Effects of Peer Tutoring on Students' Achievement in Biology in Senior Secondary Schools in Ekiti State, Nigeria.

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Abstract
This study examined the effects of peer tutoring on student's achievement in Biology in secondary schools in Nigeria. Two research questions and two hypotheses guided the study. The study used a quasi-experimental pretest-posttest control group design. The study population consisted of senior secondary school II Biology students in Ado Local Government Area of Ekiti State. A total of 56 students took part in the study. Two intact classes who were product of random selection were used for the study. One instrument, basically Biology Students Achievement Test (BSAT) was used for data collection. The instrument has a coefficient of internal consistency of 0.82. Data analysis was carried out using mean, standard deviation and t-test while the hypotheses were tested at 0.05 level of significance. The findings revealed that students that were exposed to peer tutoring instructional strategy had higher scores and performed significantly better than those exposed to the conventional method of teaching. The study recommended among other things, that since peer tutoring instructional strategy is found to be more effective and enhanced students' achievement in Biology than the conventional teaching method, Biology teachers should however accept it as one of the strategies in teaching the subject in the classroom.

Keywords: *Peer tutoring; Achievement; Strategy; Instruction*

Introduction

Students' academic achievement is hinged on several factors. Several literature spelt out factors ranging from effective methods of instruction from the side of the teacher and students' interest, readiness and positive approach to the content of instruction. Effective and meaningful learning occur when learners are able to recall contents and facts already learnt, appropriate the gathered experiences and knowledge towards problem solving (Ezeugwu 2007). To actualize these, learners should be exposed to learning strategies that are capable of creating intent curiosity towards interaction, individual and group construction of meaningful knowledge.

In recent times, attentions are now being shifted from the traditional method of teaching which is more of teacher centered and seriously limits students' understanding, active involvement and interaction, to strategies that permit students active involvement in learning process which yield immediate feedback mechanism of individual construction of knowledge. It is expected that teaching strategies that embrace and emphasis the teaching of process skills of science as stated Wasagu (2006) would definitely bring about a spontaneous shift form students' passivity to activity tendencies of learning.

Jean Piaget (1978) opined that learners learn best when allowed to interact with one another and share ideas on issues. Hence the need for reciprocal peer tutoring, discussion, group work among others. For the pace of this study, peer tutoring as a teaching strategy and its effects on students' academic achievement in Biology will be examined.

Peer tutoring remains one of the methods of instruction that involves students teaching other students. Paul, Lisa &Vanesa (2006) described peer tutoring as an instructional strategy that permits students to assist one another learn materials, reinforce skills or practice a learned task. This strategy often result in social, emotional, mental and academic gains for participating students. Animola, (2019) stated that peers are more sensitive, active and responsive to picking up integrated science concepts and other non-verbal cues. In a well-designed peer tutoring class, each of the participating students gets more attention from the tutor and freer to speak, interact and contribute to topical issues within and outside the purview of the contents of instruction. Hence, enhancing their active knowledge construction. Similarly, through a structured, planned and monitored program under the control of trained, efficient and effective teachers, peer tutoring has all it takes to assist learners receive individualized and targeted instruction that they not otherwise receive in the traditional setting.

Biology remains one of the core science subjects exclusively studied by science students at senior secondary schools in Nigeria. Its pivotal role in all field of human endavours cannot be overemphasized. Biology as a subject is multidisciplinary in approach, usage, relevance and importance. It forms the major hub in Medicine, Pharmacy, Biotechnology, Botany, Microbiology, Biochemistry, Agriculture etc. In fact, it remains a catalyst needed for sustainable national growth and development.

Biology teachers have adopted several instructional approaches in teaching the subject, yet, the desired result in students' achievement has not been accomplished (Salami, 2015). However, the strong desire to improve the achievement of students in Biology gave rise to this investigation.

