

MATHEMATICS EDUCATION: A PANACEA FOR NIGERIAN EDUCATION 'FOR ALL' AGENDA

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Abstract

Education as an essential tool for global change is a must for every person and for the survival of Nigeria economy. It is an essential innovative phenomenon for human growth and development. Mathematics as an integral knowledge is inseparable in terms of totality of educational attainment. Mathematics whose contributions to education are quintessentially accepted has pragmatically covered almost all aspects of education. This paper tries to examine the role of mathematics as it relates to education in Nigeria and interrelated factors that have conspicuously contributed to its growth. It delineates the objectives of mathematics education and positively presents mathematics as an integral part of science and technology and overall influence on the developmental structure of Nigerian education. It subsequently points the challenges facing Nigeria education 'for all' agenda as it relates to gender dichotomy and cultural issues. It further suggestively formulates the way forward in order to achieve equilibrium in Nigeria education system.

Education has been ultimately recognized as the developmental contrivance of human venture and life enterprise. Any bit of losing its content will boomerang badly. It has been generally assumed as a force to reckon with. It is this predetermined objective of its value that must have prompted the establishment of Universal Basic Education (UBE) in order to make education an accessible human undertaking. Any analysis made on educational value must be in consonance

with its enormous advantage both to individuals and the nation at large. The level of education of any nation determines the echelon of its development.

Education has been variously defined with respect to scholarly orientations and viewpoints. Fafunwa (1974) defined "education as the aggregate of all the processes by which a child or young adult develops the abilities and other forms of behaviour

which are of positive value to the society in which he lives". According to the National Policy on Education (2004:6) "education is an instrument for national development; to this end, the formulation of ideas, their integration for national development, and the interaction of persons and ideas are all aspects of education". Education is the course of action that involves teaching, training and learning particularly in schools to develop knowledge and skills. It is the major aspect of life that takes man to greater heights. Going by the NPE analytical meaning of education, one can quickly agree that 'formulation of ideas' has some mathematical and scientific attachment. It is the conceptualized knowledge of mathematics that can bring about the 'integration for national development'. Curriculum planners designed mathematics as an inclusive subject matter at all levels of education. Right from primary to secondary education, mathematics has remained a compulsory and an inescapable subject for admission into different stages of learning.

Chinweoku and Ifeakor (2010) upheld that "mathematics education is the avenue for production of scientific and technological workforce needed by the country for wealth education. Mathematics education is the greatest force that can be used to bring about change in the world of science and technology. It is an associative influence that has perpendicularly promoted the social, cultural, economical, political,

psychological, physiological, philosophical, scientific, technological, vocational and technical developmental structure of global phenomena.

Objectives of Mathematics Education

Knowing the objective of any observable fact/experience is the gateway for getting fully acquainted with the pressing issue. Unawareness of researchable objectives will hinder the content being studied. When the objectives of any phenomenon are identified, it is then the problem will be analyzed.

Mathematical Association of Nigeria (MAN) at its 1976 Conference held in Benin gave the summary of the National objectives of Primary and Secondary Education as it relates to mathematics education:

1. To lay a solid foundation for the concept of numeracy and scientific thinking.
2. To give the child opportunities for developing manipulative skills that will enable him to function effectively in the society within the limit of his capacity.
3. To provide the basic tools for further advancement as well as prepare him for trades and crafts of his locality.
4. To build on the foundation of primary level so that the children can make a useful living

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professionally, economically, politically and socially.

5. To generate interest in Mathematics and to provide a solid foundation for everyday life.
6. To develop computational skills and to develop the ability to recognize problems and to solve them with related mathematical knowledge.

These objectives are distinctively specified in order to spur the consciousness of mathematical values and opportunities in the life of the learners, educators, curriculum planners and the government. When these objectives are concretized without prejudice, the possibility of all the citizens being accessible to education will be achieved. These objectives will definitely help in observing and exploring the basic science processes including manipulating, classifying, communicating, inferring, hypothesizing, interpreting data and inferring models. They are capable of developing self confidence and self-reliance through problem solving activities in science.

