

THE EFFECT OF DEMONSTRATION METHOD ON THE TEACHING AND LEARNING OF MATHEMATICS IN SECONDARY SCHOOLS IN IKA SOUTH LOCAL GOVT.

By

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Abstract

The study examined the effects of demonstration instruction method of teaching Mathematics on the achievement of secondary students in the study area. The study adopted quasi experimental design. The demonstration method was used as experimental group while the lecture method served as the control group. The two methods of instructions were used on the target population of 1876 from 24 public secondary schools in the local government area. The sample consists of 120 students randomly selected from 4 co-educational secondary schools using purposive sampling technique. The students in the experimental group were exposed to demonstration instructional method while those in the control group, were exposed to the lecture method for a period of six weeks. The instrument for data collection, tagged "Mathematics Achievement Test (MAT)" was validated by two specialists from Department of Mathematics Education and Department of Measurement and Evaluation, Delta State University, Abraka. They were requested to determine the appropriateness or otherwise of the questions in the instrument. The reliability coefficient was determined to be 0.76. Three research questions and three null hypotheses were formulated to guide the study. While the research questions were answered using mean scores and standard deviation, the hypotheses were tested using the t-test at 0.05 level of significance. The result of the study shows that: there exists significant difference in the learning outcome of students taught with demonstration and those taught with lecture methods of instruction (in favour of those with demonstration). It was also revealed that there is no significant difference in the academic achievement of male and female students that were taught with demonstration method. The study also noted in contrast, that there is significant difference in the academic achievement of male and female students that were taught with lecture method (the identified difference in favour of the male students). The implication of these findings was that demonstration method enhanced students interest and achievement in Mathematics irrespective of gender while lecture method makes the learner mere passive listeners and is gender biased. The study recommended among other things that secondary school teachers should be encouraged to discard the use of lecture method and adopt demonstration method of instruction.

Key words: *Demonstration method, Lecture method, Teaching, Learning, Mathematics, Achievement, Gender,*

Introduction

Mathematics is an activity subject. Hence, the way it is being thought is important in aiding the students acquire basic Mathematical knowledge, skills and attitude to solving different problem in life. Mathematics being a science subject therefore demands the teacher using appropriate teaching methods that will give the students opportunity to be actively involved. Teaching methods according to Omwirhiren and Khalil (2016) are means for helping students to study effectively. In other words, teaching methods are tactics teachers adopt in meeting teaching objectives, which include instructional organization and techniques, subject matter, and the use of teaching tools and materials. Ameh and Dantani (2012) noted that methodology is very vital in any teaching-learning situation and the method adopted by the

teacher may promote or hinder learning. It may sharpen mental activities which are the bases for social power or may discourage initiatives and curiosity, thus making self-reliance and survival difficult. Erdem (2012) describes four features of teaching strategies. Firstly, teaching strategies should improve a student's predisposition to learn by increasing the desire for studying and understanding new situation. Secondly, they should be structured to help learners rapidly capture the information distributed through the instruction, and develop learner's abilities in assimilating and using knowledge possessed. Thirdly, teaching strategies should be sequenced in the most effective manner so that students can comprehend new knowledge by applying their prior experiences. Fourthly, it should be designed to allow students to genuinely engage in their learning. From the above definitions, we can view teaching methods as a system of communication between the teacher and the learner with the sole aim of helping the learner to acquire a new knowledge, thereby having a changed behavior as well as adapting to his environment successfully.

It is the responsibility of teacher to select the most appropriate method that will suit the prevailing circumstances and peculiar level of his learners in order to achieve or enhance the desired learning outcome. According to Okoko (2014), the adoption of lecture method by most teachers in order to overcome the bulky Mathematics syllabus before the SSCE affects students' interest and performance. Njoku (2007) observed that most researchers believe that in the lecture method, theory is taught as an absolute knowledge; hence student-centered activities for developing scientific reasoning skills and processes are lacking. He also stressed that the lecture method is also known to cause lack of interest and poor performance in Mathematics. Ikitde and Edit (2013) described a lecture method of teaching as a one-way communication pattern in which the teacher is the dominant figure and students' participation is virtually non-existence, rather they listen, ask questions and take notes. In the course of using this method in teaching Mathematics, the teacher dominates the teaching with little or no participation on the part of the learners. The teacher is seen as the repository of all knowledge while the students are passive recipients of knowledge transmitted by the teacher in the process of learning. To arrest students' attention, interest, curiosity and promote their performance in Mathematics, the use of activity stimulating and student-centered approach like demonstration method instead of depending on the conventional approach need to be embraced.