All over the years, students' achievement in Biology has been consistently unsatisfactory (Fakiye, Dada and Ariyo, 20018). This unsatisfactory condition has been a serious concern to authorities and stakeholders in the said field. Oneneto and Oyibor (2002) stated that poor academic achievement among students in our schools queries the method of instruction and therefore called for an in-depth investigation with a view of establishing the fundamental relationship between instructional methods and students' academic achievement.

Salami (2012) opined that there exists unsatisfactory performance in Biology in senior secondary schools. This unsatisfactory performance could be as a result of ineffective teaching methods, inadequate laboratory facilities, inadequate qualified teachers in the field of Biology, poorly structured, curriculum, government policies among others. However, it should be noted that effective teaching is a vital tool for effective learning and a good teaching with right methods leads to quick and better comprehension, mastering of subject matter and invariably result to high academic achievement.

The theoretical bases for the study

The study is hinged on behaviourist and constructivist approaches to learning. Behaviourist approach to learning has it that the outcome of peer tutoring can be significantly improved by rewarding the tutors for their good performance or prioritizing other favourable conditions for tutoring. In view of this, the outcomes of peer tutoring are conditioned to external stimuli, which are the main work and idea of skinner's theory of learning.

Similarly, Vygotsky (Vygotsky, 1987) and Piaget 1964 were fully in favour of peer tutoring. Accord to Piaget, learning does not occur totally from external influence; rather, it is a reconstruction process being fertilized right from the mind. So, every learner has their own innate tendencies, abilities and concepts. The pieces of information from the external world interact with these innate tendencies and abilities and result in the aeration of new knowledge. The cognitive theory of Piaget admits that cognition of both tutees and tutors

develop in all stages of peer tutoring by bringing about cross fertilization of ideas, views and perceptions on a given topic or concept.

More so, Vyogtsky remains one of the supporters and unbending advocates of peer tutoring. He opined that academic performance of slow learners could be significantly improved if engaged in peer tutoring. According to him, learners base on their cognitive development could be classified into 3 categories; (a) the zone of proximal development i.e zone in which students are independent in their learning. Here, the students do not depend on anybody to construct their own knowledge. This is called the independent zone. (b) the zone of proximal development. i.e the dependent zone. Here, the students depend on one another for learning to occur. Peer tutoring remains the most suitable approach for students in this stage (c) the zone of no development where students cannot learn something in the presence of external help where even peer tutoring will be fruitless.

Statement of the problem

This study is an eye-opener to the unsatisfactory performance of Biology students in external examinations. The unsatisfactory performances were occasioned by ineffective teaching methods that were characterized by students' passivity and redundancy in knowledge construction and acquisition during the teaching and learning of Biology. This condition calls for alternative methods that will guarantee effective learning of students. Although several studies have shown that the use of peer tutoring as an instructional strategy has yielded a profitable result in enhancing students' performance in Mathematics, Physics, Physical and Health Education and Home Economics but its importance in improving students' performance in Biology is deplete in literature. The question there is could peer tutoring be used to enhance students' academic achievement in Biology? Hence the study.

Objectives of the Study

The specific objectives of the study are to

1. Investigate the effect of peer tutoring instructional strategy on the achievement of students in Biology; and
2. Compare the effect of peer tutoring teaching strategy on academic achievement of high and low achievers in Biology at senior secondary schools.

Research Questions

The following research questions guided the study.

1. Will there be any difference between the mean achievement scores of students taught Biology with peer tutoring strategy and students taught with conventional method
2. Will there be any difference between the scores of high achiever and low achiever of both the experimental and control groups on posttest

Hypotheses

The following hypotheses were tested at 0.05 level of significance

H_{o1}: There is no significant difference in the mean achievement score of Biology students taught using peer tutoring strategy and conventional method of teaching.

H_{o2}: There is no significant difference in the score of high and low achievers of the experimental and control groups respectively in Biology.

METHODOLOGY

Design of the study

The quasi-experimental, nonequivalent pre-test, post-test control group design was employed using only the Senior Secondary School 11 Biology students. The design was

considered appropriate because it can be used to establish a causal effect connection between the dependent and independent variable. Also, it is considered appropriate because two intact classes were involved and the subjects were not selected randomization.

