

FUNCTIONAL MATHEMATICS EDUCATION: A PLATFORM FOR INNOVATION
AND ENTREPRENEURSHIP DEVELOPMENT IN SCIENCE AND
TECHNOLOGY EDUCATION

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Abstract

The paper dwelt exhaustively on Mathematics education as the foundation for science and technology which provide the necessary entrepreneurship learning experiences for self employment. It examined the Potentials in functional mathematics for Entrepreneurial Development. In another development the paper examined the challenges for mathematics educators which is characterized by inadequate manpower training and development that will ensure regular updating of skills, adequacy of content and instructional materials in schools. It was recommended that In-service should be organized for mathematics teachers to update their knowledge in line with advancement in science and technology.

Keyword: Development, Entrepreneurship, Functional mathematics, Innovation

Introduction

The Nigerian Education system that is in practice today was as a result of the colonial education which Nigeria had under the British Government. Although there aim was primarily for the purpose of training Nigerians for the needed white collar jobs to enhance their administration in Nigeria. The trend up till today is still deeply rooted in the mind-set of Nigerians forgetting the fact that the goal of education has since changed with reference to the National policy on education Federal Republic of Nigeria (FRN) (FRN, 2004). Having realized the effectiveness of education as a powerful instrument for national progress and development, the education philosophy and methodology has been matched with the ideals and challenges of changing economic and social structures of modern society. To this end, Dorothy (2011) as cited by Bilya (2013) states that the important thing that ever happened to Nigeria is the 1981 National Policy on Education, which emphasizes its broad aim and objectives of secondary education as the preparation for useful living within the society and preparation for higher education. However, the aim of preparing secondary school student and of course graduates for useful living has been defeated; this is because for about three decades now, majority of Nigerian youth are idle while some are involved in various vices due to unemployment. According to Tsafe (2014) unemployment is extremely high and the vulnerable categories of people are the youth, low-skilled and immigrant workers. For instance, unemployment is so rampant that recently there was a stampede which led to the death of many Nigerian youth in various centers across the country, during Nigerian Immigration Service aptitude test. This is an indication that unemployment in Nigeria is on the high side. Accordingly, the 6-3-3-4 Nigerian Education system was evolved with such regard toward producing individuals with physical and mental skills and competence that will enable individuals contribute to the development of the society

(FRN, 2004). Oli (2000) opines that to ensure a positive future of Nigeria, the youth who are believed to be the future leaders are expected to be equipped with basic necessary skills to drive the economy. Similarly, reviewing Mathematics Education curricula to align with the demand of industries could provide required skills for self employment. As a science course, Mathematics is concerned with overall physical development which is necessary in technology thereby providing job to individuals. The prosperity of any country therefore depends on the volume and the quality of mathematics offered in its school system (Eze, 2010). The relationship which mathematics has with the society and other fields of knowledge such as entrepreneurship education is best seen when one considers the national objectives of primary and secondary education as they relate to mathematics education.

Concept of Entrepreneurship

Various scholars have defined entrepreneurship globally as a potential tool for industrialization and rapid economic growth of any society. On one extreme, it is seen as the creation of new business and bearing risks therein in the attempt to create value in business opportunity. In confirmation, Reynolds (2013) affirmed that entrepreneurship is participation in new business creation that made one to be self employed. Abubakar and Babalola (2011) described entrepreneurship as a creative activity. It is the ability to create and build something from practically nothing. Akpomi (2009) stressed that entrepreneurship has been extended to include element not necessarily to business formation activity such as specific mindset relating in entrepreneurial initiative, for instance in the form of social, political or knowledge entrepreneurship. For European Commission (2004) entrepreneurship was viewed to include planning, communicating, doing, evaluating and record process in learning. This implied that entrepreneurship is geared towards creating new system processes, mobilizing men, materials, machines and financial resources in order to produce new product and or serve new market. The National Universities Commission/Education Trust Fund (2004) report revealed that most Nigerian graduates lack entrepreneurial skills, one of the reasons advanced is that most teachers that teach the subject/course are professionally and academically incompetent.

In whichever way we look at the definition of entrepreneurship, a close look at the various definition revealed that entrepreneurship is an attempt to create value through recognizing the business opportunities, combining and bringing together both human and material resources necessary for bringing out a project to function.