Demonstration Method of Teaching

Omwirhiren and Khalil (2016) described demonstration method as a practical method of teaching which involves showing, doing and telling something. According to them, the onus is on the teacher to display the steps in the process and explain them accurately and clearly while students are expected to practice by repeating the things the teacher has done. This method has been noted for bridging the gap between theory and practice. Ameh, Daniel and Akus (2007) in their own view, described demonstration method as a type of teaching method in which the teacher is the principal actor while the learners watch with the intention to act later. Here, the teacher does whatever the learner is expected to do at the end of the lesson by showing them how to do it and explaining the step-by-step process to them. Arubayi (2009), described demonstration teaching method as a visible presentation of ideals, skills, attitudes, process and other tangibles. Demonstration lessons include facts and

principles used along with materials for showing or teaching someone else. Mundi (2006) described it as a display, or an exhibition usually done by the teacher while the students watch with keen interest. Enemali (2006), opined that the demonstration method is a showing procedure, to explain, teach and inform students.

Arubayi (2015) opined that for demonstration instructional method to be effective, the lesson should be planned ahead of time, have all necessary material and equipment needed for the demonstration lesson. Participants should be given clear and simple instructions. He further stated that the sitting arrangement should be organized so that participants can see and hear clearly. After the demonstration generally, the students should be given opportunity to practice individually or in groups.

According to McKee, Willianson and Ruebush (2007), demonstration teaching method is a useful method of teaching because it improves students' understanding and retention. Al-Rawi(2013), noted that the demonstration is effective in teaching skills of using tools and laboratory experiment in science. Arubayi (2015) noted that despite the valuable merits of demonstration method, a poorly planned and executed demonstration lesson will not produce optimum learning and may not make room for individual difference while Oyegwe (2006) stressed that in a large class, students often have difficulties in observing details of the object being demonstrated.

Review of Related Empirical Studies

Generally, there exist a robust empirical literature on the methods of instruction and its effects on students' achievements. Okoko (2014), investigated the effects of lecture and demonstration methods on the academic achievement of secondary students in Mathematics in Lavun local government area of Niger State. The study compared the mean scores of the students taught with demonstration and lecture methods. The population of the study was 280 students comprising 145 girls and 135 boys from nine (12) secondary schools. The sample size of 78 SS2 students including boys and girls was drawn using stratified random sampling technique involving even and odd numbers. The odd numbers form the experimental group while the even numbers form the control groups. The data were analyzed using t-test statistic at 0.05. The result of the study showed that those taught with demonstration method had higher scores than those taught with lecture method. It was also revealed that there was no significant difference in the mean achievement scores between the males and females taught using demonstration. Omwirhiren and Khalil (2016) in a study to ascertain the effect of demonstration and lecture instructional methods on students learning outcome in chemistry in selected senior secondary schools in Kaduna Metropolis, in Nigeria adopted pretest-posttest quasi-experimental research design for the study. A sample size of 100 students was drawn from a total population of 1911 comprising 1108 males and 803 females, using purposive sampling technique. A-25 multiple choice test items tagged "Chemistry Bonding Performance Test (CBPT)" was used for data collection. The data collected were analyzed using mean, standard deviation, Analysis of variance (ANOVA), and t-test. The result showed that there is statistically significant difference in the learning outcomes of students taught with demonstration and lecture methods. The difference was in favour of those taught demonstration method. Students' active participation, their interaction in the group and the

teacher's role as facilitator of thought provoking questions according to them might have enhanced students' achievement in chemical bonding tests. The study also noted that irrespective of the sex status of the students, demonstration instructional method has positive effect in enhancing learning outcomes in chemistry. This finding showed that both male and female students, when exposed to the treatment of demonstration teaching method, performed well in their academic mean scores, implying that both sexes derived almost equal benefits from being taught using demonstration teaching method.