Roles of Mathematics in Nigeria Education System

Education as a welcome development for all round developmental configuration of any nation is sine qua non to humankind. Education is in connivance with mental and proficiency developmental nature of

mathematics and its inclination. It is this preceding knowledge that has brought the integral value of mathematical awareness as a universal remedy of 'education for all' plan. As education has remained objective so is mathematics, because mathematics tends towards projecting the overall milestone attainment in education. Mathematics plays significant and quantitative roles in nation's sectors basically in education segment.

Mathematics education is hypothetical, academic, notional, imaginary, conjectural, speculative and abstract. It is these elements of mathematical construction that will intrinsically play momentous roles which in turn produce a strong and practical effect in human endeavours. It engages in refining and redefining human objectives. One major philosophy of mathematics according to NCCE Minimum Standards "is to help students become intellectually informed in mathematical ideas, notations and skills for logical reasoning, scientific enquiry and for the pursuit of techno-scientific education". Going by this rational and intending realization goal, will be an eye-opener to all that mathematics is a driving force in human progress.

Jose Francisco (2000) opined that "mathematics occupies a crucial and unique role in the human societies and represents a strategic key in the development of the whole mankind. The

ability to compute, related to the power of technology and to the ability of social organization and the geometrical understanding of space and time, that is the physical world and its natural patterns, show the scientific and cultural role of mathematics in the history of civilization and in the future of the Information Society". The emergence of computer of different designs and applications was easily coped and adjusted by Nigerians which points to mathematical acquaintance and inclination. The idea of making use of all these newly developed technologies is the resultant impact of mathematics. With the emergence of complex technologies, the need for education to be accessible is paramount in order that the teeming youths and aging parents would be able to survive and cope with this challenging trend.

Mathematics is a fundamental part of human thought and logic, and integral to attempts at understanding of the world and its people. Kyungmee (2012) posited thus "mathematics provides an effective way of building mental discipline and encourages logical reasoning and mental rigor. In addition, mathematics knowledge plays a crucial role in understanding the contents of other school subjects such as science, social studies, and even music and art". Mathematics has a transversal nature. In fact mathematics plays an interdisciplinary role in the totality of the educational sector. Almost in all Nigerian universities, polytechnics and

colleges of education, Mathematics Department services other departments such as Physics, Integrated Science, Architectural Studies, Agricultural Science, Statistics, Economics, and Engineering.

Mathematical literacy is a crucial attribute of individuals living more effective lives as constructive, concerned and reflective citizens. Mathematical literacy is taken to include basic computational skills, quantitative reasoning, spatial ability etc.

Mathematics is applied in various fields and disciplines i.e. mathematical concepts and procedures are used to solve problems in science, engineering, economics. (For instance, the understanding of complex numbers is a precondition to learn many concepts in electronics).

Mathematics provides foundational knowledge and skills for other school subjects. With mathematical knowledge, a learner is on a progressive path.

Mathematics as an Integral Phenomenon in Science and Technology

In this modern age of Science and Technology, there is a great emphasis on Science such as Physics, Chemistry, Biology, Medicine and Engineering. Mathematics as an indomitable science is a proficient and indispensable apparatus being engaged in all these Sciences. Mathematics acts as a stamina and fiber to other Sciences.

No wonder it is still an age-long subject of learning in the world of competition and sophistication of learning culture. Any nation or educational sector removing mathematics from its curriculum is bound to collapse. Remove mathematics, nothing is left in academics. Lack of mathematical knowledge is an impediment to scientific and technological understanding. Mathematics education is an integral phenomenon for the acquisition of scientific knowledge.

