

Strategies to Improve Nigerian Students' Performance in Mathematics

Udonsa, A. E.

Mathematics Department

Federal College of Education, Yola, Adamawa State, Nigeria

ABSTRACT

This study adopts the survey research design to examine the strategies that should be adopted in order to improve Nigerian students' performance in mathematics. The aim is to spot out some of the reasons responsible for the alarming rate of failure in mathematics especially in public examinations and the possible ways to overcoming them. Sample for the study comprises 10 mathematics and 20 non mathematics teachers selected from the College of Education, Yola. Questionnaire was used to collect data for the study using five point likert scale of strongly agree, agree, undecided, strongly disagree and disagree. Analysis was done using tables and frequency counts. The hypotheses were tested using Chi-square. The research showed that the qualification possessed by a mathematics teacher has a great positive effect on the learners. However, adequate and availability of facilities such as library, mathematics laboratory are necessary in order to improve on the students' poor performance in mathematics. Based on the findings of this work, it is proposed among others that qualified and adequate mathematics teachers should be employed in our schools.

Keywords: *Students' poor performance, mathematics, public examination*

INTRODUCTION

The transfer of knowledge and skills to the students is made possible through teaching. According to Olatunji (1996) cited in Olatunji (2007), teaching is a social function aimed at guiding the necessary growth in others. Similarly, Nwachi (1991) cited in Atanda and Lameed (2006) views it as the impartation of knowledge from one person to another and the guiding of someone to behave in a particular manner. Mathematics is one of the subjects recommended in National Policy on Education as one of the core and compulsory subjects in both the primary and the post-primary schools in Nigeria. The importance of mathematics cannot be over emphasized as the knowledge of mathematics is required by every facet of our daily lives. It is absolutely indispensable in the world of science and technology and which no nation can develop without its appropriate knowledge. Despite its importance, it is disheartening that students performance in the subject at external examinations like WAEC, NECO and NABTEB have been consistently, persistently and unrelentingly poor, consecutively (Alex, 1989; cited in Popoola and Olarewaju, 2010). From national level, available data has shown that in the Secondary School Certificate Examination (SSCE) NECO of 2004, (34.6%) of the candidates failed mathematics; (25.7%) failure was recorded in 2005; while that of 2006 was (21%).

Similarly, (21%) failure was recorded in 2007; and (8.3%) in 2008 (WAEC; extracted from FRN, 2009). However, various scholars at various times had contributed their ideas to the development of what has now become Mathematics (General or Further Mathematics). For instance, Aristotle (384-322 BC) brought the idea of logic; Apollonius of Perga introduced the Parabola; Al-Karaji of India introduced the algebra; Algorithmi of India brought the idea of algorithm; Trigonometry which was introduced in Europe in 1595; Gottfried Wilhelm developed the calculus, John Napier and Jost Burgi invented the logarithm in Europe in the 17th century, and a host of other contributors.

In Nigeria, before the introduction of Western education, there were indigenous systems of counting and variety of human experiences such as counting rhymes, concrete objects, folklores and games were used to promote practice and dexterity (Taiwo 1980; Fafunwa 1974; Fafunwa 2004 and Imam 2012). With the coming of Europeans merchants and missionaries, several schools were built to facilitate evangelism and trading and arithmetic was introduced for purposes of handling money, determining the prices of foodstuff, and prosecuting daily businesses (Fafunwa, 1974; Ozigi and Ocho 1981; Basse, 2009; *en.wikipedia.org/wiki/Missionary*; <http://www.onlinenigeria.com/education>). Thus, arithmetic became the basic mathematics of that era. Later, algebra, logic, etc were also introduced (www.onlinenigeria.com/education/); (Abdulkareem, 1990).

As from independence, education was viewed as the tool for eradicating poverty and effecting national development and mathematics was considered to have a pivotal role in actualizing this purpose (Jaiyeoba 2011; Betiku 2001; FRN 1981; Tikly 2001 cited in Imam 2012). In the twentieth century, mathematics was conventionally viewed as a touchstone of intelligence and whetstone of scientific and technological innovations due to its connection to all fields of sciences (Udousoro 2002; Adeoye 1991; First Tutor 2012; Edukugho 2010). Consequently, this study explores the strategies that could be used to improve Nigerian students' performance in mathematics. The aim is to exhume some of the reasons responsible for the alarming rate of failure in mathematics especially in public examinations. Hence, the following hypotheses were formulated to guide the study.

