

MATHEMATICS EDUCATION: A PREREQUISITE FOR NATIONAL DEVELOPMENT

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Abstract

Advances in Mathematics and Science have been identified as one of the ways of achieving national development. Any nation that lacks adequate scientific knowledge will definitely remain underdeveloped, because science has been the bedrock for national development. This paper therefore, tries to examine the concept of national development. The significance of mathematics and its place in national development and strategies in mathematics education that would help in achieving national development.

Introduction

Nigeria is a country that is endowed with huge natural and human resources. In spite of these endowments, the country can hardly satisfy her citizens socially, economically and politically. Nigeria cannot attain any reasonable level of national development without meeting the vital indices of development particularly, in area of science and mathematics.

The study of numbers is vital to intellectual development as well as the development of innovative ideas and choice of career. Mathematics is a vital tool for day to day activities in such fields as engineering, piloting, agriculture, banking, medicine etc (Abudullahi, 1988). In fact, the development of a country lies in the technological know-how of such a country and there is no science and technology without mathematics. Other fields of study in one way or the other are dependent on mathematics for solving their problems through conducting research, stating hypothesis and making findings. With mathematics one can easily develop the ability to think critically and logically. It also helps in the development of innovative ideas. The study of mathematics and science goes a long way in explaining its versatility why mathematics truths are universal and this helps a lot towards national development. This paper therefore, tries to examine the concept of national development. It also looks at the significance of mathematics and its' place in national development and strategies in mathematics education that would help in achieving national development.

The Concept of National Development

Development is associated with modernization, material advancement, industrialization scientific and technological progress, the emergence of nuclear energy, electronic and biological revolution, new knowledge about man and the universe. It means urbanization, socio-cultural transformation, mass literacy, vertical and horizontal mobility, employment opportunities and the emergence of specialized and independent occupational roles (Umuru, 2002).

A nation is a large community of people sharing common language, common culture, common history and having a common constitution and government. Nigeria is a nation and the national share common characteristics of a nation such as binding principles and policies. The ultimate aim of national development must be to bring about sustained improvement in the well being of the individual and bestow benefits to all self-reliance and mobilization of domestic resources, the transformation of the structure of rural production, the development of small-scale industries and the acquisition of technological and scientific skills. These objectives are stale, but well conceived, planned and directed policies and programmes are required for their realization (Umaru, 1988). This means that development is about self reliance in every aspect of national life.

As soon as the individual are made to acquire specialized skills that will enable them to help develop the society, then the society becomes developed. This accounts for the difference between the developed countries and the underdeveloped nations. According to Alabi (1988) the major factor responsible for the wide gap in the level of development between the so called developed and the developing nations is the level of development of pure and applied science in these nations.

The Significance of Mathematics and its Relationship With Other Sciences

The role of mathematics in science cannot be over emphasized, proficiency in mathematics is

basic to the study of science subjects not only at advanced stages but also in the understanding of the elementary principles of the science subjects. In most of the Universities today, the choice of science subjects at a certain level is very much related to ability in mathematics, this is because, the knowledge of mathematics facilitates the learning of sciences.

The association between mathematics and physics is so close and frequent that without mathematics, there could hardly be any substantial physics in existence. At the elementary form of physics, students need to measure lengths, volumes and masses of objects, calculate the densities of various materials, master important ideas of menstruation, averages, relative error, the theory of screw and venire. In other to do these, students need to be skillful in computation and calculations using the four rules of arithmetic and be competent in knowledge of ideas and notions of calculus even differentiation and integration is desirable. Also the study of surface tension, the kinetic theory needs to be developed in order to teach Boyle's law, Graham's law of diffusion of gases. Dalton's law and Avogadro's hypothesis and the relation between energy and heat are so much a matter of mechanics which require a sound knowledge of mathematics.

The knowledge of mathematics required at the early stage of chemistry includes elementary calculations, ability to use the four rules, direct and inverse proportion, decimals, percentages, indices, graphs etc. at a higher level of chemistry, the study of symmetry in mathematics provides useful insight into the understanding of the structure of crystals and molecules. Probability can also be used to illustrate kinetic theory and diffusion.

In Biology, the development of techniques for the design and analysis of experiments in biological resources requires the knowledge of mathematics. In experimental biology, mathematical statistics have to be employed in solving statistical problems, similarly, mathematics plays an essential role in the study of interacting species like the population fluctuations of the predator and the prey, problems relating to the spread of infectious diseases etc.

Basic knowledge of mathematics also facilitates the learning of social science. In Geography for instance, the knowledge of mathematics is applied in the measurement of distance, Measurements in maps, the study of the solar system, the determination of the shape and the size of the earth, the relationship between longitude and time. The location of a point and its bearing. All these are possible through application of geometry and trigonometry which are branches of mathematics. (Ozigboh 1997).