Population and sample of the study

The population for this study consisted of a total number of 438 senior secondary II Biology students of 13 public secondary schools in Ado Local Government Area of Ekiti state.

The sample size for the study consisted of fifty six (56) SSII Biology students. The experimental group consisted of twenty seven (27) students while the control group consisted of twenty nine (29) students respectively. Two secondary schools were randomly selected using simple random sampling technique. Out of the two schools that were used for the study, one was assigned to control group while the other was assigned to experimental group using simple random sampling technique.

Instrument

The instrument used for the study consisted of BSAT (Biology Students Achievement Test). The instrument was used for both pretest and posttest. The instrument was designed by the researcher. The essence of the pre-BSAT was to test the level of homogeneity of the two participating groups, while the posttest was to determine the effect of the treatment on dependent variable (students' performance). The Biology Students Achievement Test (BSAT) consisted of 40 multiple choice items which were drawn from four topics.

The cell; cell and its environment, Tissue and supporting system, digestive systems. The contents were covered in six weeks.

The validation of the instrument was done by a panel of judges which consisted of two experienced Biology teachers and who are examiners in various external examination bodies (West Africa Examination Council and National Examination Council) and one measurement and evaluation expert. All of them were given copies of the content of instructions and the achievement test questions. They determined the content validity by comparing the test items with contents of instruction.

More so, to ensure the reliability of the instrument, it was administered to forty students of Muslim College, Ado Ekiti, who were not part of the study. The reliability of the instrument was assessed using a measure of consistency. This was carried out using Cronbach Alpha which yielded a consistency index of 0.82.

Treatment procedure

The two groups used for the study consisted of

a. The control group i.e. students that were exposed to the conventional method of teaching.

b. The experimental group (i.e. students that were exposed to peer tutoring)

Students in both control and experimental groups were exposed to the same content of instructions. A week before the commencement of the study, the two groups were pretested to determine their equivalence before the administration of the treatment. Shortly after this, the real study started. The control group was exposed to the conventional method of teaching which was done with the aid of one of the Biology teachers, teaching in one of the schools that was used for the study. The experimental group was exposed to peer tutoring which was supervised by the researcher. A lesson plan was developed for each session of peer tutoring lesson by the researcher being an expert in field of Biology. The lesson plans for peer tutoring was designed in a way as to ensure discussions, questions and answers with the aim

of enhancing active participation for both the tutors and tutees. The tutors were high achievers judging by their achievement scores in Biology. To do this, their previous raw scores in Biology two terms ago were obtained from their teachers. Hence, the low achievers served as the tutees.

Tutors were guided to teach various components of the plan in such a way that would satisfy their tutees. During the peer tutoring session, the researcher continuously visited each pair and observed the level of progress, and also motivated the tutees and the tutors to ask questions and teach respectively. Strict rules and discipline were also maintained by the researcher in both groups. After the instrumental treatment of six weeks was over, (BSAT) was administered to both the experimental and control groups as posttest for measuring the effects of the treatment on students' academic achievement. Data collected both for the pretest and posttest were analyzed. Also, research questions were answered descriptively using mean and standard deviation, while the hypotheses were tested using the t-test at an alpha level of 0.05.

Results

The Ho results were obtained in the course of this study.

Table 1: Pretest to equate the two groups

S/N	Group	N	Mean	Std	Std error	T
1.	Experimental group	28	14.233	4.782	1.352	0.372
2.	Control group	28	14.542	4.821		
Total		56				

The above result indicates that the difference between the mean scores of the two groups on pretest was said to be insignificant at alpha level of 0.05. Hence both group were found to have equal background knowledge of the concepts taught.

Hypothesis 1: there is no significance difference in the achievement scores of students exposed to peer tutoring instructional strategy and those exposed to conventional method of teaching.

