EXCELLENT PUBLISHERS

International Journal of Current Research and Academic Review

ISSN: 2347-3215 Volume 1 Number 2 (2013) pp. 38-44

www.ijcrar.com

Effectiveness of jigsaw learning on the upper primary wards' performance in mathematics

B.William Dharma Raja[1*] and V. Janani[2]

[1]Department of Education (Stage III), Department of Education, Manonmaniam Sundaranar University, Tirunelveli - 627 012, Tamilnadu, India
[2]Department of Education, Manonmaniam Sundaranar University, Tirunelveli - 627 012, Tamilnadu, India
***Corresponding author**

KEYWORDS

Jigsaw Strategy; Learning Behaviour; Self Esteem and Mathematics.

A B S T R A C T

The government has lot of responsibilities when it comes to education. While framing the syllabi the government and educationists should keep this in mind. Government and other educational agencies, the central and states have the responsibility to take remedial measures and give encouragement to the teachers to promote cooperative learning approach. Ample time could be allotted for the students for discussion, doing exercises, and reflection so that critical thinking and problem solving strategies are developed in the students. The architecture of the classroom should accommodate group discussion.

Introduction

Cooperative learning fosters a positive impact on intergroup relations, self-esteem, attitude toward school, and acceptance of children with special educational needs. Cooperative learning takes many forms. The most common approaches include peer tutoring, Student Teams Achievement Division (STAD), Group Investigation, and the Jigsaw Strategy (Ryan et al, 2008: 162).

Jigsaw Strategy

The jigsaw strategy is a cooperative learning plan in which six member teams work to investigate a common topic. The topics are typically broad enough in scope that individual members of the team can be assigned subjects within the topic. Individuals are responsible for researching and learning their part. Members of different teams who have studied the same part convene, discuss their part, and then return to their teams, where they take turns teaching their part to other team members. All students are expected to learn all the information on the topic, and comprehensive quizzes can be used to

supplement group reports to measure if this happens (Moore, 2005: 267).

The Jigsaw Learning is better-quality to the traditional method of teaching (Michael & Wilson, 2002; Schroeck, 2009; Souvignier & Kronenberger 2007; Baskaran, 2011; and in teaching pollution (D'Souza, 2011), geography (Khatal, 2011) and mathematics (Thiyagu, 2012).

Significance of the Study

In typical mathematics classes a group is formed normally bench-wise and the intelligent student in the group gets the leadership of the group. They so called below average students show a tendency to copy the results derived by the group and do not effectively participate in the solution of the problem. In this way, the students are denied the equal opportunities.

Jigsaw technique is a more structured method which facilitates change of roles for the students. Each student is provided a chance to play the role of an expert in some of their specialized area. It makes them to participate with more interested and responsible in learning. One of the reasons to promote the performance of the students may be through group discussion. Jigsaw technique helps the students to create peer support, expand deep thinking and perspectives with their group members. These activities will benefit the students' achievement in long run. It provides equal opportunities to engage in thinking and problem solving.

In addition to promoting mathematical achievement, there are also other possible benefits from this Jigsaw technique like developing social communication changing the learning behaviours, increasing self-esteem, etc.

When the peer act as the teacher, students feel free, less inhibited to ask questions and clear their doubts. Teachers also get a chance to join the discussion and guide the students on the best way to teach the subject. In this method active learning takes place throughout and students do not get bored or disinterested. By this attempt the investigators wish to know the effectiveness of Jigsaw method on Mathematical performance among the Standard VII Students.

Objectives of the Study

The following are the objectives of the study.

To find out the significant difference, if any, in the pre-test and post-test scores between the control group taught by traditional method and experimental group taught by Jigsaw Learning with regard to the learning objectives namely, Knowledge, Understanding, Application and Skill.

To find out the significant difference, if any, in the gain scores between the control and experimental groups with regard to the learning objectives.

To find out the significant difference, if any, in the retention scores between the control group and experimental group.

Hypotheses of the Study

There is significant difference between the pre-test and post-test scores of the control group with regard to the learning objectives.

There is significant difference between the pre-test and post-test scores of the experimental group with regard to the learning objectives.

There is significant difference between the gain scores of the control and experimental group with regard to the learning objectives.

There is significant difference between the delayed post-test scores of the control and experimental group with regard to the learning objectives.

Sample

In the present study, 35 students of Standard VII from St. Joseph Girls Higher Secondary School, Tirunelveli, Tamilnadu constituted the sample.

Method Used

The control group and the experimental group were taught by traditional method and Jigsaw Learning, respectively. A pre-test was given to the Standard VII Students of the sample groups alike which took 45 minutes to respond. The treatment period took in twelve periods, 45 minutes each.

