

Effect of Peer Tutoring Instructional Strategy on Academic Performance of Biology Students in Dutsin-Ma Metropolis

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Abstract

This study, which adopted pre-test and post-test Quasi – experimental design, examined the effect of peer tutoring instructional strategy on the academic performance of biology students in Dutsin-Ma metropolis, Katsina state, Nigeria. Two research questions and two hypotheses guided the study. The population comprised 655 SS II biology students from six public secondary schools of Dutsin-Ma metropolis. Two secondary schools were randomly selected and used as experimental and control groups. 40 students each were randomly selected from SS2 in the experimental and control groups. Biology Achievement Test (BAT) validated by experts in biology with reliability co-efficient of 0.88 was used for the study. Mean and standard deviation were used to answer the research questions, while t-test was used in testing the hypotheses at 0.05 level of significance. The results indicated that students taught biology using peer tutoring instructional strategy achieved higher than those taught using conventional lecture method. The results also indicated that female students perform slightly better than male students taught using peer tutoring instructional strategy. It was recommended that teachers should employ peer tutoring instructional strategy as it assists in improving students' academic performance.

Keywords: Peer, tutoring, academic, performance, biology, students

Introduction

The growth of any nation in the world depends on its level of science education which has introduced a lot of changes in our world and it will continue to do so in the future. Akpan (2008) opined that science education contributes to the quality of life in such areas as health, nutrition, agriculture, transportation, material and energy production, and industrial development. He further stated that it ensures that the air we breathe, and the water we drink are life sustaining, and not vectors of disease and decay. He finally concluded that if science and technology form the bedrock of sustainable development, it must be given prominence in Nigerian schools.

Science comprises of many discipline such as chemistry, physics, mathematics and Biology. Otuka and Uzoечи (2009) define biology as a science subject that is concerned with the study of life, living organisms, their structure, function, growth, evolution, distribution and taxonomy. It is very vast with many divisions including zoology, botany, ecology, genetics, morphology, anatomy, physiology, histology, microbiology, biochemistry, evolution and the more advanced cell biology, molecular biology, among others. Apart from the inter-relatedness that exists among these branches, biology is closely related with other science subjects like chemistry, geography, agricultural science, mathematics and physics. Biology has application in many specialized areas like medicine, pharmacy, food production and processing industries, biotechnology, genetic engineering, agriculture and horticulture, environmental protection, tourism industry (biological garden) etc. Considering biology's many branches and vast applications in many fields of human endeavour, its importance in a nation's economic development cannot be overemphasized. Despite the importance of biology to every aspect of life, Omole (2011) observed that there is still poor performance of students in the subjects. According to Ayuba (2011), the poor performance in biology might be due to poor method of teaching and insufficient instruction materials. It therefore becomes very necessary that efforts are geared towards finding a lasting solution to students' poor performance in biology through use of appropriate method such as peer tutoring strategy.

Ayuba (2011) considered peer tutoring as one of the effective and powerful instructional methods that can be used to develop academic as well as social skills in both tutor and the tutee. Peer tutoring instructional strategy is a type of instruction which is effective at increasing students' academic achievement at various educational levels. Paul, Lisa and Vanesa (2006) defined peer tutoring as an instructional strategy that partners students to help one another, learn material, reinforce skills or practice a learned task. According to Golding, Lisa and Tennant (2006), peer tutoring is a process by which pupil, with guidance from the teacher, helps by teaching one or more peers to learn skills or concepts. Also peer tutoring instructional strategy consists of students partnership where a student teaches his peers, linking high performance students with low performance ones; it is intended so that students gain knowledge from each other through practice and reinforcement.

Academic performance can be described as something students achieve at school, college, university, class, laboratory, library or field work. It is commonly measured using examination or continuous assessment; even though there is no general agreement on how best it can be measured since teachers employ different teaching methods.

Many studies have been carried out on effect of peer tutoring and the academic activities in biology. Ezeugwu (2009) investigated the effect of peer mediated and self-regulated instructional model on students' achievement and retention in biology. The study found

that peer mediated instructional method enhances students' achievement and retention in biology. Also, a study conducted by Ezenwosu and Nworgu (2013) on efficacy of peer tutoring on students' achievement in Biology found that students taught Biology using peer tutoring performed significantly higher than those taught Biology using convectional lecture method. Another study carried out by Jibrin and Zayum (2014) on the effect of peer tutoring instructional method on academic achievement in Biology among secondary school students in Zaria metropolis, Nigeria, found that students taught Biology using peer tutoring instructional method achieved higher than those taught using expository method. Ullah, Tabassum and Kaleem (2018), in a study on effect of peer tutoring on the academic achievement of students in the subject of biology at secondary level, found that students taught with peer tutoring strategy performed higher than those taught with conventional lecture method.