Ameh and Dantani (2012), in the study to find out the effects of lecture and demonstration methods on academic achievement of students in chemistry in Nassarawa local government area of Kano state using t-test, compared the mean scores of the students taught with demonstration and lecture methods. The population of the study was 180 students comprising 95 girls and 85 boys from nine (9) secondary schools in Gwagwaruwa zone of the local government area. The sample size of 58 SS1 students including boys and girls was drawn using stratified random sampling technique involving even and odd numbers. The odd numbers form the experimental group while the even numbers form the control groups. The result of the study showed that those taught with demonstration method had higher scores than those taught with lecture method. It was also observed that there was no significant difference in the mean achievement scores between the males and females taught using demonstration.

In a related development Daluba (2013) in his study, tagged "Effect of Demonstration method of Teaching on students' achievement in Agricultural science" employed a quasi-experimental research design. The sample size of 480 students was drawn from the population of 18225 SS2 students using purposive random sampling technique. The instrument for data collection was a 30-item Agricultural science Achievement Test (ASAT). The data were analyzed using mean, standard deviation and Analysis of Covariance (ANCOVA) at 0.05 level of significant. The study observed that the students that were taught with demonstration method were found to have high achievement scores in Agricultural science Achievement Test (ASAT) than their counterparts that were taught with conventional lecture method.

Purpose of the Study

It has been noted that for over a decade now, despite the relevance Mathematics to individuals and nation building, the interest and performance of students in science subjects and mathematics in particular are becoming woeful and it spelt doom for nation like ours that is struggling to grow technologically. This has been attributed to factors like the use of inappropriate mathematical instructional methods, inappropriate instruction materials and the availability of inexperienced instructors. Mathematics education in Nigerian schools is faced with many challenges; one of such challenges is the out-of-field teaching. This is when a teacher is assigned to teach subjects for which he or she has not got adequate training and qualification. These categories of teachers need a change of teaching method as most of them teach by the teacher-based instructional method rather student-centered. This method has been criticized for lack of effective interactive approach and caused poor academic performance. The study therefore, tends to look into the following:

- (i) Compare the effectiveness of Demonstration and Lecture methods of teaching Mathematics.
- (ii) Determine the difference in the achievement scores of students taught Mathematics with demonstration and the conventional lecture methods.
- (iii) Determine the difference in academic achievement scores of male and female students in Mathematics taught with demonstration method.
- (iv) Determine the difference in academic achievement scores of male and female students in Mathematics taught with lecture method.

Research questions:

The following research questions have been formulated to guide this study:-

- (i) What is the difference in the mean achievement scores of Mathematics students exposed separately to demonstration and conventional lecture method
- (ii) What is the difference between the mean achievement scores of male and female students taught with demonstration method only?
- (iii) What is the difference between mean score the of male and female Mathematics students who were taught with the Lecture method only?

Research Hypotheses:

The following hypotheses were also formulated to further guide the study. It will be tested at 0.05 level of significance.

H₀₁: There is no significance difference in the learning outcome of Mathematics students exposed to demonstration and conventional lecture methods

H₀₂: There is no significance difference in the learning outcome of male and female Mathematics students that were taught with demonstration teaching method.

H₀₃: There is no significance difference in the academic achievement of male and female Mathematics students taught conventional lecture methods.

Research Methodology

The study utilizes a pre-test, post-test control group quasi experimental design. Pre-test was used to establish the equality or no difference between treatment groups at the beginning of the experiment only.

Sample and Population of the Study

A sample of four co-educational schools was drawn from the population which consists of all SS2 students in 24 Public Senior Secondary schools in Ika South Local Government Area of Delta State. The total population was 1876, comprising 1052 male and 824 female students. The population is made up of single-sex and co-educational schools of which are seven male schools, five female schools and twelve co-educational institutions. The population had a mean age of ± 16 years. One hundred and twenty students (120) as sample size were selected for the study and these were made up of thirty (30) students from each of the schools sampled.

