
MATHEMATICS TEACHING AND LEARNING PROCESSES IN SECONDARY SCHOOLS IN NIGERIA: CHALLENGES AND PROSPECTS

John Aduwa, Ph.D
Government Secondary School,
Ogbia Town, Bayelsa State, Nigeria
Email: aduwayjohn4@gmail.com

ABSTRACT

The article discussed the challenges and prospects of mathematics teaching and learning processes in secondary schools in Nigeria. Various past research studies and personal mathematics teaching experiences of the author were examined. Mathematics teaching and learning, and mathematics itself, were critically and logically discussed in this paper. The article defined Mathematics teaching as the intellectual ability of the mathematics teacher in applying the appropriate teaching techniques/methods in disseminating Mathematics contents to the learners in order to effect changes in their behaviours. Challenges militating against mathematics teaching and learning were also discussed. Negative attitudinal behaviour of students, non implementation of educational policies in Nigeria, examination malpractice, lack of instructional materials among others highlighted and discussed were the problems affecting Mathematics teaching and learning processes in Nigerian secondary schools. Stringent measures to be put in place by the appropriate authorities for effective mathematics teaching and learning were recommended. The paper concluded that the future of mathematics teaching and learning will be very bright in the secondary schools, and hence improve science and technology advancement, if all Nigerians shun corruption and do what is right at all times.

Keywords: Challenges, Mathematics Education, Remedies, Secondary Schools

INTRODUCTION

No doubt, mathematics is one of the core subjects offered by all the students in secondary schools in Nigeria. It is a unique subject where students, irrespective of their proposed disciplines, are required to offer the subject at the Secondary School. As the name of the subject mathematics sounds, it is expected to be studied with joy by all the students at this level of education. But, the reverse is the case to some students and even the mathematics teachers themselves. As we all know from the literature, mathematics is a science of numbers. Although, mathematics as a subject has been defined by many scholars in different ways. Based on this, the subject has no universal definition, but in all, the definitions centered around numbers. For the purpose of this paper, the writer will briefly use some of the definitions of mathematics structured by some of the scholars.

Neliland Nichel (1986) defined mathematics as a set of precise and logical languages that lead to interesting activities applied to everyday life. Also, Ogunimoyela (1986) defined the subject as the bedrock of all scientific and technological breakthrough and achievement. Ogunimoyela (1986) stresses that most of other subjects and disciplines rely on mathematics that will lead to the development of the economy. Obodo (2000) defined mathematics as the language that uses carefully defined terms and precise symbolic representations which add precision to communication. Ezenweani (2006) viewed mathematics as the branch of knowledge that seeks to improve on human perception of himself and his immediate environment by using clear, logical, precise and exact thinking processes. In all, there is a definition of mathematics that was structured by Aminu (2005) that embraces nearly all the definitions made by other scholars. According to Aminu (2005), mathematics is defined as the study of numbers systems, symbolic language, shapes, sizes, spaces, patterns, relationship, science of generalization and measurements. This definition made by Aminu (2005) seems to be the conceptual framework within which the subject mathematics operates. One thing with mathematics, whatever rules emanated as a result of the subject does not contradict themselves in their applications. The teaching and learning of mathematics is very unique in the sense that, it cannot be handled indiscriminately by the students and teachers. The teaching and learning of the subject in the secondary schools required the logical reasoning and concentration of the teachers and students. Sometime, these logical reasoning and concentration are lacking in the minds of both the students and teachers during teaching and learning processes in the secondary schools.

Therefore, this paper intended to x-ray mathematics teaching and learning, challenges encountered during teaching and learning and the ways forward in our secondary schools in Nigeria.

Mathematics Teaching

Mathematics teaching and Mathematics itself, technically, they are not the same. Teaching is the mental ability of a person to lead, another person to gain knowledge. In support of this definition, Ezenweani (2002) defined teaching as the ability to guide one to gain knowledge. From the first definition, the mental ability of a person refers to the teacher. The teacher must first of all acquire appropriate sound knowledge of mathematics in both contents and methodology from the competent tertiary institutions. In support of this assertion, Kolawole (1994) stated that for effective learning, the teacher should have adequate knowledge and background of the subject matter (content) and for successful teaching, a

good methodology is required. Also, another person as used in the definition referred to the student. Teaching is the teacher behaviour or activities designed and performed to produce change in student's behaviour (Opote-Imala, 1998). According to Opote-Imala (1998), it is when there are positive changes in the behaviour of the student as a result of exposure to the subject matter, it is then we can say that teaching has taken place.

