

INFLUENCE OF JIGSAW-IV COOPERATIVE STRATEGY ON ACADEMIC PERFORMANCE AMONG SENIOR SECONDARY SCHOOL STUDENTS IN KATSINA STATE, NIGERIA.

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ABSTRACT

There has been the perception of a persistent failure in Biology among secondary school students over the years. This study draws upon the triple theories of Slaving Social Theory, Eysenck and Calvos Theory, and Bandura's Social Cognitive Theory to examine the influence of Jigsaw-iv cooperative strategy on the Biology academic performance, self-efficacy and anxiety among Senior Secondary School students of katsina state. The study adopted a pre-test post-test quasi experimental approach to draw on a sample size of 110 students that were obtained through random sampling technique. The study employs mean and standard deviation and t-test to analyze the hypothesized relationship among the variables. Findings from analyzed data revealed that a significant difference in the mean academic performance score exist between experimental group and control group. It also revealed a significant difference in the mean test anxiety score between experimental group and control group, while no significant difference in the mean academic performance score between male and female student of experimental group was recorded. Additionally, no significant difference in the mean test anxiety score between male and female students of experimental group was recorded. Finally, the study expound on the significance of Jigsaw-iv Strategy on self-efficacy, anxiety and academic performance of Biology students in Katsina.

KEYWORDS: *Jigsaw, Self-efficacy, Test anxiety, Academic performance, gender.*

Introduction

There are different methods of teaching Biology at secondary school level and each methods has different positive impact on student's academic performance. These methods includes differentiated instruction, utilizing technology in the classroom, inquiry based instruction, problem based experimental learning, cooperative learning and so on. Jigsaw-iv cooperative strategy is a teaching practice in which the learners are responsible for learning the material and teaching it to other learners. It encourages students' participation in a classroom where learners have a critical role for success and this success depends on active cooperation and participation.

Academic performance has long been recognized as one of the important goals of education, the world over. It refers to performance outcomes in intellectual domain taught at school, college and university. As an indicator of intellectual education, academic performance is the most important prerequisite for individual and societal prosperity.

The issue of gender imbalance in science education has been a subject of discussion in many conferences and seminars. Even the defunct Millennium Development Goals and the current

Sustainable Development Goals of the United Nations has gender equality as a theme in her memorandum (United Nations, 2015). Gender is the social role ascribed to male and female individual in the society. Even though, some psychologist and Biologist holds the opinion that, indigence is a product of gene and the environment, yet, it is unanimously agreed that, students' cognitive ability has nothing to do with gender. Unfortunately, difference in enrolment, interest and performance in science education among male and female students stirred up commotion among researchers. While some previous studies uphold gender as a significant factor for students' performance in science, other studies debunked gender as a factor for students' performance in science. The fact that, Nigerian secondary schools (public and private schools) are characterized by heterogeneity of male and female students, social interaction among the students will not cease to create competition and choices for certain science discipline. This study will therefore include gender as a moderating variable.

Academic performance is commonly measured through examinations or continuous assessment but there is no general agreement on how it is best evaluated or which aspects are most important, procedural knowledge such as skills or declarative knowledge such as facts. It is against this backdrop that this study investigates the influence of Jigsaw-iv cooperative strategy on academic performance in Katsina state.

Statement of the Problem

This study is prompted by persistent failure, self-efficacy and anxiety among Biology students. According to the chief examiners report (2012-2019), students persistently failed Biology at SSCE level in which only few candidates obtain the requirement for further studies into Nigerian higher institutions. This claim is clearly indicated in Table 1, which shows the performance of students in Biology from 2012-2019. Although, in 2018/2019, the performance of students is relatively high, it was revealed that students performed below expectation in Ecology which appeared compulsory in SSCE Biology.

Table 1 Seven Years Analysis of Biology WAEC Result in Nigeria

Year	No. Registered	No. passed (A1-C6)	passed (%)	No. Failed (D7-F9)	Failed (%)
2012	1,540,250	600,389	38.88	939,861	61.12
2013	1,672,224	648,990	38.81	1,023,234	61.19
2014	1,689,188	617,567	36.56	1,071,621	63.44
2015	1,671,421	522,820	31.28	1,148,601	68.72
2017	1,692,435	599,629	35.43	1,092,806	64.57
2018	1,265,090	630,491	49.30	634,599	50.70
2019	1,238,163	525,527	40.62	712,636	59.38

Source: (WAEC, 2019)

Throughout the Federation, the table clearly shows that for all the years the percentage failure is higher than 50%. The continuous decline in students' academic achievement in Biology in senior school certificate examination by secondary school students' is causing

some concern among Biology teachers, schools administrators, parent and the general public. Biology educators have put up noble and spirited efforts aimed at identifying the major problems associated with the teaching and learning of Biology in the State schools, yet no significant improvement has been recorded. Many attribute the incidence of students' failure in the subject to ineffective method of teaching which have results in rote learning. It is based on this problem this study seeks to investigate the influence of Jigsaw cooperative strategy on students' academic Achievement, Self-

efficacy and Anxiety in Biology while using Katsina Zonal Education Quality Assurance as the area of the study.

