

EFFECT OF PEER LEARNING STRATEGIES ON STUDENT PERFORMANCE IN INDICES AND LOGARITHMS

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Abstract

This study examines the effect of peer learning on students' performance on probability; it was a quasi – experimental research design (pretest, protest and non- randomized control group design) one population of the study comprised 160 ss2 students. A purposive sampling technique was employed to select 2 out of 16 secondary schools in katsina local government area of katsina state which made up of 160 students' constituting the experience and the control groups respectively two research question and two null hypotheses guided the study student achievement test on probability, (SATP) was the instrument validated instrument used with a reliability index of 0.72. The analysis of covenanted (ANCOVA) was used to analyze the data. The findings indicated that significant interaction effect existed between performance occurred with students taught with the peer learning strategy and those taught with the traditional conventional technique also boys and girls taught by peer learning strategy were positively affected in knowledge and improved performance.

Keywords: Peer Learning Strategy, Traditional Conventional Technique, Secondary Education, Academic Performance, Probability.

Introduction

Peer tutoring is a method of teaching in which one student (or small group of students) receives personalized or individualized instruction (Effiom, 2010). It works best when students of different ability level work together.

Mathematics as a subject is very vital to individuals and in the advancement of science and technology for the development of the society at large. It's on this backdrop that our country places it as a core subject in both primary and secondary schools. There has been a lot of concern on the failing standard of mathematics education in Nigeria in recent times. (Idah & George, 2014)

Mathematics achievement of middle and high school students is an issue of concern among mathematics education and policy makers. Accordingly, (Effiom, 2017) advocate that secondary mathematics achievement is one of the key predictors of the nation's long term economics potentials.

The Federal government of Nigeria (2004) emphasized that "the teaching and learning of mathematics should be based on its process and principle leading to fundamental and applied research in mathematics. The National Mathematics advisory panel (2008) argued that to continue to progress in mathematics achievement, we must improve the quality of

mathematics instruction received by secondary students, although mainly factors a student's mathematics learning, one factor over which school have the most immediate control is the choice of mathematics programme to be implemented by teachers administrators and curriculum developers.

The method used by many mathematics teachers is one which does not give room for students to develop their intuition, imagination and creative abilities. However, it is apparent that many mathematics teachers today are caught in the midst of a change in which they may not have been professionally prepared. Many mathematics teachers were educated in classrooms where the role of the students was to memorize mathematical information; conduct well regulated solutions to problems and then be tested on unit abilities to repeat these tasks during examinations. As a result of this, mathematics education is constantly interested on how and when to optimally adopt different mathematics instructional strategies in order to achieve stated Mathematics educational objectives (Effiom, 2010). The teaching strategies to be employed by the mathematics teacher at any given situation, according to him depends on the factors arising from teacher and student characteristics, teaching objectives, classroom learning environment and the nature and needs of the mathematics concept to be taught.

Students with difficulties learning mathematics can be found in almost every classroom. About five to ten percent of the students in Junior Secondary Schools have difficulties with Mathematics (Effiom, 2006). Students with difficulties learning mathematics include all students who have more trouble with learning mathematics than their peers, and students who need special instruction to perform at an adequate level. The seriousness of these difficulties can vary from (temporary) difficulties in one domain (that is, a particular area of the mathematics curriculum) to severe learning disabilities affecting several different domains. The difficulties can also manifest themselves at different points in a child's school career; not only in the learning of basic facts or learning to apply previously acquired knowledge, but also in the learning of such preliminary mathematics skills as counting, etc. (Effiom, 2006). The potential causes of these are numerous and can partly be explained by such child's characteristics as intellectual functioning, motivation, problem solving skills, memory skills, strategy acquisition and application, and vocabulary. Another important cause of such difficulties may be a poor fit between the learning characteristics of individual students and the instruction they receive. In the case of a poor fit, the instruction must be adapted to the student's needs. In other words, all students with mathematics difficulties require special attention (Effiom, 2017). These students have special educational needs, need extra help, and typically require some types of specific mathematics intervention.

