

EFFECT OF TEACHING METHODS ON THE PERFORMANCE OF MATHEMATICS STUDENTS IN PUBLIC SECONDARY SCHOOLS IN MAKURDI METROPOLIS, BENUE STATE, NIGERIA.

Adamu Garba

***Department of Science Technology and Mathematics, Nasarawa State University, Keffi,
Nasarawa State***

ABSTRACT

This study examined the effect of teaching methods on the performance of mathematics students in public secondary schools in Makurdi Metropolis. The study was anchored on Behaviorist Learning Theories and the theory of performance. The researcher used survey research design for study while the census sampling technique was utilized to determine the sample for the study. A sample of 156 respondents was used and primary information was obtained by the use of a structured questionnaire from three secondary schools in Makurdi Metropolis. The data collected were analyzed using multiple linear regression analysis. The probability value of the regression estimate was used in testing the hypotheses of the study. The result of the regression analysis indicates that Demonstration Method has a positive effect on Performance of Mathematics students in Secondary Schools in Makurdi Metropolis, Benue State, Nigeria and the relationship is statistically significant ($p < 0.05$) the relationship is in line with a priori expectation. Discussion Method has a positive effect on Performance of Mathematics students in Secondary Schools in Makurdi Metropolis, Benue State, Nigeria and the relationship is statistically significant ($p < 0.05$) the relationship is in line with a priori expectation. Teachers' Proficiency was negatively related to Performance of Mathematics students in Secondary Schools in Makurdi Metropolis, Benue State, Nigeria and the relationship is statistically significant ($p < 0.05$) the relationship is in line with a priori expectation. It was concluded that research into teaching method is very important due to the recognition that individual differences exist among students, feedback is important for student learning, teaching strategies are very important for students to learn well, use of a variety of evaluation procedures is necessary, career guidance should be provided as necessary, and teachers should set achievable objectives for lessons. It was recommended among others that efforts should be made by teachers in thoroughly integrating demonstration methods in their teaching.

Keywords: Teaching, Method, Mathematics, Performance, Students, Benue, Nigeria.

1.0 INTRODUCTION

Mathematics, which is one of the oldest fields of study in the history of mankind, has long been one of the most central components of human thought. It has been believed for centuries that mathematics sharpens the human mind, develops their logical thinking; enhances their reasoning ability and spatial power. It influences an individual's personal development and contributes to the wealth of the country. This is mainly because it is at the heart of many successful careers and successful lives. Mathematical skills for daily life are developed in school mathematics curriculum.

Cockcroft (2012) states that there can be no doubt that every child should study mathematics at school. He also highlights that most people regard the study of mathematics, together with that of English as being essential. For this reason mathematics is one of the core subjects in all schools worldwide as explained by the amount of time devoted to it in schools. In many countries, it is compulsory in primary and secondary levels of education. A major reason for the persistence of the special place held by mathematics in the school curriculum is the way in which it has been used in the last two centuries as a screening device, or filter, for entry to numerous professions (Howson & Wilson, 2016). Another main reason for studying mathematics is that it is interesting and enjoyable, and that people like its clarity, challenges and intrinsic interest. Cockcroft (2012) states, that the inherent interest of mathematics and the appeal which it can have for many children and adults provide

yet another reason for teaching mathematics in schools. In Africa, as in other parts of the world, mathematics enjoys a very prestigious position in school curriculum.

In Nigeria, efforts to enhance the effectiveness of mathematics education have included making mathematics a compulsory subject during the formative years of education (Miheso 2012). Mathematics enjoys a special status in the school curriculum by being one of the core subjects and that more lessons of mathematics are taught in schools than science. Similarly, mathematics was and still is one of the core and compulsory subjects in primary and secondary schools in Nigeria. Despite the fact that mathematics is essential for daily life and plays a crucial role in school curriculum, students' performance remains very low and this could be attributed to the teaching methods adopted by the teachers. This caused an outcry from mathematics teachers, mathematics educators, parents, and students. One of the main issues for the outcry was the students' poor performance in the subject. By the 1990s, the mathematics community began to voice a mounting concern regarding the teaching methods, mathematical competency and arithmetical skills of the secondary school student. The resounding question of the 1980s, extending over to the 1990s is why the literates from the school are so mathematically illiterate?