Onwuka(1990) defined teaching as a creating or providing opportunities from which learner can gain some experiences that will enable him acquire the knowledge, skills, attitudes and appreciation that will serve as tools in life. Also, Pincent (1992) defined teaching as the provision of experiences and guidance of activities designed to promote learning on the part of those engaging in the activities. In addition, Saylor and Allexander (1974) saw teaching as the act of systematically presenting stimuli and cue, that it is a polymorphous activity that takes many different forms. All the definitions stated above by different scholars are the general definitions of the teaching. The question is, what is mathematics teaching?

Mathematics teaching is the intellectual ability of the mathematics teacher in applying the appropriate teaching techniques/methods in disseminating mathematics contents to the learners in order to effect changes in their behaviours. Like what I said earlier, mathematics teaching and mathematics itself, technically, they are not the same. Those that are involve in the teaching of mathematics to our students must be professional teachers trained in both contents and methodology. From the definition of mathematics teaching given by the writer above, embraces both content and methodology.

Mathematics Learning

Learning and teaching are like tail and head of a coin, both of them complement each other. There will be no meaningful teaching without learning. Teaching generally, and indeed, mathematics teaching, have been defined and explained in this paper. A child learning started from the day he or she was born and throughout his or her life time. Learning will only stop when the person no longer exists on planet earth. According to the behaviourists quoted by Huitt and Hummel (2006), learning is a relatively permanent change in behaviour brought about as a result of experience or practice. In most cases, this is a general definition of learning. From the definition of learning above, whatever to be learned (content) must be relatively permanent in the life of the learner. Also, the relatively permanent change in behaviour was brought about as a result of teaching.

According to Verschaffel, Van Dooren and De Smedt (2012), mathematics learning can be broadly defined as the acquisition of new knowledge and skills that are related to quantity, space, and structure. According to the authors, knowledge and skills are the mathematics contents acquired by the learners. Also, the authors stressed further that the ability to learn mathematics as a subject is possessed by humans. Mathematics learning is the acquisition and relatively mastering of mathematics contents brought about as a result of teaching. Although, there are several ways a child can learn mathematics through teaching. It can be face to face contact with the mathematics teacher, online through electronic equipment or solving problems from mathematics textbook, etc. The essence of all these is to acquire the needed skills that will enable the child solve mathematics problems (contents) either at the moment or in the nearest future. With this, somebody can now say that learning of mathematics has relatively taken place.

Challenges Encountered During Mathematics Teaching and Learning Processes in Secondary Schools

Challenges encountered during mathematics teaching and learning processes in secondary schools are numerous. The challenges that will be highlighted and discussed in this paper are interdependent. In other words, the challenges are cyclical in nature. Below are some of the challenges confronting mathematics teaching and learning processes in secondary schools.

1. **Negative Attitudinal Behaviour of Students, Teachers and those concerned in Education:** Negative attitudes of some students toward mathematics in the classrooms are very worrisome. Negative attitudes of students are the result of frequent and repeated poor performance in mathematics (Nicolaidou and Philippou, 2003). A student that indicates negative behaviour towards the subject, such student cannot be attentive to what is been taught in mathematics class by the teacher. Also, a teacher with negative attitudes toward mathematics teaching cannot be effective in the classroom. Such teacher cannot be effectively prepared his or her students for mathematics external examination. Those concerned in education as used in this paper refers to the parents and the society. A situation where the parents will be telling their children that mathematics is a difficult subject is not encouraging. This is also applicable to the society.
2. **Non Implementation of Educational Policies in Nigeria:** Nigeria as a country has very good educational policies. The problem here rests on those that are charged with the responsibility of implementing those educational policies toward competent and functioning secondary school with respect to mathematics teaching and learning. Every year, Federal and State Governments budgeted huge amount of money to education. But how effective this money is been spend on education is not known to Nigerians. Although, the 26% of the budget recommended by the UNESCO to education is not followed by Federal Government of Nigeria and indeed, State Governments. Also, the little percentage of the total budget allocated to education is not well utilized by those concerned. The consequent of this is that various aspects of education including mathematics teaching and learning in Secondary Schools will suffer.
3. **Examination Malpractice:** Examination malpractice is the illegal channel of passing internal and external examinations in Nigeria by the students. Right now, the levels of examination malpractices in Nigeria, especially at the secondary school during external examinations like WAEC and NECO, have gone out of hands. At the secondary school level, some mathematics teachers and principals have tuned examination malpractices into business. In fact, some of the officers of WAEC and NECO have equally joined the examination malpractices business. This negative practice has affected the attitudes of mathematics students in JSS 1 – SS 2 and even other mathematics teachers that are not involved in the examination malpractices, negatively. On a more serious note, the students already know the quickest way of passing external examinations. The question is, how can the students learn mathematics in the classroom? The students have been instructed by the sponsors of examination malpractices, with their money, they will pass mathematics external examination. By so doing, the minds of the mathematics students have been polluted.