Chukwurah (2013) thus remarked: “education has fully addressed the social, psychological, philosophical, scientific, technological, vocational and technical issues which mathematics has always been at their centre”. When mathematics is mentioned, people’s mind quickly flashes on Arithmetic, Algebra, Geometry, Trigonometry, Statistics, and Calculus. But mathematics is much more than that. It is a creation of human mind concerned predominantly with ideas, processes and reasoning. Mathematics is a Science of all Sciences and art of all arts. Mathematics is active in every second. It is closely linked with everyday life activity. Traditionally, mathematics is tantamount to science. One cannot talk of science without referring to mathematics. For that reason, Curriculum planners earlier made mathematics a non-optional course of study at both primary and secondary education. This notion has helped immensely in the derivation of

arithmetic, numerical, geometric, algebraic and statistical knowledge towards the preparation of citizens for higher learning for the actualization of economic, scientific and technological development.

As earlier postulated that science is practically the same as mathematics, so are all the scientific concepts applicable to mathematics. Based on this assertion, the characterized features of a scientifically literate Nigerian shall be linked up as put forward by Otuka (2001). He listed them as follows:

1. Uses concepts of science as well as an informed reflection of ethical values, in solving everyday problems and making responsible decisions in everyday life including work and leisure.
2. Engages in responsible personal and civic actions after weighing the possible consequences of alternative options.
3. Defends decisions and actions using rational argument based on evidence.
4. Engages in science for the excitement and the explanations it provides.
5. Displays curiosity about the appreciation of the natural and human made world.

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6. Reads and understands scientific literature of a general nature.
7. Recognizes that science is a human enterprise primarily concerned with the study of nature.
8. Distinguishes between scientific and technological evidence and personal opinion and between reliable and unreliable information.
9. Distinguishes between facts and superstitions.
10. Searches for objective facts rather than rely on rumours, taboos, superstitions and other unauthoritative generalizations.
11. Develops inquiry skills and problem solving attitudes.
12. Recognizes the strengths and limitations of science for advancing human welfare.
13. Uses scientific knowledge and skills for responsible social actions.
14. Considers the political, economic, moral and ethical aspects of science as it relates to personal and global issues.
15. Connects science to other human endeavours e.g. history, the arts and humanities.

The above characteristics of a scientifically literate Nigerian have mathematical undertone, with these enlightened clarifications, the understanding of mathematics as an integral force and enhancement to the advancement of science and technology could not be termed a myth.

Mathematics acquisition must be composed of scientific attitudes such as inquisitiveness, skepticism, humbleness, objectivity, meticulousness, yearning for experimental verifications, balanced judgment, awareness of assumption, a predilection for new things, acceptance of chances/probabilities, conviction in the prospect to unravel difficulties and determination. Mathematics education is the bedrock upon which scientific and technological development depend. For instance, taking a critical look at the world's education especially the western countries, the findings will reveal some hidden truth about our nation's education. The Western world has invested a huge amount of resources in education basically on science which is primarily embedded in mathematical knowledge. The resultant effect to their enormous contributions to science education is that they have risen to prominence. It is quite appalling that almost all the marketable goods in Nigeria come from abroad. Cases like people with ailments and complicated medical issues being flown to overseas for treatment.

Challenges of Mathematics Education in Nigeria

Mathematics as a crucial course of learning has been going through various challenges at different times. Due to the limited scope of this study, it shall critically look majorly at the two confronting issues and slightly look at other contributing factors.

Gender Disparity: The gender difference/inequality has harmfully contributed to the numerous challenges that have been facing mathematics education in Nigeria. In this gender disparity, the females are being disadvantaged. Mathematics education as a vital operational means of achieving all round development has been relegated to the background as far as it concerns the females. This gap that has been in existence for decades is still there despite the importance and evidence of scientific and technological impact in the society. According to Anozie (2013) "it is inevitable in a society where masculine values like domination, politicking and wealth acquisition are accepted and rewarded". Most Nigerians still hold tenaciously that female education should be devoid of science and relatively being arts subjects only. This assertion must have externally been aggravated by those who think that females are incapable and mediocre. This gender gap, as an old existing trend has equally been caused by some factors such as: negative attitude of society towards female

education, poverty, influence on the part of the parents etc.

