



EFFECT OF PEER TUTORING STRATEGY ON STUDENTS' INTEREST IN BASIC SCIENCE AND TECHNOLOGY IN ABUJA METROPOLIS, NIGERIA

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ABSTRACT

This study investigated the effect of peer tutoring strategy on students' interest in Basic Science and Technology in Abuja Metropolis, Nigeria. The study answered two research questions and tested two null hypotheses. A non-randomised pretest posttest control group quasi experimental design was adopted. Basic Science Interest Scale (BSIS) was developed and administered to 420 sample from 15150 population of Basic II students using multistage sampling techniques. The scale was validated by five experts in Science Education from Joseph Sarwuan Tarka University, Makurdi, Benue State. Reliability coefficient of the interest scale was 0.80 using Cronbach Alpha formula. Experimental group was taught using peer tutoring strategy while the control group was taught using conventional teaching method. Research questions were answered descriptively using mean and standard deviation while null hypotheses were tested at 0.05 level of significant using ANCOVA. Results revealed significant differences in the interest ratings of students taught using peer tutoring strategy and their counter parts taught using conventional method of teaching. The study further revealed significant differences in the interest ratings of male and female students exposed to peer tutoring strategy. Based on the findings, the study concluded that peer tutoring strategy is an effective approach in teaching Basic Science and Technology at Basic Education level. It was recommended that peer tutoring strategy is an effective approach, therefore it should be deployed for the teaching of Basic Science and Technology.

Key Words: Peer tutoring Strategy, Conventional Strategy, Interest, Basic Science and Technology

Introduction

Science and Technology have become critical factors for sustainable development worldwide. For every developing nation to attain and sustain any national development, a well-planned and implemented science and technology education remains the only

essential tool for her national development. Nations all over the world today are striving hard to develop their science and technology because these contributes significantly to the quality of life in many areas of health, agriculture, education, communication, energy and transportation, among others. In fact,

nations that are said to be developed or civilized today have achieved that through deliberate efforts at developing their science and technology (Adejoh & Ekele, 2014). Adejoh and Ekele (2014) reported that individuals who acquire scientific and technological literacy tend to think rationally and innovatively thus enabling them to conduct themselves within the global acceptable standard. It is against this background that the Federal Republic of Nigeria in her National Policy on Education (FRN, 2014) emphasized the teaching and learning of science at all levels of educational system in the country.

In Nigeria today, the teaching of science in secondary schools is in two categories; Basic science in the Junior Secondary School and distinctive science subjects like Biology, Chemistry, Physics, Agriculture and Geography at senior secondary school. Ato (2016) emphasize the need for continuity and smooth sail through the tide of science course and this has made our policy makers and curriculum experts to make Basic science a core and compulsory subject at the Junior Secondary School level. By this arrangement, it is required that all the Junior Secondary School students have to pass Basic Science and Technology at credit level at the Basic Education Certificate Examination (BECE) before they are allowed to proceed to Senior Secondary 1 (SS1) especially those who would want to offer sciences.

Basic Science and Technology is the subject which exposes children in primary schools to learn and understand their environment, observe and explore the world around them. Nigerian Educational Research and Development Council (NERDC, 2012) affirms

that Basic Science and Technology curriculum is a product of the restricting and the integration for primary and junior secondary school (JSS) science curricula namely; Basic Science and Technology, Physical and Health Education and Information Communication Technology (ICT).

Science is concerned with finding out about things in the environment using apparatus of observation and experimentation as well as helping students to experience the richness and excitement of the natural environment (Okechukwu & Opara, 2021). Science has two major components, which are science process skills and science content. The content is the knowledge we accumulate about the environment such as facts, principles, concepts, theories and laws; while the science process skills include; observing, measuring, inferencing, classifying, predicting, communicating, experimenting, hypothesing, interpreting, experimenting, and defining among others. The objectives of teaching science as stipulated by the National Policy on Education (FGN, 2014) are to:

cultivate inquiry, knowing and rational mind for the conduct of good life and democracy, produce service studies in technological development, produce scientists for national development and provide knowledge and understanding of the complexity of the physical world, the forms and conduct of life.