Objectives of the Study

The objectives of the study were to:

1. Investigate the influence of jigsaw-iv cooperative strategy on the academic performance of Biology students in senior secondary school II of Katsina state.
2. Findout the influence of jigsaw-iv cooperative strategy on the academic performance between male and female Biology students in senior secondary school II of Katsina state. **Research Questions**

The following research questions were answered;

- i. What is the difference between the mean academic performance score of senior secondary school students taught Biology using Jigsaw-iv cooperative strategy and those taught using traditional method?
- ii. What is the difference between the mean academic performance score between male and female of senior secondary school students taught Biology using Jigsaw-iv cooperative strategy and those taught using traditional method?

Research Hypotheses

The following null hypotheses were tested at 0.05 level of significance:

H0₁: There is no significant difference between the mean academic performance score of students taught Biology using jigsaw-iv cooperative strategy and those taught with traditional method.

H0₂: There is no significant difference between the mean academic performance score between male and female students taught Biology using jigsaw-iv cooperative strategy and those taught with traditional method.

Methodology

The study adopted pre-test post-test quasi experimental research design with one experimental and control group. A pre-test was administered to both groups using the same instrument before treatment so as to determine the equivalence of the two groups. The

treatment was done by teaching ecology to the experimental group using jigsaw method. The control group were taught the same concept using traditional lecture method. A posttest was administered after six weeks using the same instrument to determine the effectiveness of the treatment. The study was conducted in Katsina Zonal Education Quality Assurance of Katsina State which comprised of three local government areas: Katsina, Kaita and Jibia. The population of the study comprised of 12,425 senior secondary chemistry students from 25 public schools in the study area. Purposive sampling technique was used to select two schools from the study. The schools were sampled based on the school type (public schools) and gender composition (co-educational schools). Two intact classes were used as the experimental and control group from the two schools selected to avoid disruption of classes in the sampled schools. A total number of 110 SS II biology students

were used, 48 from the experimental group and 62 from the control group. These are in line with the central limit theorem which prescribe a minimum of thirty students as sample size. This suggest that the minimum of 30 sample size is viable for research.

The instrument for data collection was Biology performance test (BPT) adopted from Past WAEC questions that covers the contents of ecology. The test-retest method was used in estimating the reliability of the instrument (BPT). This was achieved by administering the test twice to a constant class of 20 students which were part of the study area but not the sample. There was a time interval of two weeks between the two administration of the instruments. The two sets of scores were correlated to obtain the reliability coefficient and it was determined using the pearson product moment correlation with the aid of the statistical package for social sciences (SPSS). From the results obtained, reliability of instruments was found to be 0.87. descriptive statistic was used to answer research questions while t-test independent was used to test the hypotheses.

Results and Discussions

The results of the study are presented below:

Research Question One: What is the difference in the mean academic performance scores between students taught Biology using Jigsaw-IV cooperative learning strategy and those taught using the traditional method among senior secondary schools in Katsina state?

Table 2: Mean and standard deviation of academic performance scores of experimental and control groups

<u>Group</u>	<u>N</u>	<u>Mean</u>	<u>Deviation</u>	<u>Standard Error</u>	<u>Standard Difference</u>	<u>Mean</u>
Jigsaw-IV Method	48	32.75	5.50	0.794		
Traditional Method	62	16.68	4.92	0.625	16.07	

The Table 2 shows that Jigsaw-IV method group has a mean academic performance score of 32.75 and standard deviation of 5.50, while traditional method group has a mean

academic performance score of 16.68 and standard deviation of 4.92. The mean difference of 16.07 was obtained. The mean academic performance score of students taught Biology using Jigsaw-IV cooperative learning is greater than that of the control group. This answered the research question number one which sought to established difference between the mean academic performance scores of students taught Biology using Jigsaw-IV cooperative learning strategy and those taught using traditional method. Therefore, Biology students taught using Jigsaw-IV cooperative learning strategy have higher mean academic performance score than those in the control group.

Research Question Two: What is the difference in the mean academic performance scores between male and female students taught Biology using Jigsaw-IV cooperative learning strategy among senior secondary schools in Katsina Zonal Educational Quality Assurance, Katsina state?

Table 3: Mean and standard deviation of academic performance scores of male and female participants in the experimental group

<u>Group</u>	<u>N</u>	<u>Mean</u>	<u>Deviation</u>	<u>Standard</u>	<u>Standard</u>	<u>Mean</u>
				<u>Error of Mean Difference</u>		
Male Exp. Group	20	32.80	4.87	1.090		
Female Exp. Group	28	32.71	5.99	1.133	0.09	

The Table 3 shows that males in the experimental group have a mean academic performance score of 32.80 and standard deviation of 4.87, while the females in the experimental group have a mean academic performance score of 32.71 and standard deviation of 5.99. The mean difference of 0.09 was obtained. The mean academic performance score of both male and female participants in the experimental group who were taught Biology using Jigsaw-IV cooperative learning was almost similar. This answered the research question number two which sought to established difference in the mean academic performance scores between male and female students taught Biology using Jigsaw-IV cooperative learning strategy among senior secondary schools in Katsina Zonal Educational Quality Assurance, Katsina state.

