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IMPACT OF JIGSAW II STRATEGY OF COOPERATIVE LEARNING ON RETENTION

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Abstract

Jigsaw II strategy is one among the cooperative learning method that that has gained popularity in the classroom context. The present study aims to explore theeffect of Jigsaw II strategy of co-operative learning that is basedon the modern constructivist theoriesfor enhancing the retention capacity of science learning among high school students. The study under discussion was conducted among a sample of 80 ninth standard students from two divisions of Adwaita Mission High School, Bounsi, Banka district, Bihar following a quasi-experimental method.Comparison of scores of an achievement test based on select topics from the NCERT IX standard science text and administered immediately after experimental treatment and re-administered after three weeks to the control group as well as experimental group reveals the significance of Jigsaw II strategy of co-operative learning in maintaining retention of the learned content in science by high school students.

Keywords: *Jigsaw II strategy of co-operative learning, teaching and learning science, retention*

INTRODUCTION

Science education is considered of having great significance in the modern competitive world as it enables the individuals to seek various professions which ensure their worthy living. Science is taught as a compulsory subject because of its various functions and values. Today, the educational system is undergoing a paradigm shift: in methodology of teaching, role of teachers, extent of student participation in the instructional process, and so on. In this changing scenario the conventional methods eventually fail to accomplish the objectives of instruction. The chalk and talk method, practiced for decades slowly give way to methods which requires high degree of student activity and participation.

COOPERATIVE LEARNING

Cooperative learning is a widely employed instructional practice which incorporates maximum student involvement and contribution in the learning process. It is based on the theories of constructivism which propound that learning is construction of knowledge through experience and social negotiations and not merely the process of transferring concepts and ideas from teacher to learners as perceived earlier.

Johnson and Johnson (1990) viewed cooperative learning as working together of a group of learners, to accomplish goals that can never be obtained by working single-handedly; but by working competitively in a group; it is an act of learning together. Olsen and Kagan (1992) observations on cooperative learning states that it as a group learning activity structured in such a manner that the learning so happens is due to 'socially structured transfer of information' between the group members and each member is held accountable for his/her own learning and

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is also Responsible for the learning of other members of the group. There are numerous versions of cooperative learning strategies that are in vogue. However, Johnson, Johnson, & Holubec (1994) states in essence, that the components of various cooperative learning strategies are almost similar; positive interdependence, face-to-face interactions between learners, individual as well as group accountability, utilization of interpersonal skills, formation of small groups to promote learning, and group processing are key to it. In Jigsaw strategies of co-operative learning all the students in a class are made experts in the lesson topic; as they have to study themselves and teach the topics to other students.

JIGSAW II STRATEGY OF COOPERATIVE LEARNING

Jigsaw II strategy is the most renowned type of co-operative learning strategy put forward by Slavin (1980) adapting and modifying the Jigsaw strategy initially developed by Elliot Aronson in 1970's. In this new design of Jigsaw II, Slavin identified four characteristics which differentiate it and contribute to its success. These characteristics are: mixed ability grouping (heterogeneity of the student teams), individual accountability and responsibility, group reward and motivation, and equal opportunity for success of every participant (Chan, 2004).

Students who learn by means of Jigsaw II have to work together in cooperative teams to achieve the desired objectives of instruction. They are grouped initially into heterogeneous home teams of mixed academic and social characteristics. Students also have to work together in expert group. Expert groups are formed including a student from each home team so that all teams are represented in all expert groups. The teacher assigns different parts of the unit's work to each expert group. Members of an expert group study their part of the unit intensively and become "experts" in the assigned task. After the completion of expert group study, the initial teams are reunited, and each team member teaches his or her expertise. Thus every member is responsible for his/her own learning and that of other students in the group.

Jigsaw II was proved to be an efficient classroom strategy for enhancing student achievement and retaining it. Besides improving the scholastic dimensions, the use of Jigsaw II was found to be facilitating co-scholastic aspects of learners thereby developing all-round personality of the learners. Jigsaw significantly improves students' retention of the achievement in science and other subjects. Abu-Shouk (2010) observed that the use of Jigsaw method in teaching chemistry enhances retention besides achievement. The effect of Jigsaw strategy in improving retention in language learning is evident in the study of Maden (2010). In school science teaching Jigsaw strategies were found to be useful (Garcia, Abrego, & Robert, 2017; Joel & Samuel, 2018) particularly for teaching physics (Karacop, 2017; Kade, Degeng, & Ali, 2019), chemistry (Kumari, 2006; Koç, Doymus, Karaçöp, &Simsek, 2010), and biology (Sasikala & Ravichandran, 2013; Chukwu & Arokoyu, 2019).