As important as these objectives are, they have been hardly achieved in the Nigerian schools and colleges. This is because of a lot of challenges such as poor foundation/background of students in science, inadequate resources, poor implementation of educational policies, the use of archaic



teaching methods and strategies, among others which largely results into lack of interest by students in science classes/lessons have been identified by researchers as impediment/factors for the effective teaching and learning of science (Eriba, 2017).

Interest is a feeling of intentness concern or curiosity about an object. It is also regarded as the condition of wanting to know or learn about some object. It could be qualities which arouse concern or curiosity which holds a child's attention on an object. Interest is a very strong factor in the teaching and learning of sciences. The degree and direction of attitude towards sciences are largely determined by the kind of interest developed by students for sciences. Sambo, Ikuwi, Mohamadu and Eggari (2014) however laments that there is a low interest among students in the study of Science related discipline (chemistry, physics, biology) at all levels of education in Nigeria. That is, students dislike and/or hate science and absent themselves from science lessons. This means that there is nothing that can be done to him/her to pay attention to such subjects. This is one of the causes of failure in the subject. Loss of interest is one of the principal causes of students' failure in Science.

In order that learners should have interest in class activities, appropriate teaching strategy should be put in place to develop and enhance educational success, because students learn better in subjects they have interest in. Sambo, Ikuwi, Mohamadu and Eggari (2014) blamed the lack of students' interest in Science (including Basic Science and Technology) on poor teaching method employed by most teachers. The curiosity and interest of students manifest in their performance. The authors

reiterated that students whose interest had not been developed do not have the zeal to attend classes regularly. Even when they attend classes, they do not listen attentively neither do they do their class work because they do not have interest in learning the subject being presented to them.

The learners' interest is a fundamental factor in inculcating the right knowledge, skills, value and attitudes that the curriculum seeks to attain. Therefore, interest is an important aspect of the learning process. Interest helps in sustaining concentration, purpose, commitment and cooperation with the teacher in the learning process. According to Ardodo and Gboro (2012), interest in science possesses the strongest strength for predicting performance. Teachers' use of good innovative methods could stimulate students' interest in their attempt to make the learning of Basic Science and Technology more meaningful to learners. Okechukwu, Obiebere and Opara (2021) reported that interest is the key to educational success because learners learn better in subjects they have some interest. Generally, if one has interest in something, one will want to learn or hear more about it and will take pleasure in doing it (Anekwe, 2012). Interest is the tendency to seek and participate in certain activities. Anekwe (2012) stated that interest can be seen as the feeling one has in the course of wanting to know or learn more about somebody or something. Anekwe (2012) and Obiekwe (2013) provided evidence that many students tend to lose interest in science over the course of time. Though all subjects suffer from a steady decline in interest, only Science and Mathematics remained in decline when the intrinsic worth is considered. This being the case, it is very necessary for Nigerian science

educationist to device ways of developing and sustaining students' interest in Basic Science and Technology through appropriate teaching strategy such as peer tutoring. Peer tutoring remains one of the methods of instruction that involves a student teaching other students. 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 results 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 (Basic 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 programme under the control of trained, efficient and effective teachers, peer tutoring has all it takes to enhance learners' interest. However, from the literature available to the researchers, studies on the effect of peer tutoring on students' interest in Basic Science and Technology are scarce. Consequently, this study investigated the effect of peer tutoring on students' interest in Basic Science and Technology among Basic Science and Technology students in Abuja metropolis, Nigeria.

