EFFECTS OF GRAPHIC ORGANIZER AND SERVICE LEARNING ON ACADEMIC PERFORMANCE AND INTEREST OF SENIOR SECONDARY SCHOOL BIOLOGY STUDENTS IN LAGOS STATE

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Abstract

This study examined the effects of graphic organizers and the service-learning strategy on students' performance and interest in Biology. The study used a pre-test and post-test quasi-experimental research design. The population comprises all the Senior Secondary Senior School in Ikorodu. The instruments used in the study were the Biology achievement test and the student interest questionnaire. The Student Interest questionnaire reliability was established using the Cronbach's alpha method, whose coefficient was found to be 0.799. The biology achievement test's reliability was determined using KR-20 and was found to have a reliability coefficient of 0.75 for thirty (30) items. Data were analyzed with t-test, and ANCOVA method of data analysis. The findings indicated that, in comparison to the traditional method, there was a significant difference in the performance of students exposed to the graphic organizer and service-learning methods, but there was no significant difference in the students' levels of interest. It would be worthwhile to look at the usage of graphic organizers and service-learning in various states across the country.

Keywords: Graphic Organizer, Service-Learning, Performance Interest

Introduction

The level of education among the citizens is inextricably linked to the progress of nations. Hence, the acquisition of new knowledge, skills, values, beliefs, and habits is what is meant by education. Education accomplishes this goal by giving individuals all the tools they need to contribute positively to society. Also, Science is a form of education which entails knowledge pertaining to the physical world and its phenomena, as well as objective observation and systematic experimentation of it. It encompasses the study of nature, object behaviour, and the natural world based on observation, experimentation, measurement, and the formulation of laws. Students can develop lifelong scientific abilities through science, including the ability to come up with ideas, analyze options wisely, and even comprehend the data supporting public policy.

Biology is a science that focuses on the study of life. It is made up of numerous specialized fields that study the composition, growth, distribution, evolution, and other characteristics of living things. It gives us a greater understanding of how our body physiology interacts with our surroundings and it is essential to daily living. Biology is essential for economic development, especially in the areas of biochemistry, physical education and health, medicine, and pharmacy. (Chuwku & Dike 2019).

It is regrettable that senior secondary school students' performance on the senior school certificate examination (WASSCE) is unimpressive, given the significance of biology to human existence (Ogunleye 2023). Numerous factors contribute to the low performance of

students in biology which includes high student teacher ratio, poor reading habit, inadequate appropriate teaching resources, and the employment of traditional teaching methods by the teachers. Therefore, teaching biology requires a more student-centered approach. A graphic organizer is a student-centered strategy that shows the connections between concepts, terminologies, and facts in a learning activity through a visual and graphic presentation. It has to do with how the teacher teaches the class using visual aids like concept maps, charts, diagrams, and illustrations or relationship tables. It is a visual representation of concepts that facilitates more ordered and systematic thought organization and application of thinking abilities (Adegbile 2021). It is designed to facilitate quick fact or point recall, assist students reflect on what they have learned, and identify knowledge gaps.

Another student-centred strategy is service learning, which emphasizes connecting academic learning to real-world experiences, reflection, and learning through the use of an experimental methodology. It is a continual learning cycle that links actions generated from experiences, observations, conceptions, and active experiences. In order to address social requirements and offer a practical, progressive learning experience, this educational approach blends learning objectives with community services. It is structured around specific learning objectives, relevant service projects that meet actual community needs as identified by the community, and connections to the course material. Students are also given the chance to critically evaluate their service experiences. It's a way to encourage education by making links between volunteer work, community service, and intellectual growth, and it can support students' future civic engagement by fostering deep learning, community involvement, acceptance and appreciation of difference opinion in learning (Brail 2016).

Another factor that could affect a student's biology learning and performance is interest. It has been noted that the majority of learners perform below average due to lack of interest in the subject matter. Nwafor and Okay (2018) stated that low performance in biology in both internal and external exams is the result of a widespread lack of interest in biology among secondary school students. To increase students' interest in biology, a variety of teaching strategies must be used. In light of this, the study examined how serving learning and graphic organizers affect students' performance and interest in biology.

