

MATHEMATICS: A NECESSARY INGREDIENT FOR FOOD, SECURITY AND POVERTY ALLEVIATION AND TECHNOLOGIES FOR NATIONAL DEVELOPMENT.

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Abstract

Poverty is a global issue for all countries irrespective of their level of development. In order to solve the problem of poverty in the country, mathematicians must use adequate instructional materials, computer-aided instruction and other materials that can help them in carrying out the instructions. CCTV is a technology that is used to manage crimes and security problems in the country. Mathematics plays a major role in security system. Different forms of security were examined and the role mathematics plays in each form. Mathematics is also important in the production and processing of food for the nation. Mathematics takes place from the farm to fork. This paper therefore examines the importance and role of mathematics in the provision of food, security and poverty alleviation and technologies for national development. The provisions of human basic needs through the applications of mathematics were examined. It was concluded that mathematics plays a vital role in the provision of these basic needs. Recommendations were made that farmers should be adequately trained in Mathematics (at least in concepts that they need to know). Also, there is need to transform skills realized from Mathematics as an essential tool for self-employment. Government should encourage the use of CCTV in public places (like schools, hospital, offices, supermarkets etc.) to reduce crimes and security problems

Keywords: Mathematics, Ingredient, Food, Security, Poverty and Development

Introduction

Mathematicians have a central role to play in our economic and technological development, as mathematics is the key to the solution of most human problems. Mathematics is the language of technology. It is used to formulate, interpret, and solve problems in fields as diverse as engineering, economics, communication, seismology, and ecology. Mathematics provides us with powerful theoretical and computational techniques to advance our understanding of the modern world and societal problems, and to develop and manage the technology industries that are the backbone of our economy (Leon-Seitelman, 1994). Ibidapo-Obe (2010) sounded that Mathematics Knowledge is fundamental in addressing the critical issues of economic transformation and globalization, reduction of unemployment, poverty alleviation, hunger and disease and the sustainable effective use of natural resources facing the world today. Mathematics is a branch of knowledge that deals with measurement, numbers and quantities. Mathematics as a tool, its knowledge and skills are the bedrock of idea into reality (Abubakar, Wokoma & Afebuame, 2012). Enemali & Adah (2015a) underscored the significant role of Mathematics in various human endeavors when both stressed that mathematics is the foundation of Science and Technology without which a nation can never be prosperous and economically independent. In line with this, farm mathematics encompasses all forms of measurements on the farm, farm forecasts, farm accounts and record keeping, all forms of business that have to do with farm and farm products (Enemali & Adah, 2015b).

Eze (2007) stated science and technology are important components of poverty and prosperity. Science and technology are therefore indispensable components of national stability and developmental challenges while mathematics is fundamental or an essential ingredient to both. Green World and Associates (1995) and Muhammad (2006) defined poverty as “a condition in which income is sufficient

to meet subsistence needs”. This implies that levels of living may considerably lower than those that are deemed adequate for standards of living. This paper therefore shall discuss the following:

- i. The Role of Mathematics in Food Provision
- ii. The Role of Mathematics to Technology for National Development
- iii. The Role of Mathematics in National Security
- iv. The Role of Mathematics in the Alleviation of Poverty.

The Role of Mathematics in Provision of Food

Right from the beginning of food production which takes place on the farm, Mathematics is very important in every stage of food production. Within the broad concept of farming, there are two very important elements: time and money. At the root of both of these is Mathematics. Mathematics has enabled farming to be more economically efficient and has increased productivity. Farmers use Mathematics as a system of organization to effectively utilize their time and manage their money. Farmers use numbers everyday for a variety of tasks, from measuring and weighing, to land marking. One of the most frequently used Mathematics concept on the farm is the use of proportions. Also, farmers use Mathematics when applying chemicals and fertilizers to crops. A farmer may want to spray 160 acres at 0.8L/ hectare and needs to know how much chemicals he should purchase. Different chemicals are applied at different rates for different crops at different times during the growing season (Natasha Glyndon,). When working with fertilizers farmers must determine how much of a particular nutrient is needed for a specific crop, and apply the fertilizers accordingly. Mathematics is vitally important to the food industry and many of the processes of dealing with food. From farm to fork, and from fork to the sewers, Mathematics is an essential ingredient.

It explains and models the processes which govern the safe production, storage, testing, transport, cooking, eating and digestion of food. It helps decide whether and how it is safe to cook, eat and digest food stuff (Chris Budd, 2010). Using Mathematics we can model the process by which food is heated in the oven and compare the effectiveness of the turntable and mode-stirred designs of the micro-wave oven. An application of Mathematics helps to predict when biscuits crack, and can thus reduce the chance of them cracking when they are made. Mathematics play an important part in everyone’s life, but the increasing complexity of agricultural technology makes it mandatory that workers in agricultural occupations have skills in the analysis and solutions of mathematical problems. Mathematics plays a very large role in agriculture, but most of the time we do not even realized it. Through meticulous planning and calculating, a farmer can predict his crop yield, expenditure, income and much more with the basic knowledge of Mathematics.