It has been widely recognized that methods of teaching can have resilient effects on learner's achievement and retention in science. Lack of retention of taught concepts is a grievance of most of the learners. It results from the learning methods characterized by mechanical repetition of facts and rote memorization. For better retention in science, teacher should ensure active involvement of learners in the class room activities. But the current classroom situations are highly competitive and unfavourable to a large number of students. The students from diverse cultures join the class with divergent knowledge, abilities, and skills. To cope up with these diversities and to enable the students for better performance and retention of information conventional methods usually fail. Hence todays classrooms needs an overhauling to nurture improved academic and no-academic endeavours and virtues like cooperation, equality, and brotherhood among students. Cooperative strategies like Jigsaw II provide a democratic class room atmosphere conducive for the success of all learners.

HYPOTHESES OF THE STUDY

1. There is no significant difference in achievementin science of high school students taught through Jigsaw II strategy in the immediate and delayed post-tests conducted.
2. There is significant difference in achievement in science of high school students taught through conventional method inthe immediate and delayed post-tests conducted.
3. There is no significant difference in achievement in science of high school boys taught through Jigsaw II strategy inthe immediate and delayed post-tests conducted.
4. There is significant difference in achievement in science of high school boys taught through conventional method inthe immediate and delayed post-tests conducted.
5. There is no significant difference in achievement in science of high school girls taught through Jigsaw II strategy inthe immediate and delayed post-tests conducted.
6. There is significant difference in achievement in science of high school girls taught through conventional method inthe immediate and delayed post-tests conducted.

OBJECTIVES OF THE STUDY

1. To compare the immediate and delayed post-test scores of achievement test in science of high school students taught through Jigsaw II strategy.
2. To compare the immediate and delayed post-test scores of achievement test inscience of high school students taught through conventional method.
3. To compare the immediate and delayed post-test scores of achievement test inscience of high school boys taught through Jigsaw II strategy.
4. To compare the immediate and delayed post-test scores of achievement test inscience of high school boys taught through conventional method.
5. To compare the immediate and delayed post-test scores of achievement test in science of high school girls taught through Jigsaw II strategy.
6. To compare the immediate and delayed post-test scores of achievement test in science of high school girls taught through conventional method.

METHODOLOGY IN BRIEF

For the present study a quasi-experimental design was employed. Students from two ninth standard divisions of Adwaita Mission High School, Bounsi in Banka district of Bihar constituted the sample for the study. Forty (40) students from one division formed the control group and were taught science topics through conventional method; while forty (40) students from the other division constituted the experimental group and were taught using Jigsaw II strategy. Same topics of science were taught to the students of both the groups. Immediately after the experiment an achievement test on the taught area was administered as post-test to both the groups. Three weeks after the administration of the achievement test the same test was given to students in both the groups as delayed post-test. The difference in achievement of the students in both the groups for the post-test and delayed post-test were tested for significance using t test(for correlated means) to verify the hypotheses formulated in the study.

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RESULTS AND DISCUSSION

1. **Comparison of the immediate post-test scores and delayed post-test scores in science of high school students taught through Jigsaw II strategy**

The difference between the mean score of immediate post-testand the mean score of delayed post-test in science of students in the experimental group was subjected to t test (for correlated means). The data and results of the test of significance are given in table 1.

Table 1: Data and result of the test of significance of the difference between the mean scores of the immediate post-test and the delayed post-test Sfor the experimental group (N=40)

Test	M	SD	σM	σD	R	t value
Immediate post	21.050	2.650	0.4190	0.7091	.9421	1.8683
Delayed post	19.725	2.521	0.3986			(*p*> .05)

From table 1 it can be perceived that for the test of significance of means the t value obtained (1.8683) is less than 2.02, the table value (at 39 degrees of freedom) at .05 level. Hence, it can be inferred that there is no significant difference between the mean scores of the immediate post-test and the delayed post-test of the students in the experimental group. The apparent difference is not significant. It implies that the delayed post-test scores are comparable to the immediate post-test scores. So the extent of retention capacity of students in the experimental group taught through Jigsaw II strategy of cooperative learning is high.

2. **Comparison of the immediate post-test scores and delayed post-test scores in science of high school students taught through conventional method**

The difference between the mean score of immediate post-test and the mean score of delayed post-test in science of students in the control group was subjected to t test. The data and results of the test of significance are given in table 2.