In addition, this unwholesome practice has been even extended to our tertiary institutions which eventually painted the products from such tertiary institutions with bad colour.

4. **Employment of unqualified academic staff to teach mathematics:** With respect to public secondary schools, employment of teachers is carried out by the government. The manner in which such employment of teachers is been carried out is questionable by those concerned. For example, government may gives approval for the employment of 50 mathematics teachers. On the contrary, by the end of the recruitment process, you will discover that only 20 mathematics teachers were employed. On paper, 50 mathematics teachers were employed but in practical, only 20 were employed, the other 30 positions have been exchanged with teachers in other subjects. The result of this is the shortage of mathematics teachers. In some secondary schools, no single qualified mathematics teacher is available to teach the subject.
5. **Poor training of teachers by the tertiary institutions concerned:** The essence of establishing tertiary institutions by the government is to produce needed manpower in the various sectors of the economy including education. Some of the mathematics teachers produced by some of the universities and colleges of education are worst than some of the products from the secondary schools. We have cases where some members of National Youth Service Corps (NYSC) were sent back by their employers from their places of primary assignment because of poor performance.
6. **Lack of instructional materials:** Instructional materials are teaching materials that assist the mathematics teacher to present his or her lesson in a clear and understanding manner to the students in the classroom. Sometimes, these instructional materials are lacking in nearly all the public secondary schools in Nigeria. Teaching mathematics contents without instructional materials does not encourage the learning of the subject. It makes the subject looked abstract before the students and even the teachers. The unavailability of the instructional materials will direct the mathematics teachers to the use of lecture method and hence poor performance of students.
7. **Lack of classrooms for students for effective mathematics teaching and learning:** Majority of secondary schools in Nigeria are lacking classrooms (buildings) for effective mathematics teaching and learning. A situation where a classroom that is meant for 40 students are crowded with 100 students. In such situation, the classroom environment is not healthy for meaningful mathematics teaching and learning. This is been caused by the unavailability of school buildings. According to Ochonogor and Umudhe (2007), the population ratio of students to a teacher in some of our secondary schools was 60:1 and even more in most cases. According to Ochonogor and Umudhe (2007), the population of students in some science classrooms made classroom management very cumbersome by extension rendered science teaching and learning ineffective. The authors further stated that the ideal students – teacher ratio was about 35:1.
8. **Lack of offices for mathematics teachers:** This is also emanated from the point number seven discussed above. As a secondary school teacher, I have discovered that there are some secondary schools where there were no office spaces for teachers to prepare and plan their lessons. Some that managed to provide offices, there are no

chairs and tables. This is very common in our secondary schools located in the rural areas. Mathematics teacher that are working in such schools will not be happy in doing their teaching job.

9. **Poor remuneration and allowances for mathematics teachers:** Frankly speaking, mathematics teachers and indeed, teachers generally in public secondary schools in Nigeria are not well paid by the governments. By the nature of the teaching profession, teachers are supposed to be one of the highest paid workers in Nigeria, but the reverse is the case. Teaching profession that gave birth to the children of other professions has been treated poorly in Nigeria, and hence poor performance of children in schools. As a matter of fact, if this trend is not addressed by the appropriate authority, mathematics teaching and learning will continue to be affected badly in secondary schools.
10. **Lack of official residential accommodation for mathematics teachers:** Mathematics teachers will be posted to secondary schools where there are no official residential accommodations for them. Where do you want them to be accommodated? Infact, some mathematics teachers suffered untold hardship in their places of work as a result of lack of official residential accommodation. By this development, mathematics teachers have no choice to look for rented accommodations with their little salaries. This factor has a very serious negative implication on the attitude of the teachers towards mathematics teaching and learning in secondary schools in Nigeria.
11. **Appointment of incompetent schools administrators:** Schools administrators in secondary schools are the principals. Some of the schools administrators by my experienced as a secondary school teacher are not competent in dealing with schools matters. I have witnessed a situation where a particular school principal and a mathematics teacher were not in a good term. This negative relationship between them had affected the mathematics teacher with the fear that the principal might harm him using certain official school records. A principal by his position in the secondary school, suppose to be a father or mother to all academic staff of the school. His or her function is to co-ordinate teaching and learning activities in the school. By my standard, principals with biased mind against any mathematics teacher are not competent in terms of school administration and management. This kind of behaviour among some of the schools administrators is prevalent in some of the secondary schools in Nigeria.
12. **Mass promotion of students to the next class:** Mass promotion of students to the next class as used in this paper refers to the promotion of academically failed students to the next class by some of the principals in the secondary schools or by the students themselves. This kind of promotion of students to the next class is very common to secondary schools in rural areas. With this kind of practice among some secondary schools in Nigeria, has a very negative impact on mathematics teaching and learning and even all the teaching and learning of other subjects. For instance, students that cannot read and write were allowed to proceed to the next class by the schools. For effective teaching and learning of mathematics, promotion of students to the next class must be based on merit.