All the studies reviewed above favoured peer tutoring strategy but a study by Ndirika and Ubani (2017) on peer tutoring teaching strategy and academic achievement of secondary school biology students in Umuahia Education Zone, Nigeria found that peer tutoring has no significant effect on the academic performance of biology students. It is in order to authenticate or disprove their findings that this research investigated the effect of peer tutoring on academic performance of biology students in Dutsin-Ma metropolis, since other researches on peer tutoring were done in other places.

Gender has remained a burning issue and has remained relevant in education because it has been linked to different kinds of achievement and participation in certain professions. Gender can be referred to as the categorization of people into two, namely, male and female. Many studies were carried out on gender and peer tutoring; for example, study by Legrain, Arripe and Gernign (2003), on peer tutoring in a sport setting, found that males reported more certain expectancies and display higher performance outcome than did females; but study carried out by Ogundola (2017) found that females performed higher than males when taught with peer tutoring strategy.

Ndirika and Ubani (2017) conducted a research on effect of peer tutoring instructional strategy and academic achievement of secondary schools biology students in Umuahia education zone, Nigeria. The result indicated that there was no significant difference in the mean gain scores of male and female students. Also study by Ezenwosu and Nworgu (2013), on efficacy of peer tutoring and gender and students' achievement in Biology, found no gender difference in students' achievement in Biology. Another study by Abdulraheem, Yusuf and Odutayo (2017) found no significant difference in the performance of male and female students when taught with peer tutoring strategy. The relative efficacy of peer tutoring was consistent across gender groups. Consequently, gender differences that exist in some science related subjects, which lead to academic achievement variation of male and female, remain issue of concern to researchers. This study investigated the effect of peer tutoring on academic performance of male and female biology students in Dutsin-Ma metropolis.

Statement of the Problem

Persistent poor performance of students in Senior School Certificate Examination in Biology has continued to receive research attention. The problem of poor performance has been linked to several factors; one of such factors is poor method of teaching. Method of teaching plays a key role in enhancing students' academic performance. However, these advantages of method of teaching have not reflected in the educational system. In light of this, this study sought to find out the effect of peer tutoring instructional strategy on academic performance of biology students in Dutsin-Ma Metropolis.

Objectives of the Study

The study has the following objectives:

1. To determine the effect of Peer tutoring instructional strategy on academic performance of Biology students in Dutsin-Ma Metropolis.
2. To find out the influence of gender on the academic achievement of biology students taught with peer tutoring instructional strategy in Dutsin-Ma Metropolis.

Research Questions

The following research questions guided the study:

1. Is there any differences in the academic performance of biology students taught using peer tutoring instructional strategy and those taught using lecture method?
2. What is the influence of gender on the academic performance of Biology students taught with peer tutoring instructional strategy in Dutsin-Ma Metropolis?

Hypotheses

The following hypothesis were formulated and tested at 0.05 level of significance:

Ho1: There is no significant difference in the academic performance of students taught Biology using peer tutoring instructional strategy and those taught using lecture method.

Ho2: There is no significant difference in the performance of male and female students taught biology using peer tutoring instructional strategy.

Methodology

The research design used was pretest and posttest Quasi-experimental design. The population consisted of all the Senior Secondary II (SSII) biology students in Dutsin-Ma metropolis totalling six hundred and fifty five students (655). Two co-educational public secondary schools were randomly selected for the study out of six public secondary schools, and a sample of forty (40) students comprising 20 Males and 20 Females were randomly drawn from each of the two coeducational schools; these were assigned experimental and the control groups by simple random sampling method.

The instrument used was Biology Achievement Test (BAT) constructed by the researcher, which comprises thirty (30) multiple choice items with options A to D. The instrument was validated by experts in Biology Education and Measurement and

Evaluation who are master's degree and Ph.D holders in the Department of Science Education and Foundations of Education, Federal University, Dutsin-Ma. The corrections made by these experts were noted and used to improve the quality of the final instrument. The reliability of BAT was established using test re-test method. The correlation co-efficient was 0.88 which was considered adequate for the study. The BAT was administered to both the students in experimental and control group as pretest before the treatment commenced and scores were recorded. Students in experimental group were taught some biology concepts with peer tutoring instruction while students in control group were taught with Lecture Method (LM). After 6 weeks, the same test (BAT) was re-administered to the groups as post-test. Data from the two administrations were collated and analyzed. While mean and standard deviation were used in answering the research questions, t-test was used in testing the hypotheses at 0.05 level of significance.

Presentation of results

Research question 1: Is there a difference in the academic performance of biology students taught using peer tutoring instructional strategy and those taught using lecture method?

The result of analysis for this research question is presented in Table 1.

Table 1: Mean and standard deviation of posttest of experimental and control group

Group	N	Mean	Std. Dev.	MD
Experimental	40	17.5250	3.77568	
Control	40	11.9250	2.46397	5.6

Table 1 showed that mean achievement scores of students taught biology with peer tutoring (experimental group) was 17.52 with standard deviation of 3.77; while the students taught biology using conventional lecture method (control group) had mean achievement score of 11.93 with standard deviation of 2.46. The result indicates that experimental group, taught using peer tutoring instructional strategy, performed better than control group. To buttressed answer to research question 1, hypothesis 1 was tested.