Mathematics is also a body of knowledge essential for the achievement of a scientific/technological nation. Ale and Lawal (2010) stated that the line of demarcation between the developed and the underdeveloped nations is based on their

level of mathematical attainment and ingenuity. According to them, mathematics is an undisputed agent of national development and wealth creation. Confirming this statement, Nosa and Ohenhen (2018) stated that evidence abound to show that nations that embrace mathematics, science and technology enjoy better standard of living and are less dependent on others. The world is speedily becoming a global village and that makes it even more imperative that all individuals have a better understanding and appreciation of mathematical procedures and methods of reasoning to be carried along. Adedayo (2017) stated that knowledge of mathematics promotes the habit of accuracy, logical, systematic and orderly arrangements of facts in the individual learner. It also encourages the habit of self reliance and assists learners to think and solve their problems themselves. Mathematical knowledge indeed equips individuals with the skills to solve a wide range of practical tasks and problems they may encounter in life.

Statement of the Problem

One problem with Mathematics teaching and learning is that most teachers continue to keep faith with the old system of teaching that has nothing interesting or enjoyable to offer to the learners. Eniayeju and Azuka (2010) noted that over 90% of the teachers that attended the National Mathematical Centre workshops from 2002 to 2010 still use the traditional method of teaching. Happenings in some Nigerian classrooms still present a situation where topics are just simply introduced and exercises are selected from the textbook and solved for the students who are expected to learn by rote memory of formula and facts. Sometimes, the students are not even encouraged to ask questions. Results of studies conducted on mathematics performance and the

deteriorating students' achievement in the subject clearly demonstrates the failure of this delivery system.

In a teaching and learning environment, students' active participation with lessons as well as the use of learning approaches that help students remember what they learn is important dimensions. Effective learning approaches increase the quality of learning. Students learn best by doing and experiencing (Olaitan and Ogundoyin, 2015). In a demonstrative and discussion learning approach, students and teachers are in a state of dynamic interaction in the classroom. When students interact in cooperative groups they learn to give and receive information, develop new understandings and perspectives, and communicate in a socially acceptable manner. The big question therefore is to what extent has the various teaching methods affected the academic performance of the students in the selected Secondary Schools in the Study area.

Objective of the study

The main objective of the study is to investigate the effect of Teaching Methods on the Performance of Mathematics Students in Public Secondary Schools in Makurdi Metropolis, Benue State, Nigeria. The specific objectives however are to:

- i. Investigate the effect of demonstrative method on performance of Mathematics students in Secondary Schools in Makurdi Metropolis, Benue State, Nigeria.
- ii. Assess the effect of discussion method on performance of Mathematics students in Secondary Schools in Makurdi Metropolis, Benue State, Nigeria.
- iii. Investigate the effect of teachers' proficiency on performance of Mathematics students in Secondary

Schools in Makurdi Metropolis, Benue State, Nigeria.

Hypotheses of the study

- i. Demonstration method has no significant effect on the performance of Mathematics students in Secondary Schools in Makurdi Metropolis, Benue State, Nigeria.
- ii. Discussion method has no significant effect on the performance of Mathematics students in Secondary Schools in Makurdi Metropolis, Benue State, Nigeria.
- iii. Teachers' proficiency has no significant effect on the performance of Mathematics students in Secondary Schools in Makurdi Metropolis, Benue State, Nigeria.

2.0 LITERATURE REVIEW

Theoretical framework

Behaviorist Learning Theories

The origins of behaviorist learning theories may be traced back to the late 1800's and early 1900's with the formulation of "associationistic" principles of learning. The general goal was to derive elementary laws of learning and behaviour that may then be extended to explain more complex situations. Inferences were tied closely to observed behaviour in "lower organisms" with the belief that the laws of learning were universal and that work with laboratory animals could be extrapolated to humans. It was believed that a fundamental set of principles derived from the study of learning in a basic or "pure" form could then be applied to the broader context of learning in schools. Three experimental approaches are related to the study of associationistic learning including: 1. The use of nonsense syllables and individual words to study the association of ideas 2. The use of animals to study the association between sensations and

impulses 3. The use of animals to study association and reflexology.

Behaviourism is based on the idea that knowledge is independent and on the exterior of the learner. In a behaviourist's mind, the learner is a blank slate that should be provided with the information to be learnt. Through this interaction, new associations are made and thus learning occurs. Learning is achieved when the provided stimulus changes behaviour. Behaviourism involves repeated actions, verbal reinforcement and incentives to take part.