Table 2: Data and result of the test of significance of the difference between themean scores of the immediate post-test and the delayed post-test for the control group (N=40)

Test	M	SD	σM	σD	R	t value
Immediate post	13.875	3.081	0.4871	0.7403	.8824	6.7538
Delayed post	8.875	2.747	0.4343			(*p*< .01)

From table 2 it is understood that for the test of significance of means the obtained t value 6.7538 is much greater than 2.71, the table value (at 39 degrees of freedom) at .01 level. Therefore, it can be inferred that there is significant difference between the mean scores of the immediate post-test and the delayed post-test for the students in the control group. The immediate post-test's mean score is greater than the delayed post-test's mean score; this implies that the delayed post-test scores are significantly lower than the immediate post-test scores. As time elapsed to a great extent the topics studied has got subjected to forgetting; so the extent of retention capacity of students in the control group taught through conventional method is low.

3. **Comparison of the immediate post-test scores and delayed post-test scores in science of boys taught through Jigsaw II strategy**

The difference between the mean score of immediate post-test and the delayed post-test in science of boys in the experimental group was subjected to t test (for correlated means). The details are presented in table 3.

Table 3: Data and result of the test of significance of the difference between the mean scores of the immediate post-test and the delayed post-test for

boys in the experimental group (N=17)

Test	M	SD	σM	σD	R	t value
Immediate post	20.941	3.030	0.7348	0.6447	0.9778	1.8246
Delayed post	19.764	3.011	0.7302			($p > .05$)

Table 3 shows that the t value obtained for test of significance of difference between means is 1.8246 and the value is far from the table value 2.12, (at 16 degrees of freedom) at .05 level; from this it can be inferred that there is no significant difference between the mean scores of the immediate post-test and delayed post-test for boys in the experimental group. It implies that the delayed post-test scores are comparable to the immediate post-test scores and the extent of retention capacity of boys in the experimental group taught through Jigsaw II strategy of cooperative learning is high.

4. Comparison of the immediate post-test scores and delayed post-test scores in science of boys taught through conventional method

The difference between the mean scores of the immediate post-test and the delayed post-test in science of boys in the control group was subjected to t test. The data and results of the test of significance are presented in table 4.

Table 4: Data and result of the test of significance of the difference between the mean scores of the immediate post-test and delayed post-test for boys in the control group (N=15)

Test	M	SD	σM	σD	R	t value
Immediate post	12.933	3.348	0.8644	0.6965	0.872	6.6041
Delayed post	8.333	2.894	0.7472			($p < .01$)

Table 4 above depicts that the t value obtained for the test of significance of the difference in means was 6.6041 and this is much greater than 2.98, the table value (at 14 degrees of freedom) at .01 level. Consequently, it can be inferred that there is significant difference between the mean score for the immediate post-test and mean score for the delayed post-test of the boys in the control group. The immediate post-test's mean score is greater than the delayed post-test's mean score. It implies that the delayed post-test scores are significantly lower than the immediate post-test scores. So the extent of retention capacity of boys in the control group taught through conventional method is low.

5. Comparison of the immediate post-test scores and delayed post-test scores in science of girls taught through Jigsaw II strategy

The difference between the mean score of immediate post-test in science of girls in the experimental group and their delayed post-test' mean score was subjected to t test (for correlated means). The details are given in table 5.

Table 5: Data and result of the test of significance of the difference between the mean scores of the immediate post-test and the delayed post-test for girls in the experimental group (N=23)

Test	M	SD	σM	σD	R	t value
Immediate post	21.130	2.398	0.5000	0.7377	0.9017	1.9450
Delayed post	19.695	2.162	0.4508			($p > .05$)

Table 5 port raysa t value 1.9450; which is less than the table value 2.07 (at 22 degrees of freedom) at .05 level. Hence, it can be inferred that there is no significant difference between the mean scores of the immediate post-test and delayed post-test for girls in the experimental group. It shows that the delayed post-test scores are comparable to the immediate post-test scores. So the extent of retention capacity of girls in the experimental group taught through Jigsaw II strategy of cooperative learning is high.

6. **Comparison of the immediate post-test scores and delayed post-test scores in science of girls taught through conventional method**

The difference between the mean score of immediate post-test and delayed post-test in science of girls in the control group was subjected to t test. The data and results of the test of significance are given in table 6.