A purposive sampling technique was used in selecting the sample for the study. This technique was adopted to ensure that the subjects chosen (both male and female) had similar background, experience and environmental exposure. Similarly, the co-educational schools

were also selected to ensure that both male and female students used as the subjects were exposed to the same mode of instruction.

Instrumentation:

A forty-item Mathematics Achievement Test (MAT) was constructed from five identified difficult topics/areas in the Mathematics curriculum for SS2. The forty-item multiple choice questions were made up of four options lettered A-D. The MAT was divided into five sections (A-E) based on five content areas covered. The areas were: (i) Circle geometry (ii) Sequence and Series, (iii) Angle of elevation and depression, (iv) Bearing and (v) Longitude and latitude. The questions were to measure the students' ability on the five major topics at SS2 level. The MAT was used for both the pre-test and post-test.

Validity and Reliability of Instrument:

The MAT was subjected to content and face validity by scrutiny by specialists from the Departments of Mathematics Education and Measurement and Evaluation from Delta State University, Abraka. They were requested to determine the appropriateness or otherwise of the questions in the instrument for the purpose of the research. In this way, an attempt was made to validate the instrument to ensure that it measures what it is supposed to measure.

A test is said to be reliable if repeated measurements using the test gives more or less the same results (Omwirhiren and Khalil, 2016). The data obtained from the pilot study after marking and recorded were used to determine the reliability coefficient. The reliability coefficient of the instrument was computed to be 0.76 using Crow bat alpha. This indicates that the test item was reliable and as such it is useable.

Administration of Instrument

Prior to the commencement of the treatment, a pre-test was administered to both the experimental and control groups. The scores of the pre-test was analyzed using t-test to ascertain if there is any difference in the performance of the students in the experimental and control groups. The study lasted for a period of eight weeks, during which the topics were treated with the students in collaboration with the Mathematics teachers in each of the schools.

A pre-test was administered to the whole students that constitute the subjects for the study before dividing them into two groups where treatments were given and post-test was also administered to all students as well. The researcher also mapped out lesson plans and notes that indicated the topics taught and procedures taken for a period of eight weeks.

In the first group (Experimental group) which consist of sixty students were exposed to Demonstration method of teaching and in the second group (Control group), the students were subjected to the lecture method of teaching which consist of sixty students as well.

Method of Data Analysis:

The scores from the experimental and control groups form the data for the study. The research questions were answered using the mean scores and standard deviation while the hypotheses tested using t-test statistic at 0.05 level of significance.

Interpretation of Pre-test Scores:

H₀: There is no significant difference between the Mean Scores of the Experimental and Control Groups in the Pre-test.

Table 1: Comparison of the Mean Academic Achievement Scores of the Pre-test for the Experimental (Demonstration method) Group and the Control (Lecture method) Group

Group	N	Mean	Std	df	t-cal.	t-tab	Decision
Experimental	60	47.44	2.67	118	0.8010	1.6645	No sig.
Control	60	45.30	2.51				

As stated earlier, the subjects used for this study in both experimental group (demonstration method) and Control group (lecture method) were subjected to pre-test using the Matt Achievement Test (MAT) which was marked and recorded. The scores obtained were compared using the t-test statistic as presented in table 1. It was observed from table 1 that the t-calculated is less than t-tabulated at 0.05 level of significance. Hence, it was concluded that there is no significance difference between the experimental and control groups in their pre-test mean scores. This implies that both groups had equal knowledge on the selected topics at the start of the study.

Analysis of Research Questions Research Question one: What is the Difference in the Mean Achievement Scores of Mathematics Students Exposed Separately to Demonstration and Conventional Lecture Methods?

Table 2: Relative Students' Mean Achievement in MAT Achievement Test in Relation to the Teaching Methods.

Group	Symbol	Pre-test	Post-test	Mean Gain Difference
Demonstration method	N	60	60	20.76
	Mean	47.44	68.20	
	Std	5.67	8.01	
Lecture Method	N	60	60	5.02
	Mean	45.30	50.32	
	Std	4.51	8.50	

Table 2 shows the relative mean achievement of Mathematics students exposed to demonstration and lecture methods. It was revealed that prior to the use of Demonstration method in teaching Mathematics; the mean score of the students in MAT was 47.44 with standard deviation 5.67. The mean score increased to 68.20 with standard deviation 8.01 after the same students were taught with demonstration method. On the other hand, in the control group, their mean score in MAT in pre-test was 45.30 with standard deviation 4.51 while their mean scores in MAT in post-test also increased to 50.32 with standard deviation 8.50.