Theory of performance

The Theory of Performance (ToP) develops and relates six foundational concepts to form a framework that can be used to explain performance as well as performance improvements. To perform is to produce valued results. A performer can be an individual or a group of people engaging in a collaborative effort. Developing performance is a journey, and level of performance describes location in the journey. Current level of performance depends holistically on 6 components: context, level of knowledge, levels of skills, level of identity, personal factors, and fixed factors. Three axioms are proposed for effective performance improvements. These involve a performer's mindset, immersion in an enriching environment, and engagement in reflective practice. Humans are capable of extraordinary accomplishments. Wonderful accomplishments also occur in day to-day practice in higher education. An advisor inspires students to follow their dreams. A teacher magically connects with students. A researcher continually asks the quintessential questions that lead to revolutions in thinking. A Dean inspires an entire college to collaborate and attain wonderful outcomes. Since worthy accomplishments are produced from high-

level performances, a theory of performance (ToP) is useful in many learning contexts.

Performance, as the adage goes, is a “journey not a destination.” The location in the journey is labeled as “level of performance.” Each level characterizes the effectiveness or quality of a performance. As a lawyer improves her level of performance, she can conduct legal research faster, more thoroughly, and more in-depth. As an academic department improves its level of performance, the members of the department are able to produce more effective student learning, more effective research, and a more effective culture. As a manager advances his level of performances, he is able to organize people and resources more effectively and to get higher quality results in a shorter time. As a teacher advances his levels of performance, he is able to produce deeper levels of learning, improved levels of skill development, and more connection with the discipline for larger classes while spending less time doing this. As an actor improves his level of performance, he is able to learn parts quicker, play more varied roles, and produce a deeper and more meaningful impact on audiences.

2.3 Conceptual Framework Teaching Method

Teaching is a universal human experience: parents teach their children; brothers and sisters teach each other; friends teach friends; employers teach employees; and colleagues teach each other. These examples of teaching usually involve a few students at the most and occur in the setting where the learning is used. Classroom teaching is a special instance of teaching. First, the group is large and diverse, which creates management challenges for the teacher. Second, learning takes place in an unnatural environment, which may create motivation and attention problems for students. People

who have not been responsible for teaching in a classroom have difficulty appreciating the complexity of the work.

Teaching methods are often divided into two broad categories: teacher-centred methods (also called direct instruction) and learner-centred methods (also called indirect instruction or inquiry-based learning). Demonstration and discussion are also some of the methods used by some instructors in classroom situation. An effective teacher knows several methods, some teacher-directed and others learner-directed. From among these methods, a teacher selects the one method or combination of methods most likely to achieve a particular lesson’s objectives with a particular group of students. Because teaching and learning interact, a course about teaching must also be about learning. The content and structure of the course is based on two strong claims about learning. First, learning results from what a student already knows, thinks, and does – and only from these actions of the student’s mind. A teacher enables students to learn by influencing what the student does to learn but the student has to do it. Second, as students progress through school they should learn to become their own teachers. That is, students should learn how to learn using their teachers as mode

Types of Teaching Method

In order to add to the literature on the effectiveness of active teaching techniques, the current study examined the history of teaching method and several commonly used active teaching techniques. Various kinds of teaching techniques were discussed here.

a) Demonstrations

Demonstrations involve activities that occur in the classroom as a means of demonstrating how a phenomena works

(Dunn, 2008). This technique is slightly more active than lecture because the students are able to get involved and see first-hand how the construct or phenomena presents itself in the real world. Additionally, demonstrations can break up the pace of the classroom while also providing an enjoyable experience for the students (Forsyth, 2003). However, generally, demonstrations only engages a few of the students in the classroom, have guidelines and parameters dictating the path of the learning process, and usually lead to a very specific, often predetermined, outcome. When demonstration is undertaken, not all the students are involved, thus demonstration does not allow all students to experience the phenomena under study. Thus, the uninvolved students are still just passively receiving information.