Cultural Issues: Culture which has been generally defined as the people's way of life has due to people's notion hindered the learning of mathematics education. The preconceived notion of many Nigerians about mathematics and science education has pushed many females to divert their learning faculty to arts and vocational studies. The claim that mathematics is for males has partially influenced the choice of subject matter as it concerns the learners' preference. In most universities, the teaching and learning of some mathematically related courses have been poorly assessed due to the frightening notion of the learners once such courses are compulsorily included.

Other challenges include:

1. Poor funding of mathematics education by the government. Government has not actually understood the need and significance underlying contributions of mathematics to the citizenry.
2. Poor pedagogical setting: The mathematics educators and methodological procedure have sort of bungled the insightfulness of mathematics learning. Some teachers are not qualified to teach mathematics as a subject matter. The competent ones find it difficult to

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- lay hands on suitable and updated instructional materials.
3. Poor sponsorship of research work: Government and few organizations in the private sector should support and sponsor research in mathematics. Government puts in little or no effort to solicit for funding for research.
 4. Paper qualification approach: Nigerian students mainly study to get degrees/certificates and get job. Even those who enrolled to study mathematics education may after graduation never for one day teach mathematics.
 5. Inadequate planning/insufficient teachers: There are still very few teachers trained to teach mathematics. Government/curriculum developers have not actually come out with concrete plan towards structuring and normalizing the science education in Nigeria.

Conclusion

As the paper has critically examined the role of mathematics as it relates to the recommended 'education for all' agenda, it is pertinent to note that Mathematics is the gate and key of Science. All the outlined attributes of scientifically literate persons are applicable to mathematicians and mathematics educators, because once the content and ideas of mathematics are

removed, then science will automatically go into oblivion. The famous Philosopher Kant intrepidly made it clear as he quoted that "A science is exact only in so far as it employs mathematics". Therefore, all scientific learning which do not fasten on to mathematics are said to be substandard in their groundwork. Once mathematics is neglected, it will consequentially retard almost all sectors of human venture. Any deficiency in mathematical knowledge leads to academic disaster. Having highlighted numerous mathematical influences on education and other polygonal benefits, it is now the core responsibility of the government, and curriculum developers to mutually work towards achieving a concrete and valuable policy of practically inducing the 'education for all agenda' as a functioning development. Not just a mere theoretical document.

The government, public, curriculum developers, mathematicians, mathematics educators and learners should wisely examine the challenges aforementioned and likewise devise possible means of solving the problems through making use of available solution. Therefore, for the achievement of 'education for all' programme, the need to validate the mathematical inclination for all levels of education is an avid recommendation.

The Way Forward

Equity in Gender Education:
The widened gap in the teaching and

learning of mathematics is an issue that needs an urgent and proper attention in order to unravel numerous problems in academics. Government should devise means of promoting female education especially in mathematics and science education. Anozie (2013) recommended thus: “Women should be given opportunity to education because they are moulders of our future generation. Education should be made compulsory, available and accessible for women particularly in rural areas. Government should support policies/legislative change for gender equality”.

Public Awareness: There should be public awareness on the necessity and indispensable value of mathematics education. The public should be enlightened on the scientific and technological development which is the consequential effect of mathematics. They should see mathematics and science education as refining tools for culture and tradition. Today, almost every Nigerian makes use of computer directly or indirectly. The transport system has continued to improve over the ages. No culture can be said to have abhorred the innovative structure of global technology. People should be encouraged to study and learn mathematics because mathematics as a pillar of science and technology is shaping the lives of community men and women.

Other suggestive solutions are:

1. Government should in discourse with mathematics educators find out the possible way of sponsoring mathematics students and teachers in order to address issues affecting funding education.
2. The mathematics educators should at intervals, attend conferences and engage in research as it relates to mathematics with remuneration by government.
3. The learners should harness all the conceptual attributes of mathematics as to improve in pedagogical skills.
4. There should be punishable actions to all owners/managers of ‘Special Centres’ to serve as deterrent to the promoters of such culture of academic disaster.
5. There should be planned, current, appropriate and available instructional materials and laboratory in order to enhance and boost mathematics to a greater height.
6. The teachers should be willing to teach as well as the learners being ready to study.

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