- i) There is no significant relationship between having qualified mathematics teachers and poor performance of students in public examination in mathematics.
- ii) There is no significant relationship between facilities such as libraries and mathematics and poor performance of students in public examination, such as those organised by West African Examination Council (WAEC), National Examination Council (NECO).
- iii) There is no significant relationship between having conducive environment for teaching and learning of mathematics in Senior Schools and other public examinations.

- iv) There is no significant relationship between instructional materials available in teaching mathematics and poor performance of students in Senior School examinations
- v) There is no significant relationship between teachers' payment and the poor performance of students in public examinations
- vi) There is no significant relationship between students' interest in learning mathematics and their performance in examinations.

METHOD

This study adopts the descriptive survey research design. The population of the study comprises all the teaching staff of the College of Education, Yola in Adamawa State. However, for purpose of this work, 10 professional mathematics teachers and 20 teachers from other fields of study were purposively sampled. Data were collected using well structured questionnaire. The questionnaire was structured using a five point likert scale of strongly agree (5), agree (4), undecided (3), strongly disagree (2) and disagree (1). The responses were tabulated according to their respective frequencies of occurrence. The relationship between the major variables in the study was determined using inferential statistical tool known as Chi-square.

RESULTS AND DISCUSSION

Table 1 shows that 77% of the teachers, who participated in this study, agree that provision of adequate instructional materials for mathematics lesson can improve students' performance in the subject. Majority of the respondents perceive that regular supervision of mathematics activities by the school authority can improve students' performance in mathematics. While 77% of the respondents agree that provision of adequate instructional materials for mathematics lesson can improve students' performance in the subject, 57% were of the opinion that inter-class mathematics competition can improve students' performance in the subject. On the contrary, more than 50% of the respondents state that the use of teaching aids can foster students' mastery of Mathematics concept. Majority of the respondents disagree with the point that building of more classrooms to increase class population can lead to students' effective learning of mathematics which eventually improves performance. In the same vein, 63% of the respondents disagree that Standard class size of (1 teacher to 35 students) is necessary for effective performance of students in mathematics. In addition, 60% of the respondents opine that regular practicing of past WAEC questions in mathematics can improve student performance. While 73% of the respondents agree that student performances in mathematics can be improved through the provision of only qualified mathematics teachers, 27% disagree. It is obvious that mathematics is a subject that requires logical thinking and a body of knowledge being imparted to a less experienced person, therefore,

it cannot be taught by just anybody, but by a knowledgeable and well experienced personality who is trained and retrained in the field and have a complete mastering of the subject (Jaiyeoba 2011, First Tutor, 2012 cited in Kenku 1988, Soyemi 1999, Nwachi 1991, Frankena, 1965, Omede 2012 and Kenku 1988). However, there are shortages of qualified mathematics teachers in most public schools and this has culminated into poor quality of learning outcome (Odili, 2006). Ohuche (1989) in (Adebola, Jaiyeoba and Atanda 2011), Fakuade (1973) in Aina (2006) share the same view when they submitted that shortage of qualified Mathematics teachers leads to the production of poor students which concomitantly contribute to their poor achievement in the subject. Similarly, they indentify other factors like; lack of qualified teachers, poor background at the elementary level, lack of encouragement from parents, and misconception of the subject, as causes for students failure in the subject. A subject like mathematics requires one who possesses full knowledge and has complete understanding of the nitty-gritty of the subject and the ability to transfer it effectively to students. Quality teachers are therefore required for this task (Etuk, Etudor, Nwaoku and Etuk 2006). Aina (2006) points out the implication of having unqualified mathematics teacher when he says:

This shortage in the number of mathematics teachers has led to borrowing teachers who are specialists in other disciplines like chemistry, physics, economics, engineering etc. to teach mathematics. In many cases such borrowed teachers are not professional teachers i.e. they are not trained teachers. Hence, they lack both the adequate knowledge (since they are not mathematics specialists) and the teaching methods required to teach mathematics effectively.

In essence, it means that shortage of qualified teachers leads to mathematics teaching being handled by incompetent hands that in turn can only produce poorly bred mathematics students. Consequently, students become the victim of poor teaching (Aina, 2006). If there are fundamental hiccups, errors, gaps in the process of learning, there must be difficulty with the students passing very well” (Adesulu, 2012). According to Abimbade (1995), limited background preparation in Mathematics is one of the causes for students’ poor performance in the subject. This agrees with the opinion of Aina (2006) who states that when a syllabus at lower level (for instance Junior Secondary School level) is not completed, or not properly understood by students, it may hinder the understanding of what is to be learned at a higher level (Senior Secondary level). She added that a notable occurrence in schools is that, in many cases, mathematics syllabus of a particular class are not completed, either due to lack of time or through a deliberate avoidance of some topics that the teacher is not comfortable with. This creates problems for them at the next level of learning. In the same manner, First tutor (2012) quoting Kenku (1988) attributes it to poor foundation laid at the primary school level. It is the cumulative of 11 years study that is reflecting on the final year examinations

(Adesulu, 2012). This is in consonance with the view of Onwudidgwu and Ajumobi (1988) in First Tutor (2012) who attribute it to negative perception of the subject from primary school level. The assertion below explains better:

The teaching of mathematics is wrongly handled at the primary school into the secondary school with negative opinion already formed about mathematics as a subject of study. The end result is that of mass failure of Students at SSCE in Mathematics in our schools.

