Jean Piaget believes in [the effect of] such process in formation of cognitive constructs. He believes that children, as young scientists, themselves seek to discover surrounding phenomena. Children's active interaction with the surrounding environment is continuously changing which according to Piaget leads to formation of children's cognitive patterns and constructs .

Seif also states in this regard that the performed experimental research on cooperative learning indicates that this technique is effective in increasing students' educational achievement in different subjects and at different educational level, if the groups are empowered at the level of its average members. Slavin, also, indicates to the evidence showing cooperative learning technique improves the relationship between the students of different races in different classes. In addition, this method increases self-esteem and other emotional features of the students. In this regard, Kadivar [15] also states that the cooperative technique creates appropriate relationship between the students, motivates them to learn, and enhance their self-esteem .

The future studies can investigate the effect of cooperative learning on such variables as students' self-efficiency, self-concept, and motivation.

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