Obviously, the traditional mathematics teacher-as-information-giver has failed to bring about the desired outcome of producing well-thinking mathematics students to med (lie present global challenges. The traditional approach to teaching mathematics (the lecture method) has failed to deal effectively with the problems of individual differences in mathematics. It has also failed to provide for the students appreciation and understanding of learning as a continuing aspect of modern learning theory which stresses student's active involvement in the teaching learning process (Effiom, 2015). There is therefore need to search for more effective instructional strategies that are likely to improve achievement and reduce anxiety in secondary school mathematics.

Purpose of the Study

It is the purpose of the study to investigate the effect of peer learning strategy on student's performance in Indices and Logarithm. In specific terms, the study intends to:

- i. Determine the effect of peer learning as supplemental teaching method to the traditional teaching method (lecture method).
- ii. Find out the effect of peer learning method based on gender in students' performance in Mathematics.

Research Questions

- i. What is the mean difference in the mathematics performance of student taught using peer learning when compared with traditional method?
- ii. What is the mean difference in the mathematics performance of male and female students taught using peer learning?

Hypotheses

The following null hypotheses, testable at 0.05 level of significance was developed for this study:

- i. There is no significant difference in the mathematics performance of student taught using peer learning when compared with traditional method.
- ii. There is no significant difference in the mathematics performance of male and female students taught using peer learning.

Research Design

The research design adopted for the study was the quasi-experimental design. Non randomized pre-test, post-test experimental and control groups research design was employed with the aim of observing the relative effectiveness of the independent variable. Students received treatment in their intact class groupings and were used as control. The same pre-test was initially administered to the students in the two groups, before the treatment. The traditional method was used in the control and experimental group, while peer tutoring strategy was used only in the experimental groups as treatment. At the end of the treatment, post-test was conducted in the two groups.

Population of Study

The population of this study consisted of senior secondary class one (SSC1) students in Katsina Local Government Area of Katsina State. However, there are sixteen (16) public senior secondary schools in this area, thus they constitute the population for the study.

Sample and Sampling Technique

A sample of 160 SS1 students in two (2) schools in Katsina Local Government Area was used for the study. Out of which two groups of size eighty (80) each was separated to form the experimental and control groups respectively. The sampling technique used to select two (2) out of sixteen (16) schools for this study was simple random sampling. From the schools selected, purposive sampling was used to select SS1 students and out of these SS1 students, eighty (80) students were selected from each school.

Instrument for Data Collection

The instrument used for data collection was a Student Achievement Test in Indices and Logarithm (SATIL) consisting of a twenty-item objective questions used for the pre-test and post-test, tagged “Student Achievement Test in Indices and Logarithm (SATIL) 1 and 11 (SATIL1 and SATIL 11)” respectively.

Data Analysis

The analyzed data and the results with respect to the research questions and hypotheses are presented on the table, while the summary of the result is presented at the end of the table.

Research Question 1: What is the mean difference in the mathematics performance of students taught using peer teaching when compared with traditional methods?

Group	N	Pre-test		Post-test		Mean difference
		Mean score	SD	Mean score	SD	
Experimental	80	42.8375	5.29496	52.1625	10.60862	9.325
Control	80	42.600	5.08062	42.2250	10.12451	0.375
Total	160					

Table 1 shows that the experimental group ($M = 42.8375$, $SD = 5.29496$) and the control group ($M = 42.600$, $SD = 5.08062$) scores were equivalent in pre-test. After the treatment, there was a difference observed experimental group ($M = 52.1625$, $SD = 10.60862$) with a mean difference of 9.325 and the control group ($M = 42.2250$, $SD = 10.12451$) with a mean difference of 0.375 in favour of the experimental group. This indicated that peer learning had an effect on the student Mathematics performance than the traditional teaching method.

