



## EFFECTS OF PEER TUTORING STRATEGY ON STUDENTS' PERFORMANCE IN BASIC SCIENCE IN DEKINA LOCAL GOVERNMENT AREA OF KOGI STATE

<sup>1</sup>Negedu Simon Adekali, <sup>2</sup>Alafiatayo Bunmi Mercy and <sup>3</sup>Dauda Nana Oziehisia

<sup>1</sup>Department of Science Education, Prince Abubakar Audu University, PMB 1008, Anyigba

<sup>2</sup>Department of Biology, Federal College of Education, Zaria.

<sup>3</sup>Department of Biology, Federal College of Education, Zaria.

[Simonnegedu333@gmail.com](mailto:Simonnegedu333@gmail.com), [bumercyalafiatayo@gmail.com](mailto:bumercyalafiatayo@gmail.com), [ndoziehisia@gmail.com](mailto:ndoziehisia@gmail.com).

### Abstract

*The study ascertained the effects of peer tutoring teaching strategy on students' performance in Basic Science in Dekina Local Government Area of Kogi State. Two objectives, two research questions and two hypotheses guided the study. The design adopted for this study was a pretest posttest non-randomised quasi-experimental design. The population of this study comprised 3,240 JSS II students in the area of the study. 162 (88 male and 74 female) JSS II students were drawn by purposive sampling technique from two co-educational secondary schools in Dekina Local Government Area. The instrument for data collection was Basic Science Performance Test (BSPT). Kuder-Richardson formula ( $k-R-20$ ) was used to determine the reliability coefficient index for BSAT which was 0.80. After administering the instruments, data were collected. Mean and standard deviation were used to answer the research questions while Analysis of Covariance (ANCOVA) was used to test the hypotheses at 0.05 level of significance. The results of the study revealed that students taught basic science using peer tutoring strategy did significantly better in performance than those taught using conventional method. The result also revealed that there was no significant difference between the academic performance scores of male and female students taught Basic Science using peer tutoring strategy. Based on the findings, it was recommended among other things that Basic Science teachers should use interactive strategies such as peer tutoring strategy to teach basic science in order to improve students' academic performance.*

**Keywords:** Peer tutoring teaching strategy, Academic Performance, Basic science, Gender

### Introduction

The act of teaching may be traced back to our traditional culture, where everyone was involved in some form of education. That is, a person teaches when he or she influences facts and information, cultivates habits, instructs in skill development, develops capacities, and awakens people's interest. Olinya (2017) defined teaching as an articulated attempt by the teacher to help students acquire skills, attitude, knowledge, idea to better their worth in life. That means, teachers' task is to create or influence desirable positive changes in

behavior and academic achievement of the students. In view of this, success of any teaching is measured by the degree to which the teacher is able to achieve the desired academic results. Thus act of teaching is the only way to drive home the aims and objectives of science education in Nigeria, through different instructional methods of teaching adopted by science teachers.

To attain the noble goals of teaching as contained in the National Policy on Education, science teachers needs to adopt certain techniques and teaching approaches in

science and science related subjects. Such approaches include: lecture method, demonstration, peer tutoring strategy, laboratory method and field trip discussion. All these are in attempt to enhance students' academic achievement in science education Federal Government of Nigeria of Education (FGN, 2014). Also, the learning environment in the 21<sup>st</sup> century is becoming challenging in view of prevailing insecurity. The onus is on nations across the globe to resort to providing learning environment that will be suitable for learning especially science subjects such as basic science. Such learning environment should equip both teachers and learner to employ non-conventional strategies to science teaching such as virtual laboratories, peer tutor teaching, and use of new technologies that will help both teachers and learners with minimal hazards or danger to lives and properties and efficiency in teaching and learning science subjects (United States Agency for International Development, 2019).