Comparing the performance of the two groups: Experimental group and the Control group, it was discovered that the mean gain difference of the Experimental group which 20.76 is much higher than the mean gain of the Control group which stand at 5.02. This implies that demonstration instructional method has great influence on the academic achievement of students in Mathematics more than the lecture method. By implication, the

demonstration method is proved to be better than the conventional lecture method of instruction.

Research Question Two: What is the difference between the mean achievement scores of male and female students taught with Demonstration method only?

Table 3: Mean Score Difference by Gender of Mathematics Students Taught with Demonstration Instructional Method

Group	Sex	Symbol	Pre-test	Post-test	Mean Gain Difference
Demonstration Method	Male	N	15	15	45.20
		Mean	23.20	68.40	
		Std	0.71	1.01	
	Female	N	15	15	45.29
		Mean	22.80	68.09	
		Std	0.98	1.04	

Table 3 shows the mean score difference of male and female Mathematics students in Mathematics Achievement Test (MAT) who were taught basically with demonstration instructional method. It was noticed that both sex had almost the same score in the post-test. The male students' mean score increased from 23.20 to 68.40 leading to the mean gain difference of 45.20 while the female students' mean score also increased from 22.80 to 68.09 producing a mean gain of 45.29. In the case of variability of test scores, the standard deviation so obtained in both sex showed a minimal spread of scores. The implication of this result is that demonstration method of teaching tends to produce equal result in students' achievement in Mathematics irrespective of sex.

Research Question Three: What is the difference between the mean score of male and female Mathematics students who were taught with the only Lecture method.

Table 4: Mean Score Difference by Gender in the Control Group

Group	Sex	Symbol	Pre-test	Post-test	Mean Gain Diff.
Lecture Method (Control Group)	Male	N	15	15	17.43
		Mean	23.20	40.63	
		Std	0.71	1.07	
	Female	N	15	15	9.21
		Mean	22.80	32.01	
		Std	0.98	1.22	

Table 4 shows that the mean scores of the male students when taught with only lecture method increased from 23.20 to 40.63 given rise to a mean gain difference of 17.43 while that of the female counterpart who were also taught with the same lecture method, though increased from 22.80 to 32.01 produced a smaller mean gain difference of 9.21 when compared with the male students. This result revealed that Lecture method tends to favour male students. The implication of this is that the lecture method unlike Demonstration method tends to be gender biased which is not too good for the learning of Mathematics as a science subject.

Test of Research Hypotheses

The three hypotheses formulated to guide the study were tested at 0.05 level of significance using the t-test statistic.

H₀₁: There is no significance difference in the learning outcome of Mathematics students exposed to demonstration and conventional lecture methods

Table 5: Comparison of the Post-test Mean Scores of the Experimental (Demonstration Method) and Control (Lecture Method) Groups.

Group	N	Mean	Std	df	t-cal.	t-tab.	Decision
Experimental	60	47.44	2.67	118	4.705	1.6645	Sig.
Control	60	45.30	2.51				

The Experimental group represents the Mathematics students that were taught with demonstration method of instruction while the Control group stands for students who were taught with the conventional lecture method of teaching Mathematics. In table 5, it was shown that the value of t-calculated is 4.705 while 1.6645 stands for the critical value (tabulated value). Comparing the two values, we noticed that the t-calculated value exceeds the value of t-tabulated. Hence, we reject the null hypothesis (H₀₁). This implies that there is significant difference in the learning outcome of Mathematics students who were exposed to the Demonstration method and those exposed to the Conventional Lecture method of instruction. In other words, there exists a significant difference in the mean scores of both groups.

H₀₂: There is no significance difference in the learning outcome of male and female Mathematics students that were taught with demonstration teaching method.