Hypothesis 1: There is no significant difference in the Mathematics performance of student taught using peer teaching when compared with traditional method.

Table 2: Analysis of Covariance (ANCOVA) of student performance in the experimental group and the control group

Sources of variation	Types III sum of square	Df	Mean Square	F	Sig
Corrected model	4497.060 ^a	21	224.530	21.47	.00
intercept pre-test group	2334.738	11	2334.731	1	0
error total	546.904	15	546.904	22.29	.00
corrected total	3880.689	716	3880.689	4	0
	16441.933	0	104.726	5.222	.205
	377299.000	157		37.056	.00
	20938.994				0

a. $R^2 = .215$ (Adjusted $R^2 = .205$)

Table 2 shows that there is a significant difference between the performance of student taught with peer teaching compared to those taught with conventional technique ($F_{1, 157} = 37.056$, $p < .05$). Therefore, the null hypothesis I is rejected.

Research Question 2: What is the mean difference in the mathematics performance male and female student taught using peer learning?

Table 3: Many difference between the pre-test and post-test male and female students taught with learning

Group	N	Pre-test		Post-test		Mean difference
		Mean score	SD	Mean score	SD	
Male	40	43.002500	5.23052	54.3500	11.49481	11.325
Female	40	42.65000	5.41863	49.9750	9.27497	7.325
Total	80					

Table 3 indicated that the male (M=43.025000, SD=5.23052) and female (M=42.65000, SD = 5.41863) scores were equivalent in pre-test. After the treatment, there was a difference of 11.325 and female (M=49.9750, SD=11.49481) with a mean difference of 11.325 and female (M=49.9750 SD=9.27497) with mean difference of 7.325 in favour of the male students.

Hypothesis 2: There is no significant difference in the mathematics performance of male and female students taught using peer teaching.

Table 4: Analysis of Covariance (ANCOVA) of male and female student taught using peer tutoring

Source of variation	Types III sum of square	Df	Mean square	F	Sig
Corrected model	878.653 ^a	2	439.327	4.222	.01
intercept pre-test group	1207.053	1	1207.05	11.60	.8
error total	495.841	1	3	0	.00
Corrected	351.926	1	495.841	4.765	1
	8012.234	7	351.926	3.382	.03
	226565.00	7	104.055		2
	0	8			.075
		0			0
Total	8890.887	7			

a. R squared = .099 (Adjusted R Squared= .075)

Table 4 shows that there no significant difference between the mathematics performance of male and female student taught with peer teaching (F1, 77 = 351.926, p.05). Therefore the null hypothesis 2 is retained.

Summary of Findings

The following deductions were made:

1. There is a mean difference in the mathematics performance of students taught using peer learning and those taught with conventional method in favour of those taught using peer
2. There is a significant difference between the performances of student taught with peer learning compared to those taught with the conventional technique.
3. There is a mean difference in the mathematics performance of male and female taught using peer learning in favour of the male students.

4. There is no significant difference between the mathematics performances of male and female students taught with peer learning.

Conclusion

Failure in mathematics is an indication of the inadequacy of the conventional method of teaching mathematics. Using peer teaching method, students no longer had to sit in straight row and do individual work throughout the entire teaching and learning period, but the method allowed students to be mobile and work as a teacher and later as a student on various assignments, Effiom, (2016).

In conclusion, the gap in students' mathematics performance can be bridged by using the peer teaching strategy to teach mathematics, especially in the senior secondary schools. This technique affects both male and female students positively, enhances meaningful learning and effective performance in mathematics.

Recommendations

Based on the findings, the following recommendations are made:

1. Mathematics teachers, especially those in senior secondary schools should be encouraged to adopt the peer teaching method in teaching mathematics.
2. Mathematics teachers should be retrained on the innovative technique in teaching mathematics through capacity building workshops.
3. Since the new curriculum emphasizes an activity centered teaching approach, the peer teaching strategy should be included in teachers' module for effective teaching of mathematics.

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