The treatment to the experimental group was given following the technique suggested by Aronson, 2008 (www.jigsaw.org). The experimental group students were divided into three jigsaw groups A, B and C with A_1, B_1 and C_1 as respective group leaders and each group was six students. Each group was diverse in terms of ability and intelligence and allotted a mature student as group leader. The day's lesson was divided into three segments. Each group was assigned one sub-topic to learn. Students of each group were given time to read over their segment to become familiar with it. Students were instructed not memorize it. Temporary experts groups were formed in which one student from each jigsaw group joined other students assigned to the same segment. Students in this expert group were given time to discuss the main points of their segment and rehearsed the presentation they made to their jigsaw group. Then students came back to their jigsaw group and presented their segment to the group. Other members were encouraged to ask question for clarification. The investigators floated from group to group in order to observe the process and intervened when the groups had trouble such as a member being dominating or disruptive.

After the treatment, both the control and experimental groups were given the post test. Their responses were scored with the help of scoring key prepared by the investigators. The test was given for 45 minutes. The achievement level of the students was computed through the gain scores (Post-test scores–Pre-test scores). After ten days, both the control and experimental groups were given the delayed post test. The test was given for 45 minutes.

Tools Used

The investigators used two tools namely, Non-verbal Intelligence Test (NVIT) developed by Atmanand Sharma and Self-made Achievement Test in Mathematics (ATM). There were 25 items in NVIT with six options – one key and five distractors. The validity coefficient of the test was calculated by Raven's Standard Progressive Matrices Test. The reliability coefficient of the test was calculated by the Split-half test, KR-21, and Standard Error Measurement scores were 0.94, 0.78 and 0.98 respectively.

The ATM included Percent, profit and loss, simple interest, area of trapezium, circumference of circle, and area of circle.

There were 42 items with four options – one Key and three distractors. The reliability of the test was estimated by Split-half (odd-even) method and was found to be 0.95.

Data Analysis

t-test for small sample independent means and t-test for small sample dependent means were the statistical techniques employed in this study.

Findings

There was no significant difference between the pre-test and post-test scores of the control group in Mathematics with regard to the learning objectives namely knowledge, understanding, application and skill.

There was significant difference between the pre-test and post-test scores of the experimental group in Mathematics with regard to the learning objectives namely knowledge, application and skill, but there was no significant difference in understanding between pre-test and post-test scores of experimental group.

There was significant difference in the gain scores of the control and experimental groups with regard to the learning objectives namely knowledge and skill, but not with regard to understanding and application.

There was no significant difference in the scores of the delayed post-test between the control and experimental groups with regard to the learning objectives namely knowledge and application but not with regard to skill.

Interpretation and discussion

There was significant difference between pre-test and post-test scores of the experimental group in total and with regard to the learning objectives knowledge, application and skill. The mean scores of the post-test in all the above said learning objectives were greater than the pre-test. It was clearly shows that Jigsaw Learning technique was effective in enhancing the knowledge, application and numerical skill of students. The investigation carried out by Khatal (2011) and D'Souza (2010) also revealed the same result.

There was significant difference in gain scores between the control and experimental groups in total and with regard to the learning objectives knowledge and skill. The gain scores of the experimental group were more than the control group. This increase in the gains scores of the experimental group shall be due to the influence of the Jigsaw Learning technique. The findings of were strengthened by the researches carried out by Thiyagu (2012) and Schroeck (2009). There was significant difference in delayed post-test scores between the control and experimental groups with regard to the learning objective 'skill'. The experimental group secured a better score in the delayed post-test than the control group in the learning objective skill. The Jigsaw Learning technique would have given a very good interest in the thorough understanding of geometrical shapes and so the students would have felt easy in solving the problems where they could apply these skills. The finding obtained by this study was in accordance with the findings put forth by Souvignier & Kronenberger (2007) and Baskar (2011).

Table.1a Significance of difference between the pre-test and post-test scores of the control group with regard to learning objectives

Learning Objective	Test	No.	Mean	S.D	r value	t value	P value
Knowledge	Pre-test	17	49.000	21.915	0.474	2.080	0.060^{NS}
	Post-test	17	40.824	18.214			
Understanding	Pre-test	17	46.000	14.475	0.115	0.450	0.659^{NS}
	Post-test	17	50.059	22.300			
Application	Pre-test	17	45.294	20.775	0.318	1.300	0.213^{NS}
	Post-test	17	27.235	15.299			
Skill	Pre-test	17	32.353	39.295	0.032	0.120	0.804^{NS}
	Post-test	17	35.294	29.393			
Total	Pre-test	17	42.647	13.276	0.711	0.350	0.412^{NS}
	Post-test	17	40.000	16.971			