Table 6: Comparison of the Post-test Mean Scores of Male and Female Mathematics Students in the Experimental Group (Demonstration Method Only).

Group	Sex	N	Mean	Std	Df	t-cal.	t-tab.	Decision
Experimental	Male	15	48.66	2.301	28	0.606	1.701	Non Sig.
	Female	15	46.53	2.806				

In table 6, efforts were made to compare the post-test mean scores of male and female Mathematics students in the Experimental group using t-test statistic. In table 6, it was observed that at 0.05 level of significance, the values of t-calculated and t-tabulated are 0.606 and 1.701 respectively. Since the value of t-calculated is less than t-tabulated we accept the null hypothesis (H₀₁) and affirmed that there was no significant difference in the learning outcome of male and female Mathematics students that were taught using demonstration method (in the experimental group). In other words, demonstration instructional strategy produces same learning outcome in both male and female students in the post-test. The implication of this is that demonstration teaching method is not gender bias. It is a viable method for both sexes.

H₀₃: There is no significance difference in the academic achievement of male and female Mathematics students taught with conventional lecture methods.

Table 7: Comparison of the Post-test Mean Scores of Male and Female Mathematics Students in the Control Group (Lecture Method).

Group	Sex	N	Mean	Std	Df	t-cal.	t-tab.	Decision
Control	Male	15	39.76	1.66	28	3.550	1.701	Sig.
	Female	15	17.68	1.07				

Table 7 compared the academic achievement of male and female Mathematics students who were taught with the traditional Lecture method of instruction. The table revealed that the t-calculated and t-tabulated (critical) values are 3.550 and 1.701 respectively. Based on this, we reject the null hypothesis (H_{03}) since the value of the value of the t-calculated exceeds the t-tabulated and affirmed that there is statistically significant difference in the academic achievement of male and female Mathematics students that were taught with the Lecture method. From the mean scores, 39.76 for the male and 17.68 for the female we noticed that the observed difference is in favour of the male students. The implication of this is that the Lecture method tends to be gender bias in favour of the male folk. This makes it a very poor method of teaching science generally.

Result of the Study

Based on the analysis of data collected for the study, the following findings were:

- (i) Each of the two groups (Experimental and the Control) recorded higher mean scores in the post-treatment test than in the pre-treatment (see table 2).
- (ii) There exists statistically significant difference in the learning outcome of Mathematics students taught using Demonstration method and those taught with Conventional lecture method.
- (iii) It was revealed that the difference in the learning outcomes was in favour of those students who were exposed to and taught using Demonstration teaching strategy. This is evidenced in tables 2, and 3. It was seen in these tables that the various Demonstration method had the highest mean gain differences.
- (iv) The male students who were taught with Demonstration had a higher mean gain difference from pre-test to post-test than the ones who were taught with lecture method (23.89 for demonstration method against 9.73 for the lecture method).
- (v) It was similarly revealed that the female students who were taught with demonstration method had appreciable higher mean gain difference than those of them who were taught with conventional lecture method.
- (vi) The result shows that there is no significant difference in the academic achievement of the male student and female Mathematics students who were taught with the demonstration instructional method. This means that both students who were taught with demonstration strategy performed equally well irrespective of their gender.
- (vii) There is significant difference in the academic achievement of male and female Mathematics students that were taught separately with lecture method. The observed difference was in favour of the male students. Meaning that the male students taught with Lecture method performed better than the female students that were taught with the same lecture method.

Discussion of the Findings

It was revealed in the study that each of the two groups of the study (those taught with demonstration method and those taught with lecture method) had higher mean scores in MAT in post-test than in pre-test. This finding is in agreement with the earlier finding of Daluba (2013), who observed that both those that were taught Agricultural science with lecture method and those with demonstration method recorded higher mean scores in Agric Science Achievement Test (ASAT) in post-treatment than in pre-treatment test.