Hypotheses Testing

Ho1. There is no significant difference in the mean academic performance scores between students taught Biology using Jigsaw-IV cooperative learning strategy and those taught using the traditional method among senior secondary schools in Katsina Zonal Educational Quality Assurance, Katsina state.

Ho2. There is no significant difference between the mean academic performance score between male and female students taught Biology using jigsaw-iv cooperative strategy and those taught with traditional method.

Ho3.

Table 4: Difference in the mean academic performance scores between students taught Biology using Jigsaw-IV cooperative learning strategy and those taught using the traditional method among senior secondary schools in Katsina Zonal Educational Quality Assurance, Katsina state

Groups	N	Mean	SD	Df	T	P	Remark
Jigsaw-IV Method	48	32.75	5.50	108	16.132	.000	Significant
Traditional Method	62	16.68	4.92				

From Table 4, the difference in the mean academic performance scores between students taught Biology using Jigsaw-IV cooperative learning strategy and those taught using the traditional method among senior secondary schools in Katsina Zonal Educational Quality Assurance, Katsina state was $t = 16.132$, $df = 108$, and $P = .000$. Now since the p-value (.000) is less than the alpha value (.05), the null hypothesis was rejected and the alternate hypothesis was adopted. So, the researcher concluded that there is a significant difference in the mean academic performance scores between students taught Biology using Jigsaw-IV cooperative learning strategy and those taught using the traditional method among senior secondary schools in Katsina Zonal Educational Quality Assurance, Katsina state, in favour of the participants from the experimental group who were taught Biology using Jigsaw-IV cooperative learning strategy.

Ho4. There is no significant difference in the mean academic performance scores between male and female students taught Biology using Jigsaw-IV cooperative learning strategy among senior secondary schools in Katsina Zonal Educational Quality Assurance, Katsina state.

Table 5: Difference in the mean academic performance scores between male and female students taught Biology using Jigsaw-IV cooperative learning strategy among senior secondary schools in Katsina Zonal Educational Quality Assurance, Katsina state

Groups	N	Mean	SD	df	T	P	Remark
Male Exp. Group	20	32.80	4.87	46	.053	.958	Insignificant
Female Exp. Group	28	32.71	5.99				

From Table 5, the difference in the mean academic performance scores between male and female students taught Biology using Jigsaw-IV cooperative learning strategy among senior secondary schools in Katsina Zonal Educational Quality Assurance, Katsina state was $t = 0.053$, $df = 46$, and $P = .958$. Now since the p-value (.958) is greater than the alpha value (.05), the null hypothesis was retained. So, the researcher concluded that there is no significant difference in the mean academic performance scores between male and female students taught Biology using Jigsaw-IV cooperative learning strategy among senior secondary schools in Katsina Zonal Educational Quality Assurance, Katsina state.

Discussion of the Findings

This study investigated the influence of Jigsaw-IV cooperative learning strategy on students' academic performance in Biology in Katsina Zonal Education Quality Assurance. The study revealed that, there is a significant difference in the mean academic achievement score of students taught Biology using Jigsaw-IV cooperative learning strategy and those taught with traditional method in favour of students taught Biology using Jigsaw-IV cooperative learning strategy. This finding is in line with the finding of Kumar, *et al* (2017) who compared the effectiveness of jigsaw strategy and tutorials in enhancing cognitive skills and revealed that, students' cognitive skill in the jigsaw learning group performed better than students in the tutorial group. Ataman (2017) also investigated the effect of jigsaw method based on cooperative learning model and concluded that students' achievement in physics topics when taught using jigsaw method were significantly higher than students' achievement when taught through a confirmatory laboratory method. With regards to gender, it was found that there is no significant difference in the mean academic performance scores between male and female students taught Biology using Jigsaw-IV cooperative learning strategy among senior secondary schools in Katsina Zonal Educational Quality Assurance, Katsina state. The implication of these two findings is that using Jigsaw-IV cooperative learning strategy is gender friendly in terms of improving academic performance as well as developing self-efficacy. This is because both male and female participants in the treatment group have achieved almost similar scores in both academic achievement and self-efficacy when taught Biology concepts using Jigsaw-IV cooperative learning strategy.

Conclusion

Analysis of students' performance in Biology in secondary schools has shown that, there is retrogression in Biology education in secondary schools. Students' low self-efficacy and high anxiety has been mentioned anytime Biology is mentioned. The findings of the study have provided credibility to the effectiveness of Jigsaw-IV cooperative learning strategy as sufficient enough to enhance students' performance in Biology.

Recommendations

Based on the findings of this study, the following are hereby recommended:

1. Biology teachers at secondary school level should expose students to Jigsaw-IV cooperative learning strategy in order to promote teamwork among learners and enhance students' academic performance.
2. The school administrators and supervisors should encourage the use of Jigsaw-IV cooperative learning strategy as it is gender friendly with regards to improvement of academic performance.

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