Proposals for Enhancing Mathematics Teaching and Learning in Secondary Schools

It is obvious that Nigeria's quest and desire for advancement in science and technology depends largely on the effective teaching and learning of science subjects and indeed, mathematics. Based on the information gathered from field investigation, documented literature as well as the author's personal experiences as mathematics teacher, I hereby make the following proposals that could enhance mathematics teaching and learning in secondary schools if implemented.

1. Rebranding of the minds of all Nigerians, irrespective of their positions toward education in a positive manner should be encouraged. It is a personal decision by all Nigerians.
2. Governments at all levels in Nigeria should not play politics with education of our children in secondary schools. All various educational policies should be implemented without fear and favour. No government officials will be in office forever, money allocated to educational sector should be judiciously used by those that were charged with the responsibility to do so (shun corruption).
3. The section of the constitution of Nigeria that deals with the examination malpractices offenders should be perfectly implemented by the appropriate agency of the government. Silent over this portion of the constitution is encouraging examination malpractices in our secondary schools.
4. Various examination bodies in Nigeria should adopt stringent measures in checking examination malpractices in the examination centres during examinations. I want to use this medium to commend the efforts of the current registrar of JAMB on the introduction of CCTV cameras to all JAMB centres used in monitoring the conduct of students during JAMB examination. This effort of JAMB has yielded good result. Other examination bodies like WAEC and NECO should emulate JAMB in conducting their examinations.
5. Adequate number of sound academically and professionally qualified mathematics teachers should be recruited by the governments. Such recruitment exercise should be placed in the hands of the competent and corruption free educational firm (consultant).
6. Faculty of Education in the various Universities and Colleges of Education that were charged with the responsibility of training of mathematics teachers should ensure that only qualified and competent mathematics teachers are produced. The institutions should not compromise their standard in the training of the mathematics teachers.
7. Adequate school facilities such as instructional materials, classrooms, offices and residential accommodations should be provided by governments at all levels in Nigeria.
8. Mathematics teachers' remunerations, allowances and other fringe benefits should be improved and regularly paid as at when due in order to encourage and motivate them on the teaching profession.

9. Some of the secondary schools in the rural areas that are very close to each other should be merged as one school. This will enhance effective maintenance and management by the governments.
10. Only competent principals should be appointed to manage secondary schools. The appointment of such principals should be based on a well conducted interview by the appropriate agency of government. Also, the appointment of principals based on grade level only as currently practiced by some States should be discouraged.
11. Promotion of students to the next class should be based on merit. The ideal of mass promotion of students to the next class by some of the secondary schools should be discouraged.
12. The age entry qualification of students into JSS 1 should be at least 12 years. Studies have shown that there was positive correlation between maturity and academic achievement of students.

Conclusion

Mathematics teaching and learning and indeed, mathematics itself at the secondary school level have been critically and logically examined by this paper. Furthermore, the challenges militating against the smooth mathematics teaching and learning were also looked into by the author. The author concluded that all the challenges enumerated and discussed so far were cyclical in nature. The occurrence of one factor will lead to the occurrence of other factors. The prospect of mathematics teaching and learning processes in our secondary schools in Nigeria will be very bright if all the solutions proffered by this paper are implemented by the governments at all levels in Nigeria. Right now, the present status of mathematics teaching and learning in some of our secondary schools will not help this country for its quests in achieving the advancement in science and technology breakthrough. The consequence of this will be on merely obtaining paper qualification without the practical skills.

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