Statement of the Problem

The cardinal objective of any teaching and learning process is to ensure that the learner is able to carry out a specific task and if possible utilize (transfer) the knowledge in solving a problem in a new situation. It is unfortunate

that these objectives are hardly realized over the years. The rate of failure in both local and external examination in Sciences in recent times is alarming (WAEC Chief Examiner's Report, 2021). This ugly development might have been the result of poor foundation of students laid in Basic Science and Technology at the Basic school level and this may also not be unconnected to the teaching strategy used by the teachers, because a good learning is a product of good teaching strategy. The persistent lack of interest in Basic Science and Technology by the students leaves no doubt about the possibility of ineffectiveness of the teaching strategy used by the teachers in teaching this subject, hence peer tutoring may be a vital strategy for teaching of Basic Science and Technology. Specifically, the problem investigated by this study was: what is the effect of peer tutoring on students' interest in Basic Science and Technology among Basic Science and Technology students in Abuja metropolis, Nigeria?

Objectives of the Study

The purpose of this study was to determine the effect of peer tutoring strategy on students' interest in Basic Science and Technology in Abuja Metropolis. Specifically, the study sought to:

- i. determine if the use of peer tutoring strategy enhances students' interest in Basic Science and Technology.
- ii. find out whether the use of peer tutoring strategy enhances male and female students' interest in Basic Science and Technology.



Research Questions

These research questions guided the study;

- i. What are the mean interest ratings of students taught Basic Science and Technology using peer tutoring strategy and those taught with conventional teaching strategy?
- ii. What are the mean interest ratings of male and female students taught Basic Science and Technology using peer tutoring teaching strategy?

Hypotheses

The following null hypotheses were tested at 0.05 level of significance

HO₁: There is no significant difference between the mean interest ratings of students taught Basic Science and Technology with peer tutoring strategy and those taught using conventional teaching strategy

HO₂: There is no significant difference between the mean interest ratings of male and female students taught Basic Science and Technology with peer tutoring teaching strategy.

Methodology

The study adopted a quasi-experimental design of non-equivalent group. Specifically, the study adopted a non-randomised pre-test, post-test control group design. This design is selected because the subjects were not randomized as this would disrupt the normal classroom organization of the schools. The study used intact classes. Hence, intact classes of students were randomly assigned to the experimental and control groups. The target population comprised 15 150 Upper Basic II students in public Basic Schools in FCT Abuja,

this population is from 194 public upper basic schools.

The sample size for the study is 420 Upper Basic science students selected from public Junior Secondary Schools for the study. The experimental group had 210 students (115 male and 95 female) and the control group had 210 students (120 male and 90 female). The sample size was determined using Taro Yamene formula. Multi-stage sampling technique was used to select the sample. One Area council each was selected from the three educational zones using random sampling technique of balloting. Purposive random sampling technique was used in the selection of co-educational schools (two schools for experimental group and two other schools for control group) from the three educational zones. The instrument used to collect data was Basic Science Interest Scale (BSIS) developed by the researchers. The instrument consisted of 15 items constructed on 4-point Likert-like scale of strongly agreed (SA= 4 point), agreed (A= 3 point), disagreed (D = 2point) and strongly disagreed (SD =1 point) and in reverse order for negative items. The data were collected with the help of trained research assistants (Basic Science teachers from the sampled schools). The pre-interest ratings were obtained before experimental treatment that lasted for four weeks after which the instrument was administered again to get post-interest ratings. Mean and standard deviation was used to answer research questions. Analysis of Covariance (ANCOVA) was used to test the hypotheses at 0.05 alpha level of significance due to the use of intact classes.

Results

Research Question One

What is the difference between the mean interest ratings of students taught Basic Science

and Technology using peer tutoring strategy and those taught with conventional teaching strategy?

Table 1: Mean Interest Ratings and Standard Deviation of Students Taught Basic Science and Technology with Peer Tutoring Strategy and Conventional Strategy

Groups	N	Pre-interest		Post-interest		Mean Gain
		\bar{x}	SD	\bar{x}	SD	
Experimental Group	210	40.88	7.25	52.56	6.43	11.68
Control Group	210	37.94	4.38	40.49	4.45	2.55
Mean Difference		2.94		12.07		9.13
N Total	420					

Results in Table 1 shows that, the mean pre-interest scores of students taught Basic Science and Technology using peer tutoring strategy was 40.38 with standard deviation of 7.25 while that of the students taught Basic Science and Technology using the conventional strategy was 37.94 with a standard deviation of 5.82. However, the mean post-interest scores for the experimental group was 52.56 with standard deviation of 6.43 while the mean post-interest scores for the conventional method group was 40.49 with standard deviation of 4.45. The mean gain for the experimental and control group is 11.68

and 2.55 respectively. However, the mean difference between the experimental and control group was found to be 9.13. This shows that, the students in the experimental group showed higher level of interest in Basic Science and Technology compared to the students in the control group.