First Tutor (2012) quoting Onwudidgwu and Ajumobi (1988), Amazigbo (2000), Popoola and Olarewaju (2010) seems to have shared similar opinions by identifying specific variables, such as poor primary school background in mathematics, students lack of interest, incompetent teachers in the primary school, large class population, fear of the subject psychologically, etc as reasons for students failure in the subject. There are several factors which compete with students' attention, especially in this age of information technology (Patterson, 2008). Many students spent more time for unfruitful pleasure such as browsing and chatting on facebook, MySpace, twitters, watching movies or playing video games endlessly instead of reading their books (Ofoegbu, 2005 cited in First Tutor 2012). These electronic devices provide a constant stream of entertainment that the students have gotten used to and thus divert their attention from academic activities (Patterson, 2008; Ogedebe, Emmanuel and Musa, 2012). It is therefore impossible to record good performance in the midst of this lack of academic diligence (Patterson, 2008). Hence, Undue distraction from unproductive use of Social network is a factor to students poor performance in mathematics.

Students' low performance in mathematics has been attributed to poor government policies (Odili, 2006). Evidence has shown that the politization of education for the purpose of giving basic education to all has led to automatic promotion of students from primary to secondary schools; hence, unqualified students are promoted up to examination classes which have adversely affected their performances in public examinations. It is further argued that frequent changing of ministers and commissioners of education by successive government have led to incomplete implementation of educational policies which eventually impede good success.

While Moses (2013) attributes students' failure in mathematics to inadequate revision and overstress, he therefore advises that students should spend time to practice past questions. This agrees with the *Law of Exercise* which states that successive repetition of stimulus leads to response and strengthens learning. In other words, learning is effective if the learner re-learns the material taught (Lawson, 1965). Mathematics Anxiety and Phobia is another factor. Many students often approach mathematics with trepidation and thereby considered it a riddle that cannot be reckoned with. Speaking further on this, Mutai (2011) and Bryl (1983) assert that students who developed fear towards mathematics or their mathematics teachers

are creating room for flaccid success. Similarly, Yahya (2012) argues that poor performance in mathematics stemmed from anxiety and fear. This is in consonance with the opinions of Amazigbo (2000), Udousoro (2000), Popoola and Olarewaju (2010). To this effect, some students refused to improve on it in the secondary level and this is carried over to tertiary institution. Amazigbo (2000) states that fear or panic impaired cognitive ability of students in the class. Consequently, the students tend to solve simple calculations wrongly under examination fear and tension.

Students Cognitive deficit and Psychological factor: Research indicates that there are a number of reasons that culminate to student failures in mathematics which are identified as follows:

Lack of Confidence and Building a Negative Perception of Mathematics:

Students who experienced continuous failure in mathematics have already expected to fail. Their lack of confidence compel them to rely on assistance and when there is none failure takes up.

i. Memory deficits: This plays a significant role in students’ mathematics learning process. Many students demonstrate difficulty in remembering mathematical formula and answering questions that require logical reasoning.

ii. Attention Problems: Mathematics requires a great deal of attention, particularly when multiple steps are involved in the problem solving process. During instruction, students who have attention problems often “miss” important pieces of information.

iii. Meta-cognitive Thinking Deficits: Meta-cognition has to do with students’ ability to monitor their learning efficacy, evaluating it themselves to ascertain whether learning is actually taking place, employing strategies when needed, knowing whether a strategy is successful and, making changes when needed. These are essential skills for any problem solving situation. Because mathematics is problem solving, students who are not meta-cognitively adept will likely slack down (<http://fcit.usf.edu/mathvids/understanding/understanding.html>).

