Factors Affecting Senior Secondary Certificate Examination Candidates' Performance in Mathematics: A Study of Selected Secondary Schools in Yola South Local Government Area of Adamawa State, Nigeria

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ABSTRACT

This study was conducted to assess the factors attributing to students' poor performance in Senior Secondary Certificate Examinations (SSCE) and other public examinations in mathematics. The research was carried out in six (6) randomly selected senior secondary schools in Yola South Local Government Area of Adamawa State and the data were obtained from 120 respondents (90 Students and 30 mathematics Teachers). The findings revealed some of the factors attributing to the poor performance of students in mathematics at public examinations and suggested workable strategies that could be adopted to improve students' performance in Mathematics.

Keywords: *Poor performance, attitude and improvement strategies.*

INTRODUCTION

Mathematics is a fundamental science that is necessary for the understanding of most other fields in education. This conception validates the view of Udousoro (2000) who stated that, the knowledge of science is superficial without mathematics. It is conceptualized that mathematics is a body of knowledge that exposes one to logical reasoning, analytical evaluation and critical thinking. Mathematics could be defined as the study of qualitative relations; or the science of structure, order, numbers, space and relationships about counting, measuring and describing of shapes and objects. It is also seen as a body of knowledge that opens up the mind to logical reasoning, analytical thinking, creative thinking, deep focusing and clarity of thought and precision. Therefore, to effectively understand the factors that attribute to the poor performance of students in mathematics in the Senior Secondary Certificate Examinations and plan for a better future, knowledge of the past is inevitable. The history of modern mathematics in Nigeria is traceable to the introduction of arithmetic by the European missionaries. Prior to this era, Nigeria had an indigenous mathematics which came in the form of counting, and a variety of human experience was used to promote practice and dexterity in enumeration (Fafunwa, 1974, Taiwo, 1980). The missionaries introduced this branch of mathematics called arithmetic in order to inculcate counting and numeracy skills which was mostly needed to foster business transaction and other demand of the new age (Fafunwa,1974). However, during the twentieth century, a

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high precedence was given to mathematics as it was considered to be a foundation for scientific, technological and economic development. To this end, it is imperative to note that, the study of mathematics as a subject began in the Ancient Greek in the 6th century when the term "mathematics" was coined out by the Pythagoreans from the word "mathema" which means "subject of instruction" (Heath, 1981). The idea of counting in mathematics came up in the Hunter-gatherer societies for the purpose of division of property, demarcation and measurement. To this effect, there was a reform in the curriculum between 1930s and 1950s which led to a new setting in the aims, content and organization of mathematics (Lassa, 1977 and Ohuche, 1978 cited in First Tutor 2012, Osibondu, 1988). Consequently, Mathematics Education was given its rightful place in curriculum development in Nigeria educational history, and topics in algebra, geometry, trigonometry, etc were taught in mathematics. Due to the demand of the new age, another reform took effect leading to the emergence of modern mathematics curriculum which started in the early 1950s and reached its climax in the 1960s. The reform became more intensified in the 1960s as a result of the successful launching of the *Sputnik* (the first earth satellite in space in November 1957) by the former Union of Soviet Socialist Republic (USSR). Mathematics was considered as the backbone of this technological breakthrough. Therefore, this period witnessed radical departures from the arithmetic ideology to a technologically driven modern mathematics (Osibondu, 1988). This development was based on the notion that improved mathematical skills would be of tremendous advantage to students' excellent performance in the scientific and engineering field. To test students' skills and mastery of the subject, it became one of the compulsory subjects in senior secondary certificate examinations in Nigeria. If mathematics is given such a high precedence, *what then are the factors attributing to the poor performance of students in mathematics?* Before this question is answered, let have an overview of the past records.