Research Question Two

What is the difference between the mean interest ratings of male and female students taught Basic Science and Technology using peer tutoring teaching strategy?

Table 2: Mean Interest Scores and Standard Deviation of Male and Female Students Taught Basic Science and Technology Using Peer Tutoring Strategy

Gender	N	Pre-Interest		Post-Interest		Mean Gain
		\bar{x}	SD	\bar{x}	SD	
Male	115	38.18	6.30	45.65	8.41	7.47
Female	95	40.97	5.62	47.63	7.78	6.66
Mean Difference		2.79		1.98		0.81
N Total	210					



Results in Table 2 shows that the mean interest rating of the male and female students in the peer tutoring strategy group was 45.65 and 47.63 with standard deviation 8.41 and 7.78 respectively. The mean gain for the male and female students was 7.47 and 6.66 respectively. The mean difference between the male and the female students was 0.81. This result implies that there is no much difference between the male and female students' mean interest rating in Basic Science and

Technology when taught with the peer tutoring strategy.

Hypothesis One

There is no significant difference between the mean interest ratings of students taught Basic Science and Technology with peer tutoring strategy and those taught using conventional teaching strategy

Table 3: Summary of ANCOVA Result of Students' Interest on Experimental and Control Groups

Source	Type III Sum of squares	df	Mean Square	F	Sig.
Corrected Model	17371.351 ^a	2	8685.675	338.011	.000
Intercept	9607.469	1	9607.469	373.883	.000
Pre_Interest	2058.741	1	2058.741	80.118	.000
Group	11952.146	1	11952.146	465.129	.000
Error	10715.411	417	25.696		
Total	937162.000	420			
Corrected Total	285086.762	419			

R Squared = .618 (Adjusted R Squared = .617)

From Table 3, the p-value for groups is 0.000. Hence $p < 0.05$ and the null hypothesis is rejected. This implies that there is a significant difference between the mean interest ratings of students taught Basic Science and Technology with peer tutoring strategy and those taught using the conventional teaching strategy. This means that students who were exposed to peer tutoring strategy showed

higher level of interest in learning Basic Science and Technology than those in the conventional group.

Research Hypothesis 2

There is no significant difference between the mean interest ratings of male and female students taught Basic Science and Technology with peer tutoring teaching strategy.

Table 4: Summary of ANCOVA Result of Students' Interest Score on Male and Female Students in Basic Science and Technology

Source	Type III Sum of squares	df	Mean Square	F	Sig.
Corrected Model	5432.767 ^a	2	2716.383	50.001	.000
Intercept	5331.130	1	5331.130	98.132	.000
Pre-Interest	5026.398	1	5026.398	92.523	.000
Gender	13.562	1	13.562	.250	.618
Error	11245.482	207	54.326		
Total	937162.000	210			
Corrected Total	285086.762	209			

R Squared = .193 (Adjusted R Squared = .190)

From Table 4, the p-value is 0.618. Hence $p > 0.05$ and the null hypothesis is not rejected. This implies that there was no significant difference between the mean interest ratings of male and female students taught Basic Science and Technology with peer tutoring teaching strategy. It therefore, means that both the male and female students that were exposed to the peer tutoring strategy showed the same level of interest in Basic Science and Technology.

Discussion of Findings

Findings revealed that there was significant difference in the mean interest scores of students taught Basic Science and Technology using peer tutoring and those taught with conventional method. The implication of this finding is that students perform better when they are taught with peer tutoring than lecture (conventional method). This finding agrees with the findings of Sambo, Ikuwi, Mohamadu and Eggari (2014) and Eriba (2017) who found that peer tutoring was more effective than conventional instructional approach.