Objectives of Mathematics Education

The report of the mathematics conference of the Mathematical Association of Nigeria (MAN) held in Benin, between the 6th and 7th January 1977, gave the summary of the National objectives of Primary and Secondary Education as it relate to Mathematics Education to include:

- (i) To lay solid foundation for the concept of numeracy and scientific thinking.
- (ii) To give the child opportunity for developing manipulative skills that will enable him function effectively in the society within the limits of his capacity.
- (iii) To provide the basic tools for advancement as well as prepare him for trade and craft of his locality.
- (iv) To build on the foundation of primary level so that the child can make a useful living professionally, economically, politically and socially.
- (v) To generate interest in mathematics and to provide solid foundation for everyday life.

- (vi) To develop computation skills and to develop ability to recognize problems and to solve them with related mathematics knowledge.

Functional Mathematics Education: A platform for Entrepreneurial Development in Science and Technology

Functional mathematics education is the agent of transformation in this technological age Otunu (2013). It is a way of empowering the power for productivity and to train the students toward practical mastery of the subject, its application will give people a vocation rather than giving room to job seekers, as such Science and technology are functional Mathematics oriented which include trades and careers of all kinds. Through training, individuals are helped to acquire entrepreneurial skills, promote and establish small and medium scale business, gain access to income generating opportunities and gainfully be employed. Thus, Science and Technology of which mathematics is the basis are means of wealth creation. Tsafe (2014) opines that mathematics is important in all human endeavours; as such cannot be thrown overboard in every human decision to be taken, project to be executed, policy to be implemented or any study to be carried out. Mathematics is the key to development. The role being played by mathematics in day to day activities of man is suggestive of the fact that mathematics is needed by all, not only for scientific or technological development, but also for all forms of development (Eze, 2010). The socio-cultural, utilitarian and disciplinary values of mathematics worldwide also place the subject at a vantage position for ensuring all round sustainable development.

Mathematics is a science with the basic scientific skills and objectives; according to Abdullahi (2006), physical development is associated with performing physical tasks like the ability to move, lift, stand and manipulative objects. The ability to perform those physical tasks accurately is important in technology. Mathematics fosters physical tasks in geometrical constructions. If a learner is exposed enough to mathematical activities requiring manipulative skills, then, the learner could be able to grow to become a useful practical and industrious member of his community and hence create job for himself and others. This implies that mathematical activities take cognizance of physical development which is necessary in technology thereby providing jobs to individuals. It is only skilled people with entrepreneurial background that can create wealth and employ others(Eze, 2010).

According to Iweka, Onwuka, and Moseri (2010), Mathematics has long been a compulsory subject in the primary and secondary schools in Nigeria. In institutions of higher learning, competence in Mathematics is demanded for enrolment into a wide range of courses (Science and Technology)

Problem-solving skills is another functional mathematics which enable the students apply their skills to both familiar and unfamiliar situations, thereby giving them the ability to use tested theory and also create their own before applying them. By developing problem-solving strategies, students learns to understand problem, device plan, and carryout plan, analyze and review the accuracy of their solution. The methods involved in problem-solving develop the use of reasoning, careful and reasonable argument and decision-making which are essential ingredients for effective innovation in science and technology.

In our day-to-day life, mathematics is not a mere subject that prepares students for higher academic attainment or job qualification in the future. It is more about how it compels the

human brain to formulate problems, theories and methods of solution. It prepares children to face a variety of simple to multifaceted challenges that every human being encounters on a daily basis. In addition mathematical knowledge in every field of study and industry produces new discoveries and advancement of new disciplines. All innovation introduced worldwide, for instance card reader that was used in the recent 2015 election is a by-product science, technology and mathematics.

More so, Mathematics is a creative discipline. The language of mathematics is international. The subject transcends cultural boundaries and its importance is universally recognized. Mathematics education being an aspect of general education is also a major platform for innovation and entrepreneurial development. Today, the whole world is talking about technological development. A country cannot achieve technological breakthrough without functional mathematics education. We benefit from the result of mathematical research every day. For instance, the fiber-optic network carrying our telephone conversation was designed with the help of mathematics. Weather prediction, the design of fuel efficient automobile and airplane, traffic control and medical image; all depend on mathematical analysis. For Nigeria to be one of the 20 largest economy that could create jobs by the year 2020 it depends on how functional mathematics education is.

Creative thinking is an integral element in mathematics. It implies seeing ideas or objects in a different context either by recognizing their inherent potentials to be used in different ways or situation or by putting ideas together to create something new, (Abel, 2006). Creativity and initiatives are two components of inventions. A creative individual can never be poor and can easily manipulate situation to solve environmental and economic problems. The use of problem solving strategy for teaching mathematics is very important in teaching-learning situation in all levels of schooling to develop in the learner the skill of creativity. As it relate to entrepreneurship it enable the student to understand problem, device plan, and carryout plan, analyse and review the accuracy of their solution.