Peer tutoring teaching strategy refers to teaching strategy that allows a teacher after teaching topic to group learners to ensure that the brighter students teach their counterpart who may be slow in learning (Rohrbeck, Ginsburg, Fontuzzo & Miller, 2013). According to Golding, Lisa and Veniesa (2016) peer tutoring strategy is the process by which a pupil, with guidance from a teacher, helps in teaching one or more classmate to learn a skill or concept. This means that this approach focuses on peers to solve a problem, and is most effective in fostering creativity, experimentation, problem-solving skills and the learning of deep concepts (Cohen, Kulik & Kulik, 2012).

Nathern and Liz (2019) noted that peer tutoring strategy gives teachers the capability to accommodate a classroom of diverse learners to improve academic achievement across ability levels and content areas. Similarly, Miller and Miller (2015) posit that peer tutoring strategy is an economically and educationally effective intervention for slow learners and great achievers that can benefit both the tutor and tutee socially and educationally by motivating them to learn. It means that when peer tutoring is carefully used by a teacher, the interaction among individual and group in the classroom will deepen the understanding of scientific concepts especially in basic science which is a foundation subject among students (Spencer, 2016; Smith, 2018).

Basic science refers to the combination of subjects such as chemistry, biology, physics and mathematics with aim of teaching science from a unified approach. General science was taught in primary schools and replaced by elementary science in Nigeria in the 19<sup>th</sup> century following the adoption of National Policy on Education in 1977, elementary science was changed to integrated science. Educational reforms in Nigeria education system in early 2000 resulted into reviewing of 6-3-3-4 system of education to 6-9-3. This brought about some notable changes in several subjects' curriculum such as the integrated science curriculum which was changed to basic science to broaden the objective and scope of the subject (FGN, 2014). The subject was structured to assist learners to develop interest in science and technology. The subject basic science was intended to lay a foundation for science and technology education by the end of the junior



secondary school, presently known as basic 9 as spelt out in basic science curriculum (Adeniyi, 2012; Obioma, 2012). It is worthy of note that the followings are the objectives of the Basic Science curriculum. To help learners (i) acquire knowledge in Basic Science (ii) develop adequate laboratory and field skills in Basic Science, (iii) develop ability to apply scientific knowledge to everyday life in matters of personal and community health and agriculture and (iv) reasonable and functional scientific attitude.

The framework of the New Basic Education Curriculum according to Adeniyi (2012) reflects the following: Gender entails the division of people into two categories, “men” and “women. Webster, 2019). Gender from the above, is the societal meaning assigned to male and female with a particular role that each should play. This is verifiable because, there is a general belief among Nigerians that males are superior to females in terms of physical physique, cognition, logical reasoning and even superior in academic achievement (Anigbogu, 2019). In Nigeria, also, it is believed that science subjects like physics, mathematics, chemistry and biology are male dominated subjects (Anigbogu, 2019). While others have a counter opinion for instance, Nworgu (2016) was neutral in his view as regard gender differentiation in some of the science courses. Consequently, gender differentiations that exist in some science related subjects, which lead to variation in academic achievement of male and female students remain an issue of concern to researchers. Nevertheless, there are probably hundreds of factors that can affect academic achievements of students independent of gender. Such factors include the following:

social, economic, medical/health, familial, relationships between teachers and students and school expectation.

Basic science is the bedrock for many science courses such as medicine, pharmacy, nursing, biochemistry, genetic, agriculture among others. This account for the high enrolment of students in the Junior School Certificate Examination (JSCE). In spite of the high number of students’ enrolment in basic science in Junior School Certificate Examination, studies by (Adeyemi and Ajibade, 2018 and Chief Examiner’s Report, 2021) have shown that students’ achievement in basic science in the external examinations is poor. The poor achievement of students in basic science in external examination is linked to the use of traditional method (lecture method) in teaching secondary school basic science (Adeniyi, 2012). The traditional/conventional teaching methods often used by teachers in teaching basic science include the lecture method, demonstration and direct instruction. These traditional methods of teaching stress more of the roles of the teacher than learner during science lesson. As a result, the use of traditional method does not encourage science process skill acquisition needed for proper understanding of science principles, concepts and facts. The inadequacy of traditional teaching methods necessitated this study which is set to determine peer tutoring method effect on students’ performance in Basic Science in Dekina Local Government Area of Kogi State, Nigeria.

