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Effect of Jigsaw Cooperative Learning Strategy on Students' Interest and Performance in Mathematics

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Abstract

The study investigated effects of Jigsaw cooperative learning strategy on students' interest and performance in mathematics. Two research questions and hypotheses guided the study. Quasi\ experimental design of non-equivalent pre-test and post-test group was adopted. Population consists of 532 SS II students. Sample of 82 students who participated in the study was obtained from two randomly selected schools. Instruments for data collection were Mathematics Performance Test MPT and Students Interest in Mathematics Questionnaire SIMQ. Validity of MPT and SIMQ was ascertained by experts in Mathematics Education. Test-retest reliability coefficient of 0.79 was obtained for MPT while Cronbach's alpha reliability coefficient of 0.89 was obtained for the SIMQ. Data were analysed using mean, standard deviation and ANCOVA. Findings revealed Jig saw cooperative learning strategy enhanced students interest and performance in mathematics. The study recommends use of Jigsaw cooperative learning strategy in aiding students learning and understanding of mathematics.

Keywords: Interest, Jigsaw Cooperative Learning, Mathematics, Performance and Students.

Introduction

Mathematics plays a significant role in science and technology which is the hub of economy growth as no nation can survive economically without embracing the teaching and learning of mathematics. Odogwu, (2014) described mathematics as subject that explores patterns, laws, principles and theories to explaining variety of phenomena. Mathematics is fundamental to technology and serves as an essential tool for economy development (Ijeh, 2014). The importance accorded to mathematics makes it a prerequisite for admission to Nigerian tertiary institutions (National Policy on Education (FRN), 2020). Despite the importance of mathematics there been continuous poor performance in mathematics experience by most students. Awofala and Fatade (2023) stated that students poor in mathematics has been a re occurring incident. The West African Examination Council WAEC (2017) chief examiner's report on students' performance in mathematics indicated that only 40 percent of total registered students obtained credit in mathematics.

Moreover students continous poor performance in mathematics has been a resounding issue among researchers and mathematics educators alike. Studies have attributed poor instructional method (Nsengimana *et al.* 2020); lack of interest (Mazana *et al*., 2020); negative attitude (Escalera, *et al.*, 2019) as major causes of students poor performance in mathematics. Among these factors it is sad to note the persistent use of lecture method has led to many students showing no interest in mathematics and consequently resulting in their poor performance. However in order to improve students interest and performance in mathematics, there is a need for the adoption of a more effective instructional strategy that would enhance students interest and performance in mathematics such a strategy is the Jigsaw Cooperative Learning Strategy.

Jigsaw cooperative learning strategy involves organizing students into groups with each student in a group taking charge of solving given academic tasks. The teacher gives a time frame to students in different groups working together on the same task. Students come together and present information, also give others in the group the opportunity to ask questions. The teacher monitors students' learning activities in each group and answers questions that may be asked about the topics.

Jigsaw cooperative learning strategy leads to students' continuous engagement in learning and

resulting to development of interest in group work. Cooperative-learning strategy involves students working together in small groups to accomplish educational tasks (Ahmad, 2019). Cooperative learning is considered as one of the modern instructional strategy based on the formation of heterogeneous group that can be organized into small workgroup. Amedu (2015) asserted that students are assigned to groups and work together on an instructional material. Students with same topic meet in expert group to study extensively on their assigned topic, after which they return to their various groups to teach other students.

Interest is the disposition of students to engage in group work with the aim of learning mathematics. Toli and Kallery (2021) highlights attention, effort, affect and experience as key elements associated with students' interest. Fisher *et al*. (2012) stated that interest is catalyst for successful learning and performance in mathematics. Construct of interest places emphasis on attributes such as emotion, perceive value, knowledge and engagement (Renninger & Hidi, 2011). Boniface (2018) found lack of interest as a major factor discouraging most students from learning mathematics. Students who shows interest in mathematics exhibit a discernment in decision to pursue further studies in mathematics (Azmidar *et al.*, 2017). Schiefele (1996) found interest is predictive of motivation when students developed interest they are motivated to learn and acquire knowledge in a more coherent way.

Various studies conducted on effect of Jigsaw cooperative learning strategy on students' interest and performance. Nduji, *et al.,* (2021) in their study found jigsaw cooperative learning strategy more superior in enhancing students interest and performance in physic. Areelu and Ladele (2018) study on effect of Jigsaw cooperative learning strategy found higher mean score of students interest and performance in mathematics. Gongden (2019) examined effect of Jigsaw cooperative learning strategy on students understanding of chemical kinetic and found jigsaw cooperative learning strategy effective in improving students performance in chemical kinetic. Kindom-Aaron *et al* (2019); Chukwuebuka, *et al.,* (2020) found Jigsaw cooperative learning strategy effective in boosting students interest and performance in mathematics. Although studies on Jigsaw cooperative learning strategy were found in the literature however not much is known of effects of Jigsaw cooperative learning strategy on senior secondary two students interest and performance in mathematics.

Research Questions

i) What is the difference in mean interest score of students taught mathematics using Jigsaw cooperative learning strategy and those taught using lecture method?

ii) What is the difference in mean performance score of students taught mathematics using Jigsaw cooperative learning strategy and those taught using lecture method?

Hypotheses

H_{01}: There is no significance difference in mean interest score of students taught mathematics using Jigsaw cooperative learning strategy and those taught using lecture method.

H_{02}: There is no significance difference in mean performance score of students taught mathematics using Jigsaw cooperative learning strategy and those taught using lecture method.