Table 1: Teachers’ responses on strategies to improve students’ performance in Mathematics

Items	5 SA	4 A	3 U	2 SD	1 D	Decision
1. Provision of adequate instructional materials for mathematics lesson can improve students’ performance in the subject.	20	3	-	5	2	Agree
2. Student performances in mathematics can be improved through the provision of only qualified mathematics teachers.	19	3	-	6	2	Agree
3. Regular supervision of mathematics activities by the school authority can improve students’ performance in mathematics.	18	4	-	5	3	Agree
4. The use of teaching aids can foster students’ mastery of Mathematics concept.	6	8	-	13	3	Agree

5. Inter-class mathematics competition can improve students' performance in the subject.	13	4	-	5	8	Agree
6. Building of more classrooms to increase class population can lead to students' effective learning of mathematics which eventually improves performance	7	3	-	9	11	Disagree
7. Standard class size of (1 teacher to 35 students) is necessary for effective performance of students in mathematics.	4	7	-	11	8	Disagree
8. Regular practicing of past WAEC questions in mathematics can improve student performance.	12	6	-	10	2	Agree

Note: SA = Strongly Agree, A = Agree, U = Undecided, SD = Strongly Disagree; D = Disagree

Source: Descriptive Survey, 2014

Table 2: Summary of Teachers' Responses on Effects of Unqualified Mathematics Teachers on Students' Performance in SSCE Mathematics

Sex	Agree	Disagree	Total
Male	17 (17.6)	5 (4.4)	22
Female	7 (6.4)	1 (1.6)	8
Total	24	6	30

Source: Descriptive Survey, 2014

Table 3: Computation of chi-square contingency table on Teachers' Responses on Effects of Unqualified Mathematics Teachers on Students' Performance in SSCE Mathematics

O	E	O - E	$(O - E)^2$	$(O - E)^2$
			E	
17	17.6	-0.6	0.36	0.020455
30	30	0	0	0.383523

Calculated value = 0.38 Table value = 3.84 (at 0.5% significant level)

CONCLUSION AND RECOMMENDATIONS

It is obvious that a collective effort of all the stake holders (the teacher, the parents, the government and the students) are needed in other to do away with the incessant rate of failure in our schools, especially at public examinations. If appropriate steps are taken to address these problems, then failure will be a thing of the pass. Based on the findings, the following recommendations are made:

- i) Qualified and adequate mathematics teachers should be employed in our schools.
- ii) Facilities such as well-equipped libraries and mathematics laboratory should be provided to all senior secondary schools for the performance of the students to improve.
- iii) The school environment should be conducive for teaching and learning to further enhance performance.
- iv) Instructional material for teaching mathematics should be adequate and available to assist the students to improve their performance. Where there is no 'live' material improvisation is necessary.

- v) Mathematics teachers should be motivated by Government to boost their morale for teaching in order to improve students' performance.
- vi) Students should put in more effort and develop interest for mathematics as the core subject to enhance their performance.
- vii) The school principal should create more awareness and award for excellent in order to motivate the students.

REFERENCES

- Abimbade, A.** (1995). *Mathematics Method 2*. Centre for External Studies, Faculty of Education, University of Ibadan (TEE 333).
- Abdulkareem, Y. A.** (1990). *A guide on Historical Foundations of Education in Nigeria*. Ilorin: Ibraheem Kewulere Commercial Press.
- Adesulu, D.** (2012). News ANALYSIS: On The Tracks of Mass Failure in NECO Exams, (online) retrieved at <http://www.vanguardngr.com/2012/04/news-analysis-on-the-tracks-of-mass-failure-in-neco-exams>, on July 22, 2013).
- Adebola, O., Jaiyeoba, O. A. and Atanda, A. I.** (2011). School Quality Factors and Secondary School Students' Achievement in Mathematics in South-Western and North-Central Nigeria. *The African Symposium: An Online Journal of the African Educational Research Network*, Volume 11, Number 1, (June, 2011), Retrieved at http://www.ncsu.edu/aern/TAS11.1/TAS11.1_JaiyeobaAtanda.pdf on May 27th, 2013.
- Adeoye, B.** (1991). Mathematics, prerequisite for successful learning of Physics. *Journal of Mathematics Association of Nigeria*, (Online) Retrieved at www.iiste.org on July 16, 2013.
- Aina, M. E.** (2006) *Instructional Techniques and Methods in Schools Mathematics: MED 518*, National Open University of Nigeria, the REGENT (Printing & Publishing) Ltd.
- Amazigo, J. C.** (2000). *Mathematics Phobia Diagnosis and Prescription*. National Mathematics Center, First Annual Lecture, Abuja, July.
- Atanda, A. I. and Lameed, W. O.** (2006). *Fundamentals of school organization and classroom management*. Ibadan: Awemark Industrial Printers.
- Bassey, M. O.** (2009). *Missionary Rivalry and Educational Expansion in Nigeria, 1885-1945*. The Edwin Mellen Press; Scholarly Publisher of Academic Research, (Online) Retrieved at <http://mellenpress.com/mellenpress.cfm>, on June 29, 2013.
- Betiku, O. F.** (2001). Causes of Mass Failure in Mathematics Examination among Students: A Commissioned paper presented at Government Secondary School Karu, Abuja Science Day, 1st March.
- Bryl, P. G.** (1983). *A Descriptive Study of Mathematics Anxiety*. Ph D. Thesis Indiana University Dissertation abstract international A3 (8), 583.
- Edukugho, E.** (2010). Nigeria: Why We Want Mental Arithmetic in Primary Education. Vanguard, Retrieved at <http://www.vanguardngr.com>, on 12th June, 2013.
- Etuk K. G., Etudor E. E., Nwaoku A. N. and Etuk U. R.** (2006). Teaching Staff Quality and Teaching Effectiveness: A Panacea for Quality Assurance in Akwa Ibom State Higher Institutions. *Nigerian Journal of Educational Administration and Planning*, 6(2), 107-119.
- Fafunwa, A. B.** (2004). *History of Education in Nigeria*. Ibadan: NPC Educational Publishers Ltd.
- Fafunwa, A. B.** (1974). *History of Education in Nigeria*, London: George Allen and Unwin.
- Federal Republic of Nigeria** (1981). *National Policy on Education* (2nd Edition) Lagos: Nigerian Educational Research and Development Council Press.