### **Purpose of the Study**

The study was guided by the following objectives.

1. To determine the academic performance scores of students taught basic science using peer tutor teaching strategy and conventional strategy.
2. To determine the differences between the performance scores of male and female students taught Basic Science using peer tutoring strategy.

### **Research Questions**

This study was guided by the following research questions.

1. What are the effects of using peer to peer tutoring strategy and conventional strategy on students mean performance scores in Basic Science?
2. What is the effect of peer to peer tutoring strategy and conventional strategy on mean performance scores of male and female students in Basic Science?

### **Hypotheses**

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

**H0<sub>1</sub>:** There is no significant difference between the mean performance scores of student taught basic science with peer tutoring strategy and those taught with lecture strategy.

**H0<sub>2</sub>:** There is no significant difference between the mean performance scores of male and female students taught basic science using peer tutoring strategy.

### **Methodology**

The design adopted for this study was Quasi-experimental design. Because it involves the administration of pre-test and post-test to respondent in their intact classes. The study was conducted in Dekina Local Government Area of Kogi state. The area is made up of

numbers of town and villages such as Ologba, Ulaja, Birdu, Agala, Egume. Educationally, the area has about sixty-three (63) public and private secondary schools where basic science is taught as a subject at junior secondary schools.

The population of the study was made up of all Junior Secondary School two (JSS II) students in Dekina Local Government Area of Kogi state. That is, 3,240 JSSII students on the whole make up the population of the study (Post Primary School Service Commission, 2020). Purposive sampling technique was used to select 162 students in their intact classes from junior secondary school two (JSSII) from two co-educational secondary schools in Dekina Local Government Area. The two schools were grouped into experimental school and control schools. Two classes each of Junior Secondary School (JSSII) were selected by simple random sampling from both experimental and control schools for the study.

The instrument for collecting data for the study was Basic Science Performance Test (BSPT). The BSPT was a twenty (20) item multiple choice questions which was developed by the researcher from the Basic Science content areas (man and his environment, and interaction between man his environment) covering junior senior secondary Basic Science Curriculum from JSS I to JSS 2. The instrument has options A-D for each of the item. The items were drawn from selected topics in basic science Basic Science curriculum. Two marks were awarded for each of the BSAT questions. The BSAT was face validated by three (3) research



experts in Science Education Department, Prince Abubakar Audu University, Anyigba.

The trial testing of the instrument BSAT was carried out by the researcher using 30 JSS II students from one co-educational school outside the area of study in Ankpa Local Government Area of Kogi state. The data collected from the trial testing of BSAT was used to determine the reliability coefficient of the instruments using Kuder-Richardsons 20 (K-R<sub>20</sub>) formula which was 0.80. Research assistants in the two schools were trained for two days on how to use lesson plan for experimental and control groups to teach three selected topics (balanced diet, waste disposal, pollution and energy) in Basic Science curriculum. Pretest was administered before treatment which involved research assistants. This was followed by three weeks of teaching using lesson plan on peer tutoring instructional strategy for experimental school and lesson plan on conventional teaching method in control school respectively. Posttest was administered to students after

three weeks of teaching in both experimental and control schools. The data obtained from the pre-test and post-test scores were analyzed. Mean and standard deviation were used to answer the research questions while Analysis of Covariance (ANCOVA) was used to test the hypotheses at 0.05 level of significance. The justification for the use of ANCOVA is due to control extraneous variables of non-equivalent subjects as intact classes were used in the study.

**Results**

Results obtained from that data are discussed as follows. The results were based on the data analyzed. Mean and standard deviation were used to answer the research questions while hypo theses were tested using analysis of covariance.