Demonstration method refers to the 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 learners are 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 (Ameh, Daniel and Akus, 2017). Mundi (2006) described it as a display or an exhibition usually done by the teacher while the students watch with keen interest. He further added that, it involves showing how something works or the steps involved in the process. Some of the advantages of this method as outlined by Olaitan and Ogundoyin (2015) and Mundi (2006) include: - It saves time and facilitate material economy; the method is an attention inducer and a powerful motivator in lesson delivery; students receive feedback immediately through their own products; it gives a real-life situation of course of study as students acquire skills in real-life situations using tools and materials; it help to motivate students when carried out by

skilled teachers and it is good in showing the appropriate ways of doing things.

b) Discussion

Discussion is known as a hybrid form of teaching because students give and receive information, is often considered the prototypic method and core component of active teaching and learning (McKeachie, 2012; Stewart, *et al.*, 2010; Whetten & Clark, 2016). A classroom discussion is an active teaching technique because it enables students to explore issues of interest, opinions, and ideas. However, it also leads to deeper levels of learning because in order to build on each other's ideas, the students must first listen and understand the contributions of others students in order to respond or add to it (Hadjioannou, 2007). Additionally, past studies have shown that during discussion students are attentive, active, more engaged, and motivated (Bligh, 2010; Ryan & Patrick, 2011).

2.3.2 Student's performance in Mathematics

The word is speedily becoming a global village and that makes it even more imperative that all individuals have a better understanding and appreciation of mathematical procedures and methods of reasoning to be carried along. Adedayo (2017) stated that knowledge of mathematics promotes the habit of accuracy, logical, systematic and orderly arrangements of facts in the individual learner. It also, he said, encourages the habit of self-reliance and assists learners to think and solve their problems themselves. Mathematical knowledge indeed equips individuals with the skill to solve a wide range of practical tasks and problems they may encounter in life. Saint Paul Public School (2007) commenting on the importance of mathematics stated that the study of mathematics helps the mind to reason and

organize complicated situations or problems into clear, simple and logical steps. The reality, they noted, is that in a society such as ours, high paying jobs often demand someone who can simplify complicated situations and reduce them to the level everyone can understand. They therefore insisted that by knowing more mathematics, students give themselves the competitive edge they need to vie for such high paying jobs.

It is being often told that there exists phobia towards mathematics learning amongst the student communities in some schools. Mathematical skill is essential not only for the higher education aspiring section, but also success in several competitive examination for jobs depends upon the basic understanding in mathematics. Thus, perfect teaching-learning in secondary schools in all subjects in general and mathematics subject in particular has been a serious issue needing investigation.

The importance of quality education in nation building has also been realized by several nations including developed countries. Several developed nations including United States of America (USA) realized that their role as leaders in the world's economy and their capacity to produce wealth and quality jobs depend directly on the ability of education system to produce students who can compete in mathematics and science dominated industries of the future. Thus, improving mathematics and science education has been the priority of the policymaking agenda (Anon, 2005).

Students' performance in mathematics subject has been investigated through bilateral surveys in two European countries (Robertson, 2000). Requirements of changes in national policies suiting their respective culture are emphasized in order to minimize the differences in performances amongst the

countries. The interactions of a large number of socio-economic as well as academic environmental factors influence the student's performance in school. Poor school performance not only results in the child having a low self-esteem, but also causes significant stress to the parents (Karande and Kulkarni, 2005). Identification of causes of poor performance and execution of corrective action plan so that the students can perform up to their full potential is required.

A psychological aspect of female students with special reference to mathematics subject has been matter of investigation in past reporting that high mathematics anxiety is associated with low mathematics achievement (Yee, 1987). Another interesting finding of such study was that for the most capable students, test anxiety seems to act as a facilitator in their mathematics performance. The role of teachers has also been pointed out by the study stating that students' scores on the perception of their mathematics teachers have the strongest correlation with their mathematics anxiety scores. Teacher's quality supported by training and experiences has influencing role in effective teaching-learning. Teaching experience plays important role in success of education (Tui, 1987).

Unfortunately, students' performance in this all important subject has been consistently poor especially in the Senior Secondary Certificate Examination (SSCE) organized by the West African Examination Council (WAEC) and the National Examination Council (NECO). SSCE is the examination written by Nigerian students at the end of their secondary education and it is used to measure the extent of knowledge and skills the students have acquired at that level of education. The result of this examination is

also used as prerequisite for admission into institutions of higher learning where students could go to pursue courses in their areas of interest. In most Nigerian institutions, a credit pass in mathematics and English language is required to read any course whatsoever. However, students' results released yearly by the examination bodies continue to show a steady trend of mass failure of the students in mathematics. The table below gives credence to this fact.