The idea of logic where the validity or conclusion rests upon the validity and consistency of the assumption and definitions upon which the conclusion are based will help to eliminate frequent conflicts in our societies. If the society is free to be of conflict then there shall be a level playing ground for entrepreneurs to operate.

The role of mathematics in commercial and technological development of the civilized nations and the general acceptance that mathematical methods are central to the solution of all kinds of problems have rightly enhanced the importance of Mathematics instruction in tertiary institutions (John, 2007). Mathematics consists of activities such as concept formation, abstraction, generalization, theory building and problem solving, which is the basic mathematical activity; all other activities are pre-requisite to it.

Though functional mathematics is a platform for innovation and entrepreneurial development in science and technology, yet there are far-reaching impediments for Mathematics educators.

Challenges for Mathematics Educators

The challenges of Mathematics educators as contained in the work of Nnenna (2010) are as follow:

- (i) Mathematics is the subject that parents often recall with anxiety and frustration from their own experience

- (ii) Although Mathematics is an abstract science, Mathematics education is very much a social endeavor, improving mathematics education requires among other things, thorough understanding of pressures that shape current educational practice.
- (iii) The teaching of mathematics needs technological means of making it interesting, one of which is Information Communication Technology (ICT), yet many mathematics teachers lack the knowledge and application.

Strategies for Improving Functional Mathematics Education

The strategies for addressing the challenges of Mathematics educators, in particular and mathematics education in general are:

- (i) Ensuring adequate provision of instructional materials for effective teaching and learning in schools
- (ii) Establishing a sound program of manpower training and development that will ensure regular updating of skills.
- (iii) In order to retain the quality of teachers in schools; condition of service should be improved for the teachers.
- (iv) Constant review of Mathematics curriculum to meet the challenges and demand of the nation's industrial and entrepreneurial development.
- (v) Involvement of science and Mathematics teachers in the education and industrial or entrepreneurial development.

Potentials in Functional Mathematics for Entrepreneurial Development

Mathematics is a course that touches the lives of the citizens through every human decision to be taken, policy to be implemented or any study to be carried out (Tsafe, 2014). It is in this regard that mathematics could be found in every sphere of life including employment generation and sustainability. A skillful mathematics graduate should be able to construct some of the mathematics teaching and learning resources. This materials could be categorize into two main aspect as contained in the work of (Alio, 2013):

- (a) The teacher-made mathematics teaching materials
- (b) The commercially-made teaching materials.

The teacher-made teaching materials are the materials which the teacher can make or construct by himself, such materials are the materials the teacher can improvise by himself. The teacher can teach the students how they could produce such materials by themselves. According to Alio (2013), such productions are necessary especially in schools where there are no ready-made instructional materials e.g Geoboard, chart of different types, tangram, cards, Rolleographs, cut-out shapes (templates), funnel boards, weighing balance, trundle wheel, graph board, clinometer, compass bearing, mathematical set, 3-Dimensional models, ladder etc. The commercially made mathematics teaching materials are mathematics teaching materials which are carefully developed by experts for sale in shops and markets e.g Computer, calculators, projector, measuring cylinder, slide rule etc.

With the above mentioned potentials, mathematics educators can become self reliant by opening centres where they could be producing some of these teaching resources. The centres could also become training grounds for others. He can admit apprentices who could help him in this production. The apprentices employed in turn pay for the training.

Textbook is one of the most important generators of information for a successful teaching and learning. Mathematics educators could become self-reliant through writing good text books in mathematics for all levels of education. These text books could be supplied to school libraries at local, state, and federal levels of education. At the same time, book shops could be opened where these books could be sold

Recommendations

- (i) Having seen the place of mathematics, more effort should be made by the stake holders to popularize the need for mathematics and technology and also to generate and sustain students' interest in mathematics.
- (ii) Mathematics teachers should encourage themselves and be encouraged to embrace information communication technology.
- (iii) Mathematics teachers should be made to join professional associations within science education to understand and engaged in current issues within the field.
- (iv) In-service should be organized for mathematics teachers to update their knowledge in line with advancement in science and technology.
- (v) The state and federal governments should be willing to purchase materials developed by mathematics educators to schools

Conclusion

This paper has established Mathematics education as the foundation for science and technology which provide the necessary entrepreneurship learning experiences for self employment. Graduates from institutions of higher learning should understand the situation in which they find themselves, as such should utilize the education they have acquired to take good decisions for their self-survival in the society.

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