**Research Question One**

What is the difference in the mean performance scores of students taught basic science using peer tutoring strategy and those taught using conventional strategy?

**Table 1:** Mean Performance Scores of Students Taught Basic Science Using Peer Tutoring Strategy and Conventional Strategy

Group	Sample (n)	Pretest		Posttest		Mean gain
		Mean	Std. D.	Mean	Std. D.	
Peer Tutoring	84	7.94	1.56	23.21	0.99	<b>15.27</b>
Conventional	78	6.94	1.55	10.83	1.62	<b>3.89</b>
<b>Mean Difference</b>		<b>1.00</b>		<b>12.38</b>		<b>11.38</b>
<b>Total</b>	<b>162</b>					

Table 1 shows that the mean performance scores of students taught Basic Science using peer tutoring strategy was 7.94 with standard deviation of 1.56 at pre-test. It also shows mean

value of 23.21 with standard deviation of 0.99 in the post-test. The mean performance of students taught Basic Science using conventional method was 6.94 with standard

deviation of 1.55 during pre-test. It also shows mean value of 10.83 with standard deviation of 1.62 in post-test. Table 2 also revealed that the mean gain of students taught Basic Science using peer tutoring was **15.27**, while those taught using conventional strategy had a mean gain of **3.89**. The mean difference between the

two teaching methods was **11.38** in favour of peer tutoring.

### Research Question Two

What is the difference in the mean achievement scores of male and female students taught biology using peer tutoring strategy?

**Table 2:** Mean Performance Scores of Male and Female Students Taught Basic Science Using Peer Tutoring Strategy

Gender	Sample (n)	Pretest		Posttest		Mean gain
		Mean	Std. D.	Mean	Std. D.	
Male	48	8.00	1.56	23.27	0.57	<b>15.27</b>
Female	35	7.97	1.44	23.09	1.36	<b>15.12</b>
<b>Mean Difference</b>		<b>0.03</b>		<b>0.18</b>		<b>0.15</b>
<b>Total</b>	<b>73</b>					

Table 2 shows that for the experimental group, the mean performance scores of male students was 8.00 with standard deviation of 1.56 at pre-test. It also shows mean value of 23.27 with standard deviation of 0.57 in post-test. Table 2 also indicates that the mean academic performance scores of female taught Basic Science using peer tutoring was 7.97 with standard deviation of 1.44 at pre-test. It also shows mean value of 23.09 with standard deviation of 1.36 in post-test. The mean gain of

male students taught was 15.27, while that of female students was 15.12. The mean difference male and female was 0.15 in favour of male students.

### Test of Hypotheses

#### Hypothesis One

There is no significant difference between the mean performance scores of students taught basic science using peer tutoring strategy and those taught with conventional method.

**Table 3:** Analysis of Covariance of the Effect of Peer Tutoring and Conventional Teaching Strategies on Students' Performance in Basic Science

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	6146.504 <sup>a</sup>	2	3073.252	1761.037	.000	.957
Intercept	2028.096	1	2028.096	1162.141	.000	.880
Pretest	4.017	1	4.017	2.302	.131	.014
<b>Strategy</b>	<b>5583.118</b>	<b>1</b>	<b>5583.118</b>	<b>3199.243</b>	<b>.000</b>	<b>.953</b>
Error	275.732	158	1.745			
Total	54080.000	161				
Corrected Total	6422.236	160				



The analysis of data in Table 3 shows that the probability value associated with the calculated value of F (3199.243) for the effect of strategy on the performance of students in Basic Science is 0.000. Since this value (0.000) is less than the 0.05 level of significance, the null hypothesis is rejected. Hence there is a significant difference in the mean performance scores of students taught Basic Science using peer tutoring strategy and

those taught using conventional strategy in favour of the students taught Basic Science using peer tutoring strategy.

**Hypothesis Two**

There is no significant difference between the mean scores of performance male and female students taught basic science using peer tutoring strategy.