2.4 Empirical review

Duruji, Azuh, Segun, Olanrewaju and Okorie (2014) examined teaching method and assimilation of students in tertiary institutions: a study of covenant university, Nigeria. The choice of teaching method which is the general principles, pedagogy and management strategies used for classroom instruction is very important to a degree of assimilation by the recipient of teaching. Teaching theories primarily fall into two categories or "approaches"; teacher-centered and student-centered. In the former, teachers are the main authority figure in this model. Students are viewed as empty vessels whose primary role is to passively receive information (via lectures and direct instruction) with an end goal of testing and assessment. However in a student-centered approach, teachers and students play an equally active role in the learning process. The teacher's primary role is to coach and facilitate student learning and overall comprehension of material. Student learning is measured through both formal and informal forms of assessment, including group projects, student portfolios, and class participation. The main aim of this paper is to examine the relationship between teaching method and assimilation of students and the impact on examination performance. A sample of 300 students cutting across the various schools and colleges in Covenant University who have

taken at least not less than two semesters examinations was used for the study. Student-Lecturer relationship, examination contents, students' mode of study and assimilation, effort and students' CGPA were the parameters used for this purpose and it was found that assimilation is better with student-centered approach.

Daluba (2013) investigated the effect of demonstration method of teaching on students' achievement in agricultural science in secondary school in Kogi East Education Zone of Kogi State. Two research questions and one hypothesis guided the study. The study employed a quasi-experimental research design. The population for the study was 18225 senior secondary two (SSII) students in 195 secondary schools. Six (6) secondary schools were used for the study using purposive random sampling technique. In each of the schools selected, two intact classes of the SSII were used. Four hundred and eighty (480) students in the twelve intact classes constituted the sample for the study. The instrument for data collection was a 30-item 'Agricultural Science Achievement Test' (ASAT). Using Kuder Richardson 20 (K-R20) formula, a reliability index of 0.78 was obtained. Research questions 1 and 2 and the only hypothesis were answered using mean, standard deviation and analysis of covariance (ANCOVA) at 0.05 level of significance. The result of study revealed that demonstration method had significant effect on students' achievement than those taught with the conventional lecture method. It was recommended among others that efforts should be made by teachers in thoroughly integrating demonstration method in the teaching of agricultural science in secondary schools; efforts should be intensified by teachers to aggressively adopt demonstration method in teaching agricultural science in all classes at the secondary school level in the study area.

Das and Karuna (2005) examined Secondary School Education in Assam (India) with Special Reference to Mathematics. The paper describes the prevailing academic scenarios of a representative group of secondary schools in Assam (India) with special references to students performance in general and mathematics performance in particular. The state of Assam is one of the economically backward regions of India and is witnessing socio-political disturbances mainly centered with younger population. Object oriented education leading ensured employment is expected to reduce the present social crisis in this region. Appropriate secondary school knowledge backed by perfect learning in mathematics can make students competent for future career. Investigation of prevailing education scenario vis-à-vis mathematics performance of students of 21 representative schools of Assam revealed wide variations of academic environment amongst the school so also the variations of performances. The financial and managerial statuses of the schools seem to be major factors influencing academic performance. In general, academic performances as well as mathematics performances of the government and private schools are better than the schools not getting government aids. The study also revealed that mathematics performances of schools are positively correlated with (a) the academic performance of school indicated by school leaving pass percentage and also (b) with the performances in subjects other than mathematics. On the other hand, students and teacher ratio seems not to affect the mathematics performance of the schools. Improvement of the performance of secondary school in Assam is required considering the societal needs.

Uche and Chinyere (2011) studied Poor Performance of Nigerian Students in Mathematics in Senior Secondary Certificate

Examination (SSCE): What Is Not Working? This paper considered the importance of mathematics to the individual as well as to the nation. It noted that students' performance in this all important subject has been dismal especially in the Senior School Certificate Examination (SSCE). The poor performance trend is indeed worrisome as seen from the summary of students' result in SSCE mathematics covering many years in the study. This is despite various efforts by government and its agencies, private organizations and other stakeholders in the education business to boost achievement of students in the subject. It becomes, therefore, a clear indication that certain things have still not been put in place. The paper considered these problems yet unsolved and recommended among others that efforts made at carrying out researches should not be allowed to waste away. Research results should be made to reach the implementers of the findings to be able to achieve the desired result.