Candidates Performance in Mathematics in Public Examinations (2004-2012)

For instance, in 2004, (34.47%) of the candidates failed mathematics in WAEC. In 2005, the failure rate stood (34.41%). (24.95%) in 2006, (24.24%) in 2007; while that of 2008 came down to (17.07%), (Salman, et al, 2012). In 2009, the failure rate was 27.09% and in 2010 WAEC has shown that (80.78%) failure was recorded in Mathematics and English Language. About 60.1% failed in 2011 WAEC results and the 2012 WAEC result has shown that only (9.7%) of 1,672,244 candidates obtained credits passes (credits or Distinction) in Mathematics. In expressing dissatisfaction over the consistent mass failure, the former Minister of Education (Professor Rugayyatu Rufai) disclosed that the May/June 2011 WAEC result was not better either as only (39.9%) candidates obtained five (5) credits and above including mathematics and English Language (representing 60.1% failure rate) while NECO result of the same year 2011 failure rate stood at (8.06%). Similarly, in 2012 NECO, only (31.58%) scaled through by obtaining a total of five credits and above with mathematics and English Language inclusive (NUC, 2012). A statistical data on the level of students' performance across the country shows that the Northern part, especially, North-East states performed poorly in the May/June 2012 WAEC. For

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instance, out of 21,233 candidates that sat for the examinations in Gombe State, only 906 (4.27%) scaled through. In Adamawa State, only 1706 (5.26%) candidates made it out of 32,410 candidates (NUC, 2012). NABTEB results of 2003 – 2007 showed similar poor achievement in the subject as 21.01% failed in 2003, 23.14% in 2004, (23.08%) in 2005, (16.52%) in 2006, and (18.81%) in 2007 (FRN, 2009). Therefore, available records have shown that the performance of students in SSCE Mathematics has continued to wane at alarming rate and many scholars have expressed disappointment over the issue (Onyekakeyah, 2011, Nnabugwu, 2012). In recognition of this perennial academic downturn, many Researchers had made concerted effort in assessing the factors responsible for it.

Some of the factors attributed to the observed poor performance in Mathematics

Inadequate Facilities and Resource Materials: There is a conventional view that the decay or lack of educational facilities such as well-equipped laboratories, standard libraries, standard classrooms, current instructional materials and a host of other related factors limit the chances of students' success in mathematics (Akpan, 1987, Odogwu, 2002, Odili, 2006, Bacharach, Bauer and Shebb's, 1986). Studies have shown significant relationship between adequate facilities and students' academic performance. For instance, Alausa (2013) quoting (Keith 2004) pointed to the size of a library media and other necessary facilities as the best school predictor or consequential factors that should be in place to enhance good academic performance of learners. Therefore, failure is certain where these facilities are inadequate or completely lacking. In supporting this view, the Nigeria Examinations Committee (NEC) also observed that poor infrastructure and manpower deficits in schools and the over population of students are what hindered the preparation of students for WAEC examinations (Alausa 2013).Many scholars are of the view that the poor academic achievement of children is not due to their own inability, but because government has failed in providing the enabling environment for them to succeed. Olatunji, (2007) observed the situation and filed in the report below;

> *"Here is Federal Government which had loudly trumpeted the laudable projection, that every Nigerian should be literate by Year 2000, but never supported the project by ensuring the availability of books in schools to ameliorate the critical shortage of textbooks and library materials, at all levels of education".*

The argument goes that good quality of teachers and government's provision of necessary facilities are the prerequisites for good academic performance of learners. In support of this view, Aina (2006) argues that the consistent poor performance in the subject has been attributed to such factors as negative attitudes of students and teachers, lack of motivation of teachers; and non-availability of instructional materials. Olatunji (2007) documented the report and below is the extract:

> *"A visit to most government secondary school will show to you that the government is not serious with education in Nigeria. For instance, the basic teaching aids that will facilitate knowledge transfer from teachers*

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to students are simply nonexistent. The laboratories are poorly equipped, some science students have never seen test tubes before, even the physical infrastructures like classrooms and libraries are nothing to write home about. So with these factors in place, how do you expect the students to perform brilliantly in examinations? It is just not possible."

Further report on this reveal that governments at all levels have not helped matters with their failure to invest in infrastructure in schools, teaching and learning resources and a rigorous teachers' training programme (Nigerian Compass, 2012).

Lack of teaching aid: Evidence suggests that the quality of teaching and learning is improved when students have ample opportunities to learn, apply, and consolidate new knowledge through practical viewing of abstract issues. In recognition of this, Akinyemi (1983) notes that teaching without relevant and adequate instructional materials and poor relationship with the students is the cause of student failure in the subject (cited in First Tutor, 2012). Many scholars have supported this view by pointing out that lack of Mathematics teaching equipment and instructional materials as some of the reasons attributed to the observed poor achievement in Mathematics (Abimbade, 1995; Akpan, 1987; Odogwu, 2002). The general conception is that a child who has been exposed to a lot of learning equipment and teaching aids like concrete materials, pictures, etc. will easily master the concept than the one who has none of such facilities (Aina, 2006). This is because teaching aids make learning meaningful and relevant to the experiences of the students (Aina, 2006).