**Table 4:** Analysis of Covariance on Effect of Peer Tutoring Strategy on Male and Female Students in Basic Science

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	1.896 <sup>a</sup>	2	.948	.985	.378	.024
Intercept	1589.107	1	1589.107	1650.603	.000	.954
Pretest	1.203	1	1.203	1.249	.267	.015
<b>Gender</b>	<b>.711</b>	<b>1</b>	<b>.711</b>	<b>.738</b>	<b>.393</b>	<b>.009</b>
Error	77.019	80	.963			
Total	44725.000	83				
Corrected Total	78.916	82				

Table 4 shows that the probability value of F (0.738) on the effect of peer tutoring on students’ performance based on gender is greater than 0.05 level of significance, the null hypothesis is therefore, not rejected. Thus, there is no significant difference between the mean performance scores of male and female students taught Basic Science using peer tutoring strategy.

**Discussion of Findings**

The result of this study has shown that students taught Basic Science using peer tutoring strategy significantly achieved better in the BSAT than those taught basic science using conventional method. The result of those taught Basic Science using peer tutoring at posttest level had the highest mean performance score of 23.21 while the

conventional method had the least mean achievement score of 10.83. This result shows that students score at large extent depend on instructional teaching method applied by basic science teachers. Therefore, the finding of this study concord with the findings of Nathern and Liz (2019), Fakiye (2021) who found out that students exposed to peer tutoring instructional strategy had higher scores and performed significantly better than those exposed to the conventional strategy.

The study also revealed that there was no significant difference between male and female students’ performance in Basic Science when taught using peer tutoring. This result is in agreement with the findings of Tubonemi and Martha (2021) who find out in their research that there is no significant difference in the achievement of male and female students

who were taught Basic Science using peer tutoring strategy. On the contrary, the findings disagree with findings by Greenwood, Carta and Hall (2012) which noted that male students achieve better than female students in another science subject such as Biology. The implication of the findings of this study is that peer tutoring is an effective teaching strategy that is capable of enhancing students' performance in Basic Science as well as bridging the gender gap in students' performance in the subject.

### Conclusion

The growing concern in the educational sector is the need for teachers to deploy teaching strategies facilitate teaching and learning in science subjects. Thus, the results of the study have revealed that the use of peer tutoring strategy in teaching fostered students' achievement in basic science than conventional method. Secondly, the study also revealed that no gender disparity was found among male and female students taught Basic Science using peer tutoring strategy.

### Recommendations

Based on the findings in the study, the following recommendation were made

1. Basic Science teachers should use more of interactive strategies such as peer tutoring strategy in teaching to improve students' performance in Basic Science.
2. Government at all levels should in providing funds to enable teachers undergo professional training through organizing workshops and seminars centered on the use of peer tutoring teaching strategy to promote science teaching.
3. There should be more collaboration among science educators, curriculum reviewers and

planners in modifying existing Basic Science curriculum to accommodate content that focuses on peer tutoring strategy and all gender friendly learning materials.

### References

- Adeniyi, E.O. (2012). *9 – Year basic science and technology curriculum*. Abuja. Curriculum Development Centre, NERDC.
- Adeyemi, S. O. & Ajibade, I. A. (2018). A comparison of students' achievement and attitudes between constructivist and traditional classroom environment in Thailand vocational electronic programs. *Journal of Vocational Education Research*, 29(2), 1-10.
- Anigbogu, M.A. (2019). Educating the girl child. Psychology News 1(3). *Journal of Educational Psychology*, 73(2), 267-290
- Chief examiner report (2021). WAEC: *Why students perform poorly*. Retrieved on 10<sup>th</sup> July 2012 from [www.Thisdaylive.com](http://www.Thisdaylive.com)
- Cohen P.A; Kulik, J.A. & Kulik C.C. (2012). Education outcomes of tutoring: A meta-analysis of finding. *American Educational Research Journal*, 19(2), 237-248
- Fakiye O.K (2021). Effect of peer tutoring on students' achievement in Biology in secondary schools in Nigeria. *International Journal of Innovation and Research in Educational Sciences Volume*, 5(1), 2349–5219.
- Federal Government of Nigeria (FGN, 2014). *National Policy on Education*. Abuja: NERDC Press.