Yara (2012) studied performance indicators of secondary school Mathematics in Nyamira south district of Kenya. These indicators are student discipline, teachers' qualification and experience and school facilities. The study employed the descriptive survey design approach with a population of 77 Mathematics teachers and 525 students comprising of 320 males and 205 females. Two validated research instruments (Questionnaire for Teachers (QFT) and Questionnaire for Students (QFS) were used to gather data. Three research questions were answered. Data were analyzed using descriptive statistics of mean, percentages and t – test analysis. The results showed that there was a negative relationship between student discipline and academic performance in Mathematics ($t = -5.820$; $p < 0.05$); there was a negative relationship between teachers' qualification,

experience and academic performance in Mathematics ($t = -5.19$; $p < 0.05$) and there was also a negative relationship between school facilities and academic performance in Mathematics ($t = -5.709$; $p < 0.05$). It was recommended that the Government should provide more teaching - learning facilities in schools to make the learning environment more attractive to students and teachers; more teachers should be trained and encouraged to stay in rural areas.

3.0 METHODOLOGY

Research Design

The survey design was used to evaluate Mathematics programme and performance of secondary school in Benue State. This research was carried out in Makurdi Metropolis of Benue State with private and public secondary schools in Makurdi Metropolis are spread evenly across the council wards of the Local Government Areas. The population of this study consists of the mathematics teachers and SS II students of selected Government owned secondary schools in Makurdi Local Government Area of Benue State. The selected schools are:

Table 1: Name of the selected Urban schools Makurdi Metropolis

No	Name of School	Population
1.	Government College Makurdi	61
2.	Government Girls Secondary School Makurdi	51
3.	Special Science Senior Secondary School Makurdi	34
	Total	146

Source: Author's Computation, 2019

The three schools have a population of 146 students and a 10 mathematics teacher in the selected secondary schools bringing the total

population of the respondents for the study to 156.

Table 2: Number of Mathematics Teachers in the selected schools

S/No	Name of School in Makurdi	Population
1.	Government College Makurdi	4
2.	Government Girls Secondary School Makurdi	3
3.	Special Science Senior Secondary School Makurdi	3
	Total	10

Source: Author's Computation, 2019

The Simple random sampling procedure was used for selection of the sample size. Three schools out of 40 accredited secondary schools in Makurdi Metropolis were

selected by simple balloting without replacement. The random sampling technique was used to give equal opportunity for every school to be selected,

and it is the number that represents all the schools. The Sample size of this research is the same as the population. This is because the census method of sampling was used. As a result, the sample for the study is 156 respondents from the selected Secondary Schools in the study areas. Questionnaire was used as a data collection tool. The questionnaire was designed for Mathematics teachers and students. The questionnaire for Mathematics teachers was divided into sections A and B. Section A was concerned with the teachers' personal information, section B, with the Mathematics teachers' view of the attitude exhibited by the teachers during lessons via four-point Likert scale (Strongly Agree, Agree, Disagree and Strongly Disagree). Content and construct validity of the instrument were carried out using exploratory factor analysis and the result indicates that the instrument for the study is valid. The reliability of the questionnaire and the achievement test developed by the researcher were ascertained by Cronbach Alpha test. The Cronbach reliability Coefficient Alpha (α) of 0.89 indicates that the questionnaire for the study were reliable.

Method of Data Analysis

Based on the research questions, the researcher employed both descriptive and inferential statistics for data analysis. Specifically, the following measures were used to analyze the available data. Data collected were analyzed using frequencies and means. Analysis of variance (ANOVA) which is a collection of statistical models used to analyze the differences among group means and their associated procedures (such as "variation" among and between groups), was used to determine the difference in the variables of our study.

Model Specification

Multiple regression analysis was employed to determine the effect or outcome of the

relationship between the independent and the dependent variables of the study. The traditional multiple regression formula and its implicit forms are represented below:

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + e \quad (1)$$

The implicit model form of the model is as shown below:

$$\text{Student's Performance} = f(\text{Teaching Method}) \quad (2)$$

The implicit form of the model is as shown

$$\text{STP} = f(\text{DMS, DSC, TEP}) \quad (3)$$

Where,

STP = Student's Performance

DMS = Demonstration Method

DSC = Discussion Method

TEP = Teachers' Proficiency

The explicit forms of the formula above are depicted below:

$$\text{STP} = b_0 + b_1\text{DMS} + b_2\text{DSC} + b_3\text{TEP} + U_i \quad (4)$$