Table 6: Data and result of the test of significance of the difference between the mean scores of the immediate post-test and the delayed post-test for girls in the control group (N=25)

Test	M	SD	σM	σD	r	t value
Immediate post	14.4	2.829	0.5658	0.7498	0.8896	6.9348
Delayed post	9.2	2.661	0.5322			(p< .01)

Table 6 shows that for the test of significance of the difference between means the t value obtained is 6.9348 and it is much greater than the table value 2.80 (at 24 degrees of freedom) at .01 level. Hence it can be inferred that there is significant difference between the mean score for the immediate post-test and mean score for the delayed post-test of the girls in the control group. The immediate post-test's mean score is greater than the delayed post-test's mean score. It implies that the delayed post-test scores are lowered significantly from the immediate post-test scores. So the extent of retention capacity of girls in the control group taught through conventional method is low.

CONCLUSION

Learning of science is not an easy task for many students due to varied reasons such as lack of interest and motivation, inappropriate methods of teaching, lack of individual attention, and so on. Lack of proper learning of science concepts consequently leads to decreased retention rates. The findings of the present study reveal that use of Jigsaw II strategy of cooperative learning in secondary classrooms enhances the retention capacity of students in science. Therefore it is proposed that Jigsaw II strategy should be encouraged among school classes. Teachers should also be provided with proper training to incorporate Jigsaw II strategy of cooperative learning in their instructional process. It is recommended that Jigsaw II strategy should be made a compulsory teaching technique at teacher education institutions and for teacher trainees in their internship.

REFERENCES

1. Abu-Shouk, M. A. M. A. (2010). *A proposed program cooperative learning method (Jigsaw) for the second graders in Al-Duwaim, Khalil secondary school for chemistry and its effect on their academic achievement and retention* (Doctoral dissertation), University of Khartoum, Sudan.
2. Chan, K. (2004). Using jigsaw II in teacher education programmes.*Hong Kong Teachers' Centre Journal, 3,* 91-98.
3. Chukwu, J., &Arokoyu, A. (2019).Effects of Jigsaw-puzzle instructional strategy on secondary school students' performance on growth as a concept in biology in AbiaState.*Advances in Research*, *20*(1), 1-6. Retrieved from https://doi.org/10.9734/air/2019/v20i130148
4. Garcia, A., Abrego, J., & Robert, R. (2017).Using the Jigsaw method for meaningful learning to enhance learning and retention in an educational leadership graduate school course.*Global Journal of Human-Social Science: Linguistics & Education, 17*(5), 5-16. Joel & Samuel, 2018
5. Johnson, D. W., & Johnson, R. T. (1990). *Cooperative learning and achievement.* In S.

Sharan (Ed.), *Cooperative learning: Theory and research* (pp. 23-37). Westport. CT: Praeger Publishers.

6. Johnson, D. W., Johnson, R. T., &Holubec, E. J. (1994). *Cooperative learning in the classroom.*University of Michigan: Association for Supervision and Curriculum Development.
7. *Kade, A., Degeng, I. N. S., & Ali, M. N. (2019).*Effect of Jigsaw strategy and learning style to conceptual understanding on senior high school students.*International Journal of Emerging Technologies in Learning, 14*(19).
8. Karacop, A. (2017).The effects of using Jigsaw method based on cooperative learning model in the undergraduate science laboratory practices. *Universal Journal of Educational Research, 5*(3), 420-434 Retrieved from http://www.hrpub.org
9. Koç, Y., Doymus, K., Karaçöp, A., &Simsek, Ü. (2010).The effects of two cooperative learning strategies on the teaching and learning of the topics of chemical kinetics.*Journal of Turkish Science Education, 7*(2), 52-65.
10. Kumari, P. (2006). *Effectiveness of cooperative learning using Jigsaw III strategy on the chemistry achievement of secondary school students* (Unpublished master's thesis).Mahatma Gandhi University, Kottayam.
11. Maden, S. (2010).The effect of Jigsaw IV on the achievement of course of language teaching methods and techniques.*Educational Research and Review, 5*(12), 770-776. Retrieved from http://www.academicjournals.org/ERR
12. Olsen, R., &Kagan, S. (1992). About cooperative learning. In: Kessler, C. (Ed.). Cooperative language learning: A teacher's resource book (pp. 1-30). Englewood Cliffs, NJ: Prentice Hall Regents.
13. Sasikala, J. E.M., &Ravichandran, T. (2013).Effectiveness of co-operative learning on achievement in biology.*Indian Journal of Applied Research, 3*(6), 144-145.
14. Slavin, R. E. (1980).Cooperative learning.*Review of Educational Research, 50*(2), 315-342.