- Golding, S, Lisa. F., & Veniesa, T. (2016). Effect of peer tutoring attitude and personality on academic performance of first year introductory programming students. *Jamaica: Taylor and Francis Ltd.*
- Graesser, A.C., Person, N.K. & Magliano, J.P. (2015). Collaborative dialogue patterns in naturalistic one-on-one tutoring. *Applied Cognitive Psychology*, 9, 359-387
- Greenwood, C.R, Carta, J.J. & Hall, V. (2012). The use of peer tutoring strategies in classroom management and Education Institution. *School Psychology Review*, 17(2), 258-275.
- Idoko, A.I. (2015). Evaluation of the implementation of the primary education science core curriculum. Unpublished PhD Thesis, University of Nigeria, Nsukka
- Jekayinfa, A.A. & Kolawole, D.O. (2018). *Perspectives on history of education in Nigeria*. Retrieved on January 2012 from [www.unilorin.edu.ng/publications/jekayinoluwa/JAMBANDNABTEB.doc](http://www.unilorin.edu.ng/publications/jekayinoluwa/JAMBANDNABTEB.doc).
- Miller, S.R. & Miller P.F. (2015). Cross-age Peer Tutoring: A strategy for promoting self-determination in students with severe emotional disabilities/ behavoiur disorder. *Preventing School Failure*, 39(4), 32-38
- Nathern S.A & Liz Shelly (2019). The effect of peer tutoring on academic performance of students with disabilities in grades 6 through 12. Accused at <http://rse-sagepub.com/content/early>
- Nworgu, B.G. (2016). *Educational research, basic issues and methodology*. Ibadan: Wisdom Publishers Limited
- Obioma, G. (2012). Reform in the Nigerian 9year Education Curriculum: Implications for school based assessment. A Paper presented at the 38th Annual Conference of the International Association of Educational Assessment at Astana, Kazakhstan.
- Olinya N. (2017). Effect of Inquiry Method on Students Interest in Computer. *Journal of Science Teacher Today*, 3(1), 17-20
- Post Primary Schools Service Commission (2020). *School Enrollment by Class and sex*. Kogi State Ministry of Education. Lokoja: University Press.
- Rohrbeck, C.A.; Ginsburg, B; Fantuzzo, J.W. & Miller, W. (2013). Effects of reciprocal peer tutoring on academic achievement and psychologist adjustment: A component analysis. *Journal of Education Psychology*, 8(2), 173-177
- Smith, K. (2018). Peer Tutoring: A proactive international for the classroom. [www.cend.umn.edu/ceed/publications/tipsheets/preschoolbehaviortipsheets/peertutor.pdf](http://www.cend.umn.edu/ceed/publications/tipsheets/preschoolbehaviortipsheets/peertutor.pdf)
- Spencer, V. G. (2016). Peer tutoring and students with emotional or behavioral disorders: review of the literature. *Behavioral Disorders*, 31(2), 204-222.
- Sternberg, R.J. (1988). *The triarchic mind: A new theory of human intelligence*. New York: Viking
- Tubonemi, W.U. & Martha E.R (2021). Effects of field trip and demonstration methods of teaching on students' achievement in Biology. *A Journal Education Research and Development*, 2(4), 124-128.

United States Agency for International Development (2019). Peer tutoring makes a difference in Benin. Retrieved June 6, 2022 from [www.usaid.gov/stories/benin/cs-benin-peertutoring.html](http://www.usaid.gov/stories/benin/cs-benin-peertutoring.html).

Webster, M. (2019). *Pandemic*. Retrieved May 6, 2022 from <https://www.merriamwebster.com/dictionary/pandemic>