Where:

b_0 = intercept value of the dependent variable

e = the random error term

b_1, b_2, b_3 , = the regression coefficients of the independent variables

A priori expectations

(X_1) = Demonstration Method; *a priori* expectation is positive

(X_2) = Discussion Method; *a priori* expectation is positive

(X_3) = Teacher's Proficiency; *a priori* expectation is positive

3.9 Data Analysis Techniques

The data for the study was collected, coded and analyzed using computer-based Statistical Package for Social Sciences (SPSS version 20.0 for Microsoft Windows). Various statistical methods were used in analyzing this study: percentages, frequency and tables were used to examine the respondents' bio-data. Multiple Regression was used to assess the nature and degree of relationship between the

dependent variable and a set of independent or predictor variables. However, probability value of the estimate was used to test the 3 hypotheses for this study.

Decision rule: The following decision rules were adopted for accepting or rejecting hypotheses: *If the probability value of b_i [$p(b_i) > \text{critical value}$] we accept the null hypothesis, that is, we accept that the estimate b_i is not statistically significant at the 5% level of significance. If the probability value of b_i [$p(b_i) < \text{critical value}$] we reject the null hypothesis, in other words, that is, we accept that the estimate b_i is statistically significant at the 5% level of significance.*

4.0 RESULTS AND DISCUSSIONS

This section presents the results of the regression analysis and the discussions of the findings obtained from the study areas.

Figure 1: Regression Standardized Residual

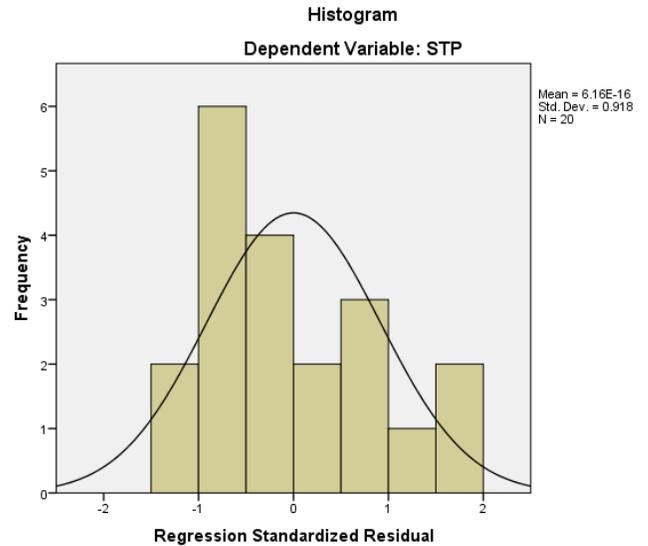


Figure 1 above shows a histogram of the residuals with a normal curve superimposed. The residuals look close to normal, implying a normal distribution of data. Here is a plot of the residuals versus predicted dependent variable of Student's Performance (STP). The pattern shown above indicates no problems with the assumption that the residuals are normally distributed at each level of the dependent variable and constant in variance across levels of Y.

It is very unlikely that a histogram of sample data will produce a perfectly smooth normal curve like the one displayed over the histogram, especially if the sample size is small. As long as the data is approximately normally distributed, with a peak in the middle and fairly symmetrical, the assumption of normality has been met.

Source: SPSS 20.0 Result Output, 2019

Table 3: Regression Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics		
	B	Std. Error				Beta	Tolerance	VIF
1	(Constant)	-25.896	19.856					
	DMS	.607	.248	.482	2.448	.026	.950	1.052
	DSC	.798	.291	.544	2.744	.014	.939	1.065
	TEP	.045	.220	.040	.205	.840	.987	1.013

a. Dependent Variable: STP

Source: SPSS 20.0 Result Output, 2019

a) Effect of Demonstration Method on Performance of Mathematics students in Secondary Schools in Makurdi Metropolis, Benue State, Nigeria.

The model specification for Student Performance in Mathematics establishes that Demonstration Method (DMS) has a positive effect on Performance (STP) of Mathematics students in Secondary Schools in Makurdi Metropolis, Benue State, Nigeria and the relationship is statistically significant ($p < 0.05$) the relationship is in line with *a priori expectation*. This means that a unit increases in Demonstration Method (DMS) will result to a corresponding increase Performance (STP) of Mathematics students by a margin of 48.2 %. Using the probability value of the estimate, $p(b_1) < \text{Critical Value of } 0.05$ confidence level. Thus, we reject the null hypothesis. That is, we accept that the estimate b_1 is statistically significant at the 5% level of significance. This implies that Credit Appraisal has a significant effect on financial performance in the Nigerian Banking Industry.