Table 2: T-Test Analysis of Post-Test Scores of those Taught Peer Tutoring Instructional Strategy and Conventional Method

Group	N	Mean	Std	t	d f	p-value(sig.2-tail)
Experimental Group	28.	35.54	9.56			
				3.000	27	0.006
Control Group	28	28.04	9.55			

Table shows that there was significant difference in the mean scores of the two groups in the BSAT ($t=3.00$, $P<0.05$). Thus, the null hypothesis is rejected. This implies that there is significant difference in the achievement of students taught Biology with peer tutoring and those taught with conventional method. The mean scores revealed that experimental group ($\bar{X}=35.54$) achieved more than the control group ($\bar{X}=28.04$). Hence, the treatment group achieved better than the control group in BSAT.

Hypothesis 2: there is no significant difference between scores of high achievers and low achievers of the control and experimental groups respectively.

Table 3: T-Test Analysis of Post-Test Scores of Higher and Lower Achievers of the two Groups

Group		N	Mean	Std	T	df	Sig(p)
Experimental group	High achiever	15	53.75	18.88	6.97	27	0.01
	Lower achiever	13	13.54	9.56			
Control group	Higher Achiever	15	35.24	9.56			
	Low achiever	13	34.64	6.37	0.37		0.31

It can be observed from the above table that the mean post-test scores of high and low achievers of the two groups (experimental) using t-test indicates the t= 6.9, p< 0.05for the experimental group with 27 as the degree of freedom at alpha level of 0.05. Hence, it is statistically significant. Also the same table showed t=0.37, p>0.05 for the control group with 27 as the degree of freedom at alpha level of 0.05. Hence, it is statistically insignificant. In view of this, the null hypothesis 2 was rejected. This shows that there is significant difference in the scores of high and low achievers of both the experimental and control groups respectively.

Discussion

H_1: Based on the post-test score, in table 2 students in the experimental group performed better than those in the control group. This is in support of the findings of Adedeji (2013) who investigated pupils' performance in Mathematics by comparing peer tutoring and the conventional method of teaching. At the end of the study, it was found by the researcher that those that were exposed to peer tutoring had a better mean achievement score than their counterparts that were exposed to the conventional method. Such an improved performance may be attributed to the interactive nature of the strategy and its potential benefits in knowledge in knowledge construction among learners.

Also, the findings is in conformity with Bowman (2009) who carried out an investigation on the effectiveness of peer tutoring on students emotional and behavioural disorders. The findings of Bowman revealed that peer tutoring as a strategy enhances students' learning performance, at the same time stabilizes their emotional and behavioural disorders. Similarly, the finding is in consonance with Oviawe, Ezeji and Uwameiye (2015) who investigated the Comparative effects of three instructional methods on students' performance in building technology in Nigerian polytechnics. The outcome of the study revealed that students who were taught using peer tutoring had better scores than their counterparts that were exposed to other methods of instruction. Conversely the finding negates the outcome of the study that was carried out by Ajewole (2000) on relative effectiveness of peer tutoring and concept mapping in micro economics. According to his findings, students that were exposed to concept mapping performed significantly better in the mean adherent test than those that were exposed to peer tutoring. Similarly, the study is in line with Turkey Alzahrani & Melinda Leko (2018) who found out that peer tutoring instructional strategy assisted in improving reading and comprehension skills among secondary school students with disabilities.

CONCLUSION AND RECOMMENDATIONS

Conclusions

Based on the result of the findings, the researcher concludes that peer tutoring strategy is superior to the conventional method of teaching as it enhances students' academic performance in Biology via peer interaction and discussion. Moreover, when students are exposed to peer tutoring though peer discussion, interaction, asking and answering of questions among themselves, concepts are more lucidly and appropriately internalized. This also improves their learning confidence, critical thinking, knowledge construction and most importantly, internalization of conceptual facts.

RECOMMENDATION

In view of the above findings, the researcher recommends that

1. Peer tutoring should be more encouraged and supported in teaching and learning of subjects at senior secondary schools.
2. Conferences, seminars and workshops should be organized and sponsored by government for teachers on how to use the strategy effectively.
3. Government and her agencies should intensify efforts in providing adequate and enabling, environment that will enhance and foster the use of peer tutoring.

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