Methods

Quasi-experimental design of non-equivalent pre-test and post-test group was adopted in the study. Population consists of 532 Senior Secondary Two SS II students in Kazaure Local Government Area. Sample of 82 students who participated in the study was obtained from two randomly selected schools. Two intact classes one from each selected school were randomly assigned as experimental and control group. Instruments for data collection were Mathematics Performance Test (MPT) of multiple choice type and a five point Likert scale Students Interest in Mathematics Questionnaire SIMQ. MPT consisting of twenty multiple choice questions on quadratic equation was adapted from WAEC past questions, reason is that quadratic equation a topic in the SS 2 mathematics curriculum while SIMQ consisting of ten item statements on interest in mathematics was adapted from Wong and Wong (2019). MPT and SIMQ were validated by expert in Mathematics Education corrections and suggestions given were effected before the final administration of the instruments on students. Test-retest **r**eliability the MPT was administered twice on a group of SS2 students who were not part of the main study scores from first and second administration were correlated and split half method use to obtained reliability coefficient of 0.79 while Cronbach's alpha was used to obtained reliability coefficient of 0.89 for the SIMQ. Data collected were analysed using mean, standard deviation to answer research questions and

hypotheses tested at 0.05 significance level using ANCOVA.

Decision Rule: Accept p-value ≤ 0.05
Reject p-value >0.05

Results

Table 1: Mean Interest Score between Experimental and Control Group

Method		**Pretest**		**Post test**		**Mean Gain**
Method	N	Mean	SD	Mean	SD	
Jigsaw	45	22.67	8.09	68. 00	16.60	45.33
Lecture	37	20.27	7.26	21.62	7.64	1.35

Table 1 gives the post-test mean interest score as 68.00 and SD 16.60 for experimental group while post-test mean interest score of 21.62 and SD 7.64 was obtained for the control. This revealed students taught using Jigsaw cooperative learning strategy shows more interest in mathematics than those taught using lecture method.

Table 2: Mean Performance Score between Experimental and Control Group

Method		**Pretest**		**Post test**		**Mean Gain**
Method	N	Mean	SD	Mean	SD	
Jigsaw	45	23.33	8.25	67.11	15.16	43.78
Lecture	37	19.1	8.25	21.89	8.76	2.79

Table 2 gives the post-test mean performance score as 67.11 and SD 15.16 for experimental group while post-test mean performance score of 21.89 and SD 8.76 was obtained for the control. This revealed students taught using Jigsaw cooperative learning strategy perform better in mathematics than those taught using lecture method.

Table 3: ANCOVA on Students Interest in Mathematics the between Experimental and Control Group

Source	**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**	**Partial Eta Squared**
Corrected Model	50029.498[a]	2	25014.749	237.193	.000	.857
Intercept	16749.665	1	16749.665	158.822	.000	.668
VAR00002	105.279	1	105.279	.998	.321	.012
VAR00001	48037.922	1	48037.922	455.501	.000	.852
Error	8331.478	79	105.462			
Total	249600.000	82				

**Significant at 0.05

Table 3 gives F (237.193) significant at 0.000 indicating there is a significance difference in mean interest score of students taught mathematics using Jigsaw cooperative learning strategy and those taught using lecture method.

Table 4: ANCOVA on Students Performance in Mathematics between Experimental and Control Group

Source	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	48436.827[a]	2	24218.413	263.862	.000	.870
Intercept	16987.675	1	16987.675	185.082	.000	.701
VAR00002	381.454	1	381.454	4.156	.045	.050
VAR00001	43526.677	1	43526.677	474.227	.000	.857
Error	7250.978	79	91.785			
Total	245000.000	82				

**Significant at 0.05

Table 4 gives *F* (263.86) significant at 0.000 indicating there is a significance difference in mean performance score of students taught mathematics using Jigsaw cooperative learning strategy and those taught using lecture method.

Discussion

It was found that students taught using Jigsaw cooperative learning strategy obtained higher mean interest score in mathematics than those taught using lecture method. Hypothesis which stated there is no significant difference in mean interest score of students taught mathematics using Jigsaw cooperative learning and taught using lecture method is therefore rejected. Hence there is a significant difference in mean interest score of students in mathematics between experimental and control group as a result of the adoption of Jigsaw cooperative learning strategy. This finding is consistent with those of Igboanugo (2011); Umar, *et al* (2014) who reported Jigsaw cooperative learning strategy enhances students interest.

It was found that students taught using Jigsaw cooperative learning strategy obtained higher mean performance score in mathematics than those taught using lecture method. Hypothesis which stated there is no significant difference in mean performance score of students taught mathematics using Jigsaw cooperative learning strategy and taught using lecture method is therefore rejected. Hence there is a significant difference in mean performance score of students in mathematics between experimental and control group as a result of the use of Jigsaw cooperative learning strategy. This finding is in agreement with those of Gull and Shehzad (2015); Altun (2015); Egbulefu, *et al.*, (2015) Gladys and Jinadu (2020); Samuel e*t. al.*, (2023); Isa (2023), Theresa and Aniekan (2023), Menakaya *et al* (2022), Jacob *et al.* (2022) who reported Jigsaw cooperative learning strategy enhances students performance in mathematics.

Conclusion

Jig saw cooperative learning strategy has positive effects on students interest and performance in mathematics. Students who adopted the Jig saw cooperative learning shows more interest in mathematics learning and perform better academically.

Recommendation

The study recommends use of Jigsaw cooperative learning strategy by teachers in aiding students learning and understanding of mathematics due to it positive effect on interest and performance in mathematics.

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