All these contributions have a great impact to the underdeveloped and developing countries thereby improving in national development.

Achieving National Development Through Mathematics Education

It is a truism that the subject, mathematics arose from the social needs of man (Alele Williams, 1988).

This supports Adamu's (1979) view that mathematics is a man's creation out of his day to day activities. This shows that mathematics has great capacity for man's survival, and for alleviating man's suffering. Thus mathematics education has the potentials for the development of the nation.

Mathematics education can contribute effectively towards national development through:

1. The teaching and learning of application of mathematics.
2. Emphasizing the relevance of mathematics modeling to real life problems.
3. Establishing the mathematics culture.
4. The role of the acquisition of mathematical methods and techniques through proper mathematics education.

1. The Teaching and Learning of Applications of Mathematics

Alele Williams (1988), asserted that the teaching and learning of proper application of mathematical tools can significantly improve some aspects of our existence. According to her, many simple and major local and national decisions can be backed by sound economic and management analysis whose theory rely almost exclusively on the principles of operations research. She noted that no organization can afford to carry out its operations on the basis of trial and error, and then called on administrators to be encouraged to adopt a scientific approach, which is also mathematical- Thus

mathematics education enables one to acquire the mathematical approach or scientific approach for the running of one's business for higher productivity. Also the bulk of industrial planning relies exclusively on mathematical techniques, and not on trial and error. The mathematical techniques such as accurate statistics constitute a basis for good economic strategy.

2. Emphasizing the Relevance of Mathematics Modeling to Real Life Problems

Adewoye (1988), pointed out that mathematics education has not made effective impact on society, especially in underdeveloped and developing countries. He then suggested one way of rectifying the situation which is emphasizing the relevance of mathematics and mathematics modeling to real life problems. For instance, Madu (1993) discussed and illustrated the relevance of the study of mathematics in solving basic agricultural problems of water resources system management. Specifically, he focused on the mathematics methods used in studying the response of crops to irrigation water. Since irrigation is effective in incremental food production in Nigeria, knowledge of relevance of the study of mathematics in this regard would enable the increased production of agricultural products, which would help in the development of the country economically. The main occupation practiced by over 70% of rural Nigerians is agriculture. However, the advent of the oil economy in the 1970s helped to dwarf the contribution to the Gross National Product of Nigeria (Okonkwo, 1990).

3. Establishing the Mathematics Culture

Another strategy through which mathematics education can contribute to national development is the establishment of mathematics culture. According to Ukeje (1990) mathematics culture means "The ability, readiness and willingness to always think and act logically, to use implications and logical deductions in our decision making process, to be free from prejudices and superstitions, to behave and act in accordance with the laws of causes and effects, in fact to be scientific in our behaviour and mathematical in our thinking". Mathematical culture is the underlying structure for solving man's problems. These problems are basically all social ones, and include: feeding, clothing, housing and moving from place to place. Thus Nigeria can only be developed through appropriate scientific and technological means backed by sound mathematical culture, resulting from proper mathematical education at all levels of the educational system.

4. The Role of the Acquisition of Mathematical Methods and Techniques Through Proper Mathematics Education.

The Egyptians for instance, built a great civilization based on their scientific and technological know-how, built upon the mathematical methods, which enabled them to harness the "waters" of the Nile to productive agriculture by using irrigation method. Thus using simple mathematical methods provides solution to societal problems which are largely economic. (Agwagah, 2002). Mathematics education exposes the learner to such mathematical methods which they can apply in the solution of the economic problems of the society.

Recommendation

In order to achieve national development through mathematics education the following recommendations are made:

1. The inculcation of scientific approach must start from the grassroot. This can be achieved through the teaching of the process of mathematics, its methodology and history of mathematics from the primary school to the university level.
2. The establishment of mathematics culture should be pursued by making everybody mathematically illiterate. This can be realized when Nigerians understand mathematics concept.
3. More fund, mathematics laboratory equipment should be released by the government to enhance the teaching and learning of mathematics in schools.
4. Mathematics should be popularized through public awareness seminar and workshop organized by the government for effective implementation of the production of skilled

manpower.

Conclusion

With mathematics education, pupils can extend their understanding and knowledge and the same time develop those personal qualities of self-reliance, self discipline, and enterprising approach and the ability to solve practical real world problems which will stand them on better ground in later life.

It is no doubt from the above that a nation cannot be developed without mathematics, and mathematics education provides the avenue for the acquisition of the mathematical knowledge and skills. Hence mathematical education is a pivot for successful national development. Mathematics education enables pupils to have some appreciation of those greater problems of the world such as the solution of which depends on mathematics and science. Effort has to be made toward improving mathematics and change of attitude of learners towards mathematics, which will make for effective national development.

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