NS – Not Significant

Table.1b Significance of difference between the pre-test and post-test scores of the experimental group with regard to learning objectives

Objective	Test	No.	Mean	S.D	r value	t value	P value
Knowledge	Pre-test	18	42.056	19.371	0.461	2.080	0.001**
	Post-test	18	62.444	15.508			
Understanding	Pre-test	18	52.944	11.000	0.101	0.410	0.687^{NS}
	Post-test	18	58.778	16.473			
Application	Pre-test	18	31.944	12.19	0.563	2.730	0.007**
	Post-test	18	55.000	17.664			
Skill	Pre-test	18	36.111	33.456	0.210	2.860	0.008**
	Post-test	18	77.778	25.566			
Total	Pre-test	18	43.722	8.273	0.725	4.21	0.001**
	Post-test	18	59.611	11.469			

NS – Not Significant ** Significant at 1% level

Table.2 Significance of difference between the gain scores of the control and experimental groups with regard to learning objectives

Learning Objective	Group	No.	Mean	SD	t value	P value
Knowledge	Control	17	6.412	21.581	3.940	0.000**
	Experimental	18	20.389	18.404		
Understanding	Control	17	4.059	20.008	1.500	0.145^{NS}
	Experimental	18	5.833	18.863		
Application	Control	17	18.059	21.525	0.810	0.423^{NS}
	Experimental	18	23.056	14.756		
Skill	Control	17	2.941	48.312	2.790	0.009**
	Experimental	18	41.667	46.177		
Total	Control	17	2.678	11.642	5.850	0.000**
	Experimental	18	16.842	8.282		

NS – Not Significant ** Significant at 1% level

Table.3 Significance of difference in the scores of the delayed post-test between the control and the experimental groups with regard to the learning objectives

Learning Objective	Group	No.	Mean	S.D	t value	P value
Knowledge	Control	17	52.471	19.030	1.460	0.155^{NS}
	Experimental	18	61.611	18.049		
Understanding	Control	17	52.647	21..410	2.520	0.017^{NS}
	Experimental	18	68.500	15.132		
Application	Control	17	47.647	24.804	0.240	0.811^{NS}
	Experimental	18	45.778	20.778		
Skill	Control	17	38.235	28.115	4.350	0.000**
	Experimental	18	77.778	25.566		
Total	Control	17	50.353	19.043	1.260	0.217^{NS}
	Experimental	18	58.389	18.145		

NS – Not Significant ** Significant at 1% level

Recommendations

In the traditional classrooms, generally, teacher was the only resource. But now there is a paradigm shift in students' learning. Now teacher is one of the resources for learning. He has to think out of the box. In such a scenario the teacher has to adopt Jigsaw Learning. These days the students have very many diversions. In order to sustain their interest level the teacher needs to be smart in this approach. The teacher should not follow only the lecture method. Even a brilliant lecture will loosen its value if the students are drilled through lectures over a period of time. During the Jigsaw Learning the teacher should monitor each group. The type of 'I' teachers should give way for activities and discussions inside the classroom. He should be a facilitator and coordinator. He should talk less and make the students do much of the talk. Having said that the teacher should talk and motivate the discussion whenever required. When a group is not performing the expected level the teacher has to prompt by giving hints. Besides he has to evaluate, appreciate and suggest the students. He should allow the group with liberty and his intervention should only stimulate the process of discussion.

References

Baskaran, D., 2011. Effectiveness of cooperative learning approach (jigsaw with reward) in enhancing the academic achievement of learners in learning social science at the secondary level, Res.Reflect. Edu. 9(3): 17-20.

D'Souza, and Giselle., 2010. Two heads are better than one cooperative learning is so much fun, EDUTRACKS, 10(3): 38-41.

Khatal and Mohan, N. 2011. A study of effectiveness of learning geography through jigsaw map & traditional method, Inter. Refer.Res. J. 3(27): 75.

Kumari, V., and Sobha, D'Souza. 2011. Metacognitive – cooperative learning approach to enhance mathematics achievement, New Front. Edu. 30(2): 416-425.

Moore, D.K., 2005. Effective Instructional Strategies, USA: Sage Publications.

Ryan, K., M.J. Cooper and Tauer, S. 2008. Teaching for student learning becoming a master teacher, New York: Houghton Mifflin Company.

Schroeck , and Courtney, D. 2009. Using cooperative learning strategies to teach imperialism in a high school world history class, The History Teacher, 37: 425-446.

Souvignier and Kronenberger. 2007. The effects of cooperative methods at elementary school level, Edu.Psychol. 77(4): 755-771.

Thiyagu, K., 2012. Effectiveness of co-operative learning method in learning of mathematics among eighth standard students. i-manager's, J. Edu.Psychol. 4(2): 43-48.