- Federal Republic of Nigeria** (2009). *Annual Abstract of Statistics*. Abuja: National Bureau of Statistics.
- First-Tutor** (2012). Education Has Now Become a Weapon In Nigeria (Online) at www.firsttutor.blogspot.com, Retrieved on 28th April, 2013.
- Lawson, R.** (1965). *Learning and Behaviour*. New York: Macmillan.
- Imam, H.** (2012). Educational Policy in Nigeria from the Colonial Era to the Post-dependence Period. (Online) *Italian Journal of Sociology of Education*, 1, 2012, retrieved at www.ijse.eu/index.php/ijse/article/viewFile/142/144, on 20th May, 2013.
- Jaiyeoba, A. O.** (2011). Primary School Teachers' Knowledge of Primary Education Objectives and Pupil Development. *The African Symposium: An Online Journal of the African Educational Research Network*, 11(1), June 2011.
- Moses, A.** (2013). 5 Reasons Students Fail their Exams (Online) Retrieved at <http://www.leaderinlearning.wordpress.com> on September 2nd, 2013.
- Mutai, H.** (2011). Reasons why students fail in mathematics (online). Retrieved at www.kenyaplex.com/...reasons-why-students-fail-in-mathematics.aspx on July 16, 2013.
- Odili, G. A.** (2006). *Mathematics in Nigeria Secondary Schools. A Teaching Perspective*. Port-Harcourt: Rex – Charles and Patrick Ltd.
- Ogedebe, P. M., Emmanuel, J. A. and Musa, Y.** (2012). A survey on Facebook and Academic Performance in Nigeria Universities. *International Journal of Engineering Research and Applications*, 2(4), 788-797, July-August 2012 (Online) Retrieved at www.ijera.com on June 30th, 2013.
- Olatunji, B.** (2007). WAEC: Edo Tops list of Average Performers, Abuja. Accessed Online at <http://www.nairaland.com/waec-results> 2000-2007. Retrieved on September 12, 2013.
- Ozigi, A. and Ocho, L.** (1981). *Education in Northern Nigeria*. London: George Allen and Unwin Publishers Ltd.
- Patterson, E.** (2008). Why Do High School Students Fail Algebra? *Yahoo! Contributor Network*. (Online) retrieved at <http://voices.yahoo.com/why-high-school-students-fail-algebra-html>. On June 30, 2013.
- Popoola, F. R. and Olarewaju, R. R.** (2010). Factors Responsible for Poor Performance of Students in Mathematics in Nigerian Secondary Schools. *Journal of Research in Education and Society*, 1 (2 & 3), 55 - 65
- Taiwo, C. O.** (1980). *The Nigerian Educational System*. Lagos: Thomas Nelson Nigeria Limited.
- Udousoro, U. J.** (2002). The Relative Effects of Computer and Text: Assisted Programmed Instruction on Students' Learning Outcomes in Mathematics, Unpublished Ph. D. Thesis, University of Ibadan, Ibadan.
- Yahya, A. S.** (2012). Strategies to Reduce Pathological Fear in Mathematics among Secondary School Students in Adamawa State, Nigeria. *JPAIR: Multidisciplinary Journal*, Vol. 8 March 2012.