This finding is in line with that of Daluba (2013) who investigated the effect of demonstration method of teaching on students' achievement in agricultural science in secondary school in Kogi East Education Zone of Kogi State and found that demonstration method had significant effect on students' achievement than those taught with the conventional lecture method.

b) Effect of discussion method on performance of Mathematics students in Secondary Schools in Makurdi Metropolis, Benue State, Nigeria.

As shown by the results of the multiple regression coefficients, Discussion Method

(DSC) has a positive effect on Performance of Mathematics students (STP) in Secondary Schools in Makurdi Metropolis, Benue State, Nigeria and the relationship is statistically significant ($p < 0.05$) the relationship is in line with *a priori expectation*. This means that a unit increases in Discussion Method (DSC) will result to a corresponding increase Performance (STP) of Mathematics students by a margin of 54.4 %. Using the probability value of the estimate, $p(b_2) < \text{Critical Value of } 0.05$ confidence level. Thus, we reject the null hypothesis. That is, we accept that the estimate b_2 is statistically significant at the 5% level of significance. This implies that Discussion Method has a significant effect on the performance of Mathematics students in Secondary Schools in Makurdi Metropolis, Benue State, Nigeria.

This finding is in line with that of Duruji, Azuh, Segun, Olanrewaju and Okorie (2014) who examined teaching method and assimilation of students in tertiary institutions: a study of covenant university, Nigeria and found that in a student-centered approach of teaching method, teachers and students play an equally active role in the learning process. The teacher's primary role is to coach and facilitate student learning and overall comprehension of material. Student learning is measured through both formal and informal forms of assessment, including group projects, student portfolios, and class participation.

c) Effect of Teachers' Proficiency on Performance of Mathematics Students in Secondary Schools in Makurdi Metropolis, Benue State, Nigeria.

Teachers' Proficiency (TEP) was negatively related to Performance of Mathematics

students (STP) in Secondary Schools in Makurdi Metropolis, Benue State, Nigeria and the relationship is statistically significant ($p < 0.05$) the relationship is in line with *a priori expectation*. This means that a unit increase in Discussion Method (DSC) will result to a corresponding increase Performance (STP) of Mathematics students by a margin of 54.4 %.

Using the probability value of the estimate, $p(b_3) > \text{Critical Value of } 0.05$ confidence level. Thus, we accept the null hypothesis. That is, we accept that the estimate b_3 is not statistically significant at the 5% level of significance. This implies that Teachers' proficiency has no significant effect on the performance of Mathematics students in Secondary Schools in Makurdi Metropolis, Benue State, Nigeria. Goeke (2013) in a comparative study of Indian and American high schools that performed outstandingly in mathematics, found a contrary result. The researcher found that content knowledge with experiential and professional knowledge plays an important role in assisting teachers to adapt curriculum contents and thus influences teachers' teaching proficiency and learners' performance in mathematics..

5.0 CONCLUSION AND RECOMMENDATIONS

Conclusion

Research into teaching method is very important due to the recognition that individual differences exist among students, feedback is important for student learning, teaching strategies are very important for students to learn well, use a variety of evaluation procedures is necessary, career guidance should be provided as necessary, and teachers should set achievable objectives for lessons. Demonstrations and discussions methods have been found to

have a statistically positive effect on the performance of students in the study area. Hence, Mathematics is undoubtedly considered an important subject not only in its own right as a field of study and research, but also because of its importance to almost every field of intellectual endeavor. It was found to help in preparing and sharpening the intellectual capacity of individuals and members of the society for meaningful, active, and purposeful participation in the society. It is in this regard that this study identified that the various mathematics teaching methods be designed to develop the student's ability to think at various stages of study by the school.

Recommendations

Based on the findings of this study, the following recommendations are made:

1. It was recommended among others that efforts should be made by teachers in thoroughly integrating demonstration methods in their teaching.
2. Efforts should be intensified by teachers to aggressively adopt discussion method in teaching in the selected secondary schools as it has been shown to have a much larger effect on academic performance of the students in the study areas.
3. More qualified teachers should be sent to the study areas to help improve the teaching and learning of mathematics as teachers' proficiency was negatively related to students' performance in the study areas.

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