The attitude of students towards mathematics: It is argued that, students' factor is the direct cause for their success or failure in mathematics. No matter how professional the teacher is, no matter the amount of instructional materials provided, without the students to exhibit the right attitude and learn with a strong determination for success, all other efforts become unproductive. Thus, Aina (2006) quoting, Mwamwenda, (1995) and Neale (1969), argues that the achievement of students in a subject is determined by their attitudes rather than inability to study. This validates the view of Haimowitz (1989) in Mbugua, et al (2012), who asserted that the cause of most failures in schools might not be due to insufficient or inadequate instruction but by active resistance by learners. Various studies conducted on similar issue have validated the assertion that one of the major factors causing poor performance in Mathematics is the negative attitude of the students (Adegboye,1991, Osafehinti, 1988 and Osibodu, 1988) cited in (First Tutor 2012), Jackson, (1998). Similarly, Ojo (1986) and Wiseman (1970) in (Aina 2006) attributed it to both teachers' and students' attitude towards the subject and added that negative attitude towards Mathematics by students may have resulted from the teachers' own attitude towards the subject. In the same manner, Banks (1964) as cited in (Aina, 2006) sums it up thus: "teacher's attitude and effectiveness in mathematics may be the prime determinants of students' attitudes and performance in the subject"

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Method of teaching: The way mathematics is taught in classroom can affect learners' interest in it. Students are unwilling to learn unless they are somehow involved in the process of learning. They seldom learn much when they are treated simply as passive receptors. Such lack of involvement tends to undermine their drive to think for themselves (First Tutor, 2012). In support of this notion, Udousoro (2000) attributes the low achievement of students in mathematics to the use of traditional chalk and talk methods. He also attributed students' poor performance in mathematics to lack of problem solving skills and poor instructional strategy. According to Akpos (2012), the reason for yearly failure in Mathematics among secondary school students has been traced to teachers' lack of practical skills which would have made the subject interesting and less boring. This deficiency has made students to hate this unavoidable subject (Mefor, 2011).

Lack of interest: Alebiosu (1997) as cited in First Tutor (2012) states that interest is one of fundamental factors necessary for effective Mathematics Education. According to him, having high ability or skills does not guarantees that students will perform successfully on the task, therefore, they need to have an internal drive and a positive mindset about the learning task in order to sustain motivation. This is in consonance with the view of Amazigo (2000) as cited in Ekwueme and Ali (2012), who attributes the poor performance in mathematics to lack of interest and poor attitude of students toward the subject.

Dependence in Examination Malpractices: Due to the increasing demand of paper qualification as parameter for academic achievement, various illicit and crude means have been employed in achieving success 'at a go' (Adesulu 2012, Ahmed 2003, Dora, 1979. This has led to collusion and irregular activities, inside and outside the examination hall and ended in damaging the students study habit and preparation for such examinations (Omede, 2012). In recognition of this, Ezekwesili (former Education Minister) revealed an alarming rate of examination mal-practices aided and abetted by employees of Ministry of Education, subject teachers, invigilators, school principals, supervisors, and even school proprietors as well as staff of examination bodies, etc. Between 2000 and 2006, a total of 232 officials were caught in the act, below is the extract:

> "*State by state analysis showed that Abia recorded 11 personnel, Adamawa 1, Akwa-Ibom 10, Anambra 31, Bayelsa 1, Bauchi 2, Benue 7, Cross River 11, Delta 6, Ebonyi 7, Edo 5, Enugu 6, Ekiti 4, FCT 4, Imo 15, Kaduna 2, Kano 4, Kebbi 4, Kogi 4, Kwara 4, Lagos 3, Nasarawa 3, Niger 1, Ogun 2, Ondo 14, Osun 4, Oyo 9, Plateau 6, Rivers 4 and Sokoto 1"* (Reported by Dike, 2007).

It must also be stated that many school proprietors, education administrators and managers, owners of tutorial centres, parents, compounded issues by conniving with security men to perpetrate examination malpractices in favour of some candidates/their children (Adesulu 2012, Ahmed, 2003). Onyechere,the Founder and Executive Chairman of the Examinations Ethics Project (EEP), also observed the high rate of examinations malpractice and reported as follows:

> "*When you have an educational system in which almost all the people*

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> *in all the sectors are involved in cutting the corners, not just students but parents also encourage students; we are talking about teachers, principals, supervisors and invigilators and we are talking about a situation whereby there is malpractice in primary schools!"*-From Vanguard Newspaper of Thursday, March 04, 2004.