By implication, the findings suggest that students are likely to develop interest, enthusiasm and passion for Basic Science and Technology when they are taught by a more knowledgeable peer. This could be due to the fact that they stand a chance of asking questions freely, repeating concepts until a level of mastery is achieved and forming concepts of their own with the help of a tutee.

Findings also revealed that male students taught Basic Science and Technology with peer tutoring has more interest towards learning of Basic Science and Technology than their female counterpart does. This finding agrees with the findings of Okechukwu, Obiebere and Opara (2021) who found that the results showed that among interest towards learning was enhanced irrespective of gender. This finding of the study support Vygotsky (1978) social constructivist's theory which suggests that cognitive development is limited to a certain range at a particular age. However, with the help of social interaction, such as assistance from a mentor, students can comprehend



concepts and schemes that they cannot know on their own. Construction of ideas directly depends on negotiation between people as there are no two individuals that think the same. This is in accordance with Vygotsky zone of proximal development which emphasized that a child should be made to interact with someone who is beyond his/her current level of independent capability. By doing so Vygotsky stressed that a child's higher mental structures would develop. Therefore, a child is likely to develop interest in the subject if allowed to learn through social interaction when peer tutoring is utilized.

Conclusion

Based on the results of the findings, the researchers conclude that peer tutoring strategy improves students' interest in teaching and learning of Basic Science and Technology.

Recommendations

Based on the findings of the study, the following recommendations were put forward;

- i. Peer tutoring strategy is an effective approach therefore it should be implemented for the teaching of Basic Science and Technology at all levels of Basic education.
- ii. The Federal, State, Ministries of Education and FCT Education Secretariat should organize in-service training programme in form of seminars, workshops and conferences for Basic Science and Technology teachers to acquaint them with the appropriate knowledge and skills on how to use peer tutoring strategy in teaching the subject.

References

- Adejoh, M.J. & Ekele, G.E. (2014). *Contemporary issues in science, technology and agricultural education*. Makurdi: Micro teacher and Associates.
- Anekwe, J.U. (2012). *Effect of constructivist based instructional model on students' interest and academic achievement in French Language in Anambra State*. Unpublished PhD Thesis, University of Port Harcourt, Nigeria.
- Animola, V. (2019). *Relative effectiveness of mastery learning and peer tutoring instructional strategies on students' performance in integrated science*. An Unpublished Masters Thesis, Institute of Education. OAU, Ile Ife, Nigeria.
- Ardodo, S.O. & Gboro, L.O. (2012). Prediction of interest of science students of different ability on their academic performance in Basic Science. *International Journal of Psychology and Counseling* 4(6), 68-78.
- Atoo, S.F. (2016). *Effect of concept mapping strategy on students' achievement and retention in Basic Science in Benue State, Nigeria*. Unpublished M.Ed Thesis, University of Agriculture, Makurdi.
- Eriba, J.O. (2017). Importance of teaching methods and their effective use in classroom lesson delivery. Unpublished invited paper delivered at a refresher workshop for teachers at the Federal Government College, Otobi.

- Federal Government of Nigeria (2014). *National Policy on Education (4th edition)*. Lagos: NERDC Press.
- Obiekwe, A.C. (2013). *Effect of peer assessment on students' academic achievement and interest in Chemistry*. Unpublished PhD Thesis, University of Nigeria, Nsuka (UNN).
- Okechukwu, O.R & Opara, F. (2021). Team teaching strategy and students' interest in Basic Science in Anambra State. *International Journal of Trend in Scientific Research and Development*, 5(6), 940-945.
- Sambo, M.H., Ikukwi, I.J., Muhamuda, A.M. & Eggari, P.O. (2014). Comparative Analysis of students' interest in Basic Science Curriculum in Nasarawa State, Nigeria. *Journal of Education and Practice*, 5(29), 84-90.
- Vygotsky, L.S. (1978). *Mind in society. The Development in higher psychological processes*. Cambridge, M.A.: Harvard University Press.