The present study also observed that there exists statistically significant difference between the learning outcomes of Mathematics students who were taught using the demonstration instructional method and those exposed to lecture method. This result is in line with the earlier findings of Daluba (2013), Ameh and Dantani (2012) & Omwirhiren and Khalil (2016). These researchers noted in their separate studies that the students in the experimental group, who were allowed to interact and allowed to carry out activities in group obtained higher learning outcome than those in the control group, who were mere passive listeners in their classes. The study also revealed that the male students who were taught using the demonstration method performed better and higher than the male students that were taught with lecture method. Similarly, it was observed that the female Mathematics students who were taught with demonstration method also achieved higher and better than the females who were taught with lecture method. This result was in support of Daluba (2013) who revealed that significant differences existed in the mean achievement scores in favour of the students who were taught Agricultural science using demonstration method as opposed to those taught with lecture method. The implication of these results is that the demonstration method as an activity-based method tends to influence positively the students' academic achievement. This gives demonstration method edge over the lecture method. This also agrees with Musa (2007) who noted that the adoption of good and thought provoking teaching methods, under conducive learning environment, facilitates better learning and mastery of the learnt materials by students. Daluba (2013) observed in his study that the activity nature of the demonstration method made the students to be able to provide answers to the ASAT questions than their counterpart in the control group who were taught with the traditional lecture method.

The result of the present study revealed that there is no significant difference in the academic achievement of male and female Mathematics students that were taught Mathematics using the demonstration teaching strategy. This implies that both the male and female students who were exposed to the demonstration method of teaching had the same learning outcome irrespective of their gender differences. This finding collaborates with the earlier findings of Omwirhiren (2013) and Ameh and Dantani (2012), who noted that there is no significant difference in the post-test mean achievement score between the male and the female students taught using the demonstration method. They asserted that demonstration method promotes homogeneity of achievement between the boys and the girls. In other words, demonstration method is not gender bias in learning outcomes. The implication of this is that irrespective of the sex of a student, teaching him or her with demonstration method, will enhance his or her achievement in Mathematics and in sciences in general. This implies the high rate of failure in Mathematics and Sciences which are occasioned by lack of interest on the part of the students on one hand, and poor instructional strategy on the other hand will greatly be minimized, if the instructor can be professional enough to select and use

appropriate instructional strategy like demonstration method that will help to enhance the interest and performance of students in both internal and external examinations.

The study in contrast, revealed a significant difference between the achievement of male and female students who were taught with the conventional lecture method. It was further revealed that the observed differences in achievement were in favour of male students. The implication is that unlike the demonstration method, the lecture method of teaching, tend to promote gender inequality in academic achievement, and this will not help a nation like Nigeria that is craving for scientific and technological advancement.

Conclusion

Based on the results of the analysis of present study, it is concluded that the demonstration method as student-centered method enhances effective teaching and learning of Mathematics. Interest and achievement level of students is a function of the instructional method adopted by the teacher in transmitting information and knowledge to the students. It is the responsibility of the teacher to professionally select and use appropriate instructional strategy that will not only enhance the interest of the students towards the subject but also help to improve on their overall learning outcomes.

Recommendations

Sequel to the findings of the study and its conclusion, the following recommendations were made:

- (i) The secondary school teachers should be encouraged to discontinue the use of lecture instructional method in the teaching of Mathematics and Science subjects in general in order to avoid making the students passive learners.
- (ii) The study calls on all the Mathematics teachers at the secondary school level to adopt more activity-based method of instruction like demonstration method that will not only stimulates and motivates the learners but also have the potential of enhancing learning outcomes of both genders.
- (iii) Policy makers and Curriculum planners should help to emphasis the use of demonstration teaching method in the teaching-learning process at the secondary schools for all science subjects in general and Mathematics in particular.
- (iv) The government at all levels in conjunction with other stakeholders in education should encourage and sponsor Mathematics teachers at all levels to attend seminar and workshops on effective use of demonstration method in teaching Mathematics.
- (v) The professional bodies like the Mathematical Association (MAN) and Science Teachers Association of Nigeria (STAN) should champion the course and encourage its members to accept and adopt the more result oriented teaching methodologies such as demonstration method and other students' centered strategies in the teaching of Mathematics.
- (vi) The government, through her agencies saddle with the responsibility of overseeing the development of education in the country should as a matter of urgency, provide the financial and material resources that will enhance the adoption and application of demonstration teaching method in Mathematics in our schools.

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