This attitude of dubious assistance for candidates and students, often erode the spirit of serious reading and where there is strict surveillance the result is mass failure not only in mathematics but in other subjects as well (NUC, 2012). The causal factor for this menace has been attributed to mathema-phobia. It is argued that out of fear and anxiety, students smuggled into examination halls with prepared notes and textbooks, which usually led to expulsion or litigation in so many cases (Stephen, 2007 cited in Yahya 2012).

Workable strategies for improvement over poor performance in mathematics

The mathematical centre Abuja has among others embarked on the following measures to improve the teaching and learning of mathematics: (www.nmcabuja.org).

Mathematical games for primary and secondary schools

The production of mathematics games is one of the numerous strategies being employed by the centre to improve the teaching and learning of mathematics in both the primary and the secondary school levels. The objectives of the mathematical games are stated in behavioural, clear and unambiguous manner and are related to the topics contents. Materials used for the games include cards, cardboard, marking pencil, cards with numbers etc. Some of the advantages of mathematical games to the study of mathematics include:

i) Enriching the mathematics vocabularies
ii) Introducing new ideas
iii) Allowing for individual differences
iv) Use of mathematical games can aid the review variety of skills and to reinforce them;
v) Generation of interest and excitement about learning mathematics
vi) Improvement of study habits;
vii) Developing positive attitude and
viii) Developing sense of competitiveness with mathematical motivational potency as well as skills into competitive strategy.

Teaching modules: The centre has designed the mathematics teaching modules to address the problems of what to teach and how to teach mathematics in secondary and primary schools. They are lesson notes guiding the teachers in effective and efficient teaching revealing the background information of the topics, teaching materials needed, teaching procedure and evaluation procedure. The modules have been adjudge to be capable of enabling teachers handle teaching more effectively and improve the students' performance through improved strategies and to arouse and sustain the interest of teachers and students in the teaching and learning process.

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The national incentive scheme project: The incentive scheme was introduced in 1991/92 with a seed grant of N1.25million by the Federal Ministry of Education *(National Mathematical Centre Abuja (www.nmcabuja.org))*. This was informed by the urgent need to arouse and motivate the interest of pupils, students and teachers in the teaching and learning of mathematics at all levels. The scheme includes the incentives such as partial scholarship awards, certificate of merit, book prizes etc for pupils, students and teachers of mathematics/institutions that have attained a measure of excellence in the teaching and learning of mathematics at all levels. Under this scheme, the centre conducts an annual national competitive examination at primary, post primary and tertiary levels and undoubtedly, this has made mathematics more popular in recent times.

Mathematics by Television: This project is aimed at improving the teaching and learning of mathematics through television. The mathematics by Television project is designed to demystify mathematics as a monster; present it as students – friendly assist students' performance considerably better in their examination and to assist students' better cope with the demands of the subject in order to enhance career prospect and development. The centre believes that the this programme will assist in developing the students and teacher/school interest in mathematics; reverse the negative attitude of the students to mathematics, define and influence of mathematics in everyday life, and assist students in appreciating mathematics as a critical subject in their education pursuits.

The mathematical science library project: This is the visual library in practice and is an exposure to a pool of learning resources in a virtual reality through electronic connectivity. The centre intends to extend a network to the primary and secondary schools from the centre in virtual electronic format.

Mathematical facilities: The centre has made provision for adequate mathematical facilities in primary and post primary schools to enhance adequate preparation of students for examinations.

CONCLUSION AND RECOMMENDATIONS

The usefulness of mathematics cannot be overemphasized; it is worrisome to see the rate at which students fail mathematics in public examinations. Hence this paper addresses some of the problems faced by the students with a view to improving on the performance. The strategies for improvement above are inexhaustible; other useful ones to be adopted for amelioration of performance include:

i) The government should give necessary encouragement to teachers of primary and secondary schools in the form of study leave/leave of absent for further study and sponsor them to mathematics workshop and congresses.

ii) The head teacher/principal should liaise with professional organizations to organize seminars and symposiums, as well as conferences for teachers to create awareness and developmental needs in mathematics for national development.

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