Statement of the Problem

Biology is a crucial and core science subject for Nigerian senior secondary school students. Even though a large number of students usually enroll in biology examinations, the percentage of students who fail the subject has been alarming in recent years; the issue raised much concern among educators and parents about the trend of poor performance in biology senior secondary certificate examination results such as West African Examination Council. As a result, concerns have been raised regarding the efficacy of the techniques and instructional strategies used by biology teachers to teach the subject. This begged the question, can students' academic performance be improved by service-learning and the graphic organizer mode of teaching?

Purpose of the Study

The purpose is to assess how the use of graphic organizers and the Service-Learning model of instructions affect students' interest in biology and academic achievement. In particular the study wants to ascertain:

1. How biology students' performance is affected by graphic organizers and service learning

2. The effects of graphic organizers and service learning on biology students' interest

Research Hypotheses

H_{01}: There is no significant difference in the pre-test and post-test mean scores of students' performance exposed to Graphic Organizer, Serving-learning, and Conventional methods.
H_{02}: There is no significant difference in the interests of students exposed to graphic organizers and traditional teaching methods.
H_{03}: There is no substantial difference in the interest of students exposed to Service-learning and traditional teaching methods.

Methodology

Because the subject of the study cannot be completely controlled a quasi-experimental research design with pre-test, posttest, and control group was used. The study's participants are six intact classes from six senior secondary schools in Ikorodu West Local Government, Lagos State. The study used two instruments: the Biology Student Performance Test (BSPT) and the Students' Interest Questionnaire (SIQ). There were multiple-choice questions on the performance test, with possibilities ranging from A to E. Thirty test questions with two marks each make up the instrument. The interest test question was on Likert scale of strongly agree, agree, disagree and strongly disagree and the positive questions were graded using the following system: SA = 4, A = 3, D = 2, and SD = 1 while reverse is the case for negative questions. The instruments were presented to Biology educators to assess its face and content validity. The reliability of BSPT was assessed using KR-20 after it was administered to students of another school which are not part of the study and the reliability co-efficient achieved was 0.75, but Cronbach's Alpha was utilized for the Students' interest questionnaire and the coefficient obtained was 0.8. It took eight weeks to carried out the experiment: stage 1 which last for one week required visiting the participating schools, obtaining approval from the administrators and heads schools, training research assistants, and giving participants pre-test questions. In stage 2 (six weeks), the control group was treated with an instruction guide on the conventional teaching method while the experimental groups were treated with an instruction guide on Graphic Organizers and Service learning. In stage 3 (one week), the participant received a post-test at the conclusion of the treatment. The data were analyzed using t-tests and ANCOVA, with the pre-test scores serving as covariates. The estimated marginal means for different groups were determined using multiple classification analysis.

Presentation of Results

H_{01}. There is no significant difference between the pre-test and post-test mean score of students exposed to Graphic Organizer, Service-Learning and Conventional method of teaching

Table 1: Estimated Marginal Mean of Post-test scores of Biology Achievement Test

Method of teaching	N	Mean	Std Error
Conventional method	32	39.242	1.467
Service-Learning	30	31.738	1.502
Graphic Organizer	36	31.975	1.382

According to Table 1, the Conventional method of teaching had the highest mean score (Mean = 39.242) on the biology achievement test, followed by the Graphic Organizer method of teaching (Mean = 31.975) and Service Learning (Mean = 31.738).

Table 2: **ANCOVA of pre-test performance mean score of students in Graphic Organizer, Service Learning and Conventional method before and after treatment**

Source	Sum of Squares	df	Mean Square	F	Sig.	Eta^2.
Corrected Model	2825.784a	3	941.928	13.913	.000	.307
Intercept	1321.958	1	1321.958	19.527	.000	.172
Pre-test	2073.286	1	2073.286	30.625	.000	.246
Methods	1144.830	2	572.415	8.455	.000	.152
Error	6363.778	94	67.700			
Total	124321.000	98				
Corrected Total	9189.561	97				

R Squared =.307 (Adjusted R Squared=.285)

The Table 2 revealed that there was a significant difference in pretest and post-test mean score of students' performance in treatment and control groups, as F(2,94)=8.455, p=.000 is less than 0.05. As a result, the null hypothesis is rejected. Hence, there was significant difference between the pre-test and post-test mean score of students' exposed to Graphic Organizer, Service-Learning and Conventional method of teaching.
To determine the source of differences, the estimated marginal mean was calculated and displayed below.