Ho1: There is no significant difference in the academic performance of students taught biology using peer tutoring instructional strategy and those taught using lecture method.

Table 2: t-test analysis on posttest mean scores of biology students in experimental and control groups

Group	N	Mean	Std. Dev.	df	t	sig(2-tailed)	Decision
Experimental	40	17.5250	3.77568	78	7.42	0.00	significant
Control	40	11.9250	2.46397				

Table 2 showed that t-value of 7.42 was obtained and p-value observed was 0.00 at the degree of freedom of 78. The critical p-value of 0.00 is less than the alpha value 0.05. Thus, the null hypothesis, which states that there is no significant difference in the performance mean scores of students taught biology with peer tutoring and those taught using lecture method, is hereby rejected.

Research question 2: What is the influence of gender on the academic performance of biology students taught with peer tutoring instructional strategy in the in Dutsin-Ma metropolis?

Table 3: Mean and standard deviation of posttest of male and female biology students in the experimental group

Group	N	Mean	Std. Dev.	MD
Female	19	16.89	2.40	1.2005
Male	21	18.09	4.67	

Table 3 showed that mean achievement score of male students taught using peer tutoring in the posttest was 16.89 with standard deviation of 2.40, while mean achievement score of female students taught biology using peer tutoring in the posttest was 18.09 with standard deviation of 4.67. Thus, looking at the mean gain of 1.2005, the result shows that male students performed equally with female in experimental group. To buttress answer to research question 2, hypothesis 2 was tested.

Ho2: There is no significant difference in the performance of male and female students taught biology using peer tutoring instructional strategy.

Table 4: t-test on posttest performance mean scores of male and female biology students in the experimental group

Gender	N	Mean	Std. Dev.	df	t	sig (2-tailed)	Decision
Female	19	16.89	2.40	38	-1.004	3.22	Not significant
Male	21	18.09	4.68				

The t-value of -1.00 was obtained and the p-value (sig. 2-tailed) was observed as 3.22 at 38 degree of freedom. The p-value of 3.22 is greater than the alpha value of 0.05. The null hypothesis, which states that there is no significant difference in the performance of male and female students taught biology using peer tutoring strategy, is retained.

Discussion of findings

The result of this study showed that peer tutoring instructional strategy is an effective and good instructional strategy that leads to higher academic performance of biology students. This is because the result of this study showed that students taught biology using peer tutoring performed significantly higher than those taught using conventional lecture method. This was shown in table 2 which revealed significant difference in the mean score of academic achievement of students who were taught biology using peer tutoring and those taught using conventional method. This result is in agreement with the finding of Ayuba (2011) who reported that peer tutoring instructional strategy enhances academic achievement of students among junior secondary school students in Bauchi metropolis. Also the result corroborated the findings of Ezeugwu (2009), Ezenwosu and Nworgu (2013), Jibrin and Zayum (2014), and Ullah, Tabassum and Kaleem (2018) who reported that students taught biology using peer tutoring performed significantly higher than those taught using conventional lecture method in their separate studies but contradicts that of Ndirika and Ubani (2017) who found no significant difference when biology students were taught with peer tutoring strategy.

The result of the study in table 4 also showed that male biology students scored slightly higher than the female students in the experimental group which is not significant looking at their mean gain. This revealed that gender has no role to play in academic performance of biology students taught using peer tutoring instructional strategy. This is in agreement with the finding of Ezenwosu and Nworgu (2013), Abdulraheem, Yusuf and Odutayo (2017) and Ndirika and Ubani (2017) who reported that there is no significant difference between male and female achievement when taught with peer instructional strategy but, contradicted that of Legrain, Arripe and Gernign (2003) and

Ezeugwu (2009) who reported that male students performed significantly higher than their female counterparts in biology. It also contradicted that of Ogundola (2017) who reported that female performed higher than male students.

Conclusion

Peer tutoring instructional strategy has crucial role to play in teaching and learning processes. This is due to the fact that it had been found to be effective and powerful instructional strategy that can reduce persistent poor performance in our educational system. In this study, peer tutoring instructional strategy indicated significantly better performance for biology students compared to those taught using conventional lecture method. It can therefore be concluded that peer tutoring instructional strategy is effective in delivery of biology contents. The study also revealed that peer tutoring is not gender bias.

Recommendations

Based on the findings of the study, the following recommendations were made:

1. Biology teachers should be using peer tutoring in teaching biology.
2. Science Teachers Association of Nigeria (STAN) should be organizing conferences, workshop and seminars for biology teachers to update them on the use of peer tutoring instructional strategies in teaching and learning processes.
3. Textbooks authors should incorporate peer tutoring instructional strategy that should be used for enhanced teaching and learning as well as students' performance.
4. Curriculum planners should incorporate peer tutoring instructional strategy into curriculum and ensure appropriate operation, supervision and evaluation of the output given by peer tutoring instructional strategy.

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