H_{02}: There is no significant difference in the interest of students exposed to graphic organizer and conventional teaching method.

Table 3: Mean score and the independent t-test

Method	No	Mean	df	t-value	Sig.	Eta^2.
SD						
Graphic Organizer	36	56.36	66	0.957	.342	0.013
9.184						
Conventional	32	58.28				
7.077						

Table 3 demonstrates that students exposed to the traditional method of instruction have a higher mean (mean = 58.28; SD = 7.077) than students subjected to the graphic organizer technique (mean = 56.36; SD = 9.184). The mean difference was not significant because an independent samples t-test found no significant difference between the two techniques (t = -0.957, df = 66, p >.05). The null hypothesis is thus not rejected. The calculated effect size, 0.013 (eta squared), was extremely low. This suggests that the students' interests in both strategies were not different.

H_{03}: There is no significant difference in the interest of students exposed to service learning and conventional teaching.

Table 4: Mean score and the t-test

Method	Nos.	Mean	SD	Df	t- value	Sig.	Eta. sq.
Service learning	30	59.40	6.246	60	.658	.513	0.013
Conventional	32	58.28	7.077				

Table 5 reveals that students exposed to the service learning method of teaching had a higher mean (mean = 59.40; SD = 6.246) than students exposed to the traditional method of teaching (mean = 58.28; SD = 7.077). The mean difference between the two approaches was 1.119 and is not significant because an independent samples t-test found no significant difference between the two techniques (t =.658, df = 60, p >.05). The null hypothesis is thus not rejected. The calculated effect size, 0.007 (eta squared), was extremely low. This implied that the students' interests in both strategies were not different.

Discussion

The study found that there was a significant difference in the outcomes obtained from the post-test exercise, as students taught using the conventional method of learning outperform those exposed to both graphic organizers and the service-learning method of teaching. This result can be attributed to the fact that students who were taught with conventional learning methods are accustomed to this method of learning because they have been taught with it for a long time, whereas graphic organizers and service-learning methods were only recently introduced to the students who were taught with them. According to Ayeni (2011), teaching is a constant process; in order to obtain the desired results, the appropriate teaching method must be utilized and used on a continuous basis. It is also possible that teachers are unfamiliar with the procedure to use the methods which makes it harder to impart knowledge to students. It's also possible that students regard service learning as a more of community service, rather than genuine learning activities. This contradicts a study by Ayverdi, Nakiboglu and Aydin (2014) which found that service learning and graphic organizers boost student academic achievement more than traditional teaching method.

Furthermore, the results revealed that there is no significant difference in the interest of students taught using the conventional and graphic organizer methods of learning. Despite being exposed to graphic organizer method, the students' level of interest in biology remained constant. This is in contrast to the findings of Ayverdi, Nakiboglu and Aydin (2014) and Adeleye and Omotayo (2020), who found significant difference in the interest of students exposed to the learner-centred strategy like graphic organizer. Furthermore, the results show that students exposed to service learning methods do not differ significantly in terms of their interests with traditional method. This suggests that students who participate in service learning and traditional learning methods have comparable levels of interest. This was consistent with the research conducted by Lavin and Emily (2013), who used a non-biological approach to their study and used the service learning method to engage some students for several weeks. This may be as a result of short period of time used for the study. There's a possibility that the outcome might have been different if this teaching strategy had been used for a longer duration.

Conclusion

Based on their performance after exposure to all three teaching method, the students have a strong understanding of biology and a keen interest in the subject but conventional teaching method outperform the two other strategies. This may be as result of the study's time frame,

the students' attitude, the school's location, societal values in the study area, and other extraneous variables factors.

Recommendations

From the findings of the research it is recommended that:

- To determine the efficacy of graphic organizers and service-learning, further research in other science subject with longer period of time should be conducted.
- It would be worthwhile to look at the usage of graphic organizers and service-learning in various states across the country.
- To ascertain its efficacy, moderating variables such as school location, attitude, and cognitive style ought to be employed.

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