The Role of Mathematics to Technology for National Development

Mathematics is the father of all sciences. Everything in science eventually has its origin in Mathematics. Therefore, Mathematics is pretty important for science and technology (Jessie, 2011). A nation is classified as developed or developing according to its level of economic and technological development (Adeniyi, 1983). Kuku (1989) asserted that social and economic development of a country can be measured in terms of the development of science and technology in such a country. Similarly, Ihimodu (1983) opined that technology can contribute and accelerates the growth of an economy by increasing the nation’s resources. However, Cole and King (1969) said that today’s world rest on science and that science in turn on Mathematics. Adegboye (2000) emphasizes that Mathematics is the basic tool for understanding of science concepts. Awonoyi (1996) quoting Johnson and Rising (1972) writes:

*“No other subject has greater application than Mathematics. It is
Prime instrument for understanding and for exploring our scientific,
Economic and social World”*

Sam-Ale (2014) said that Nigeria’s development efforts will only yield fruit when mathematical sciences are given their pride of place. He described Mathematics as the ‘queen’ of sciences like Physics, Chemistry, and Biology and Computer science / information technology. It was affirmed that: “no nation

can aspire to true greatness without premium value and attention accorded science and technology. This becomes imperative because our national pride is a function of the expression of strength in technological and scientific research”.

Studies have shown however that rapid national development can be achieved through application of mathematics on national economy. Statistics have shown that Mathematics is closely knitted and has a role to play in areas like leadership, economic and finance; management, business and enterprise; information technology services and agriculture and natural resources. By definition, Mathematics can be used to find answers to questions and problems of everyday life. This simply means that Mathematics can be applied in every facet of life including the general economy of the nation. In the past, Mathematics has been used in building houses and bridges, in astronomy, weather forecasting and even in the strategic realm of warfare. In fact, wherever a country has succeeded technologically in the past, one can always pin point Mathematics as being responsible (Kenneth K. Nwabueze, 1999). The application of mathematics therefore, aids in enhancing efficient food supply for local and International appeal, thereby curtailing starvation to the teeming manpower that can enhance the development of other sectors of the economy with the prospects of improvement in the standard of living being assured (Enemali & Adah, 2015).

More recent advances in the mathematical sciences have helped improve our ability to predict the weather, to measure the effects of environmental hazards and to study the origin of the universe (Enemali & Adah, 2015). This is very important in the current trend of climate change phenomena in the entire World today. Ajai and Imoko, (2011) pointed out that the application of Science and Technology to agriculture, whose foundation is mathematics, have completely changed the face of agriculture through the introduction of mechanical devices for planting, tending, harvesting and processing of various food crops. Researchers have not only through hybridization by plant/animal breeders resulted in the improved varieties of food crops, animals and other food products, but has boosted yields through the use of fertilizers and pesticides.

Ezeilo (1981) affirmed that there can be no real technological development without a corresponding development in Mathematics both as conceived and as practiced. Also Umoinyang (1997) referred Mathematics as the foundation of science and technology without which a nation can never be prosperous and economically independent. As new methods of building or manufacturing foods are developed Mathematics formulae and models may be applied to test the structural and functional soundness of the design before it is mass produced, thus saving millions of dollars and untold time. Computer aided design is becoming increasingly important in this type of use- and it is all based on application of Mathematics (Stolperia, 2011). As research is done to develop new treatments for medical conditions, knowing the amount of medication administered is critical when evaluating the effect of the treatment, just as knowing exactly how much of what chemicals went into creating the medication. As amounts are adjusted and outcomes assessed, the mathematical data created may be used to extrapolate further possible treatment procedures or doses. According to Jonathan Farley (2006) “Mathematics is the foundation of the natural sciences. It is no coincidence that Isaac Newton, the man who formulate the law of gravitational attraction that revolutionized our understanding of universe, was also the man who popularized the calculus and the natural science, however pure, are what give us airplanes, cable T.V and the internet.

Role of Mathematics in National Security

Mathematical sciences play a key role in many important areas of Homeland security including data mining and image analysis and voice recognition for intelligence analysis, encryption and decryption for intelligence gathering and computer security, detection and epidemiology of bioterrorist attacks to determine their scope, and data fusion to analyze information coming from simultaneously from several sources (National Research Council, 2004). In addition to the traditional area of cryptology, Mathematicians at the National Security Agency now work on problems such as signal analysis, speech

processing, coding theory, data compression, analysis of communication networks and computer security. To solve problems generated by NSA's mission, mathematicians draw from a wide body of mathematical knowledge, ranging over Number theory, Finite field theory, Fourier analysis, Probability, Statistics and more. However, many times, the essential ingredient to the solution of a problem is not mathematical knowledge per se, but the keen analytic ability that a mathematician possesses through training and talent (National Security Agency). Closed Circuit Television (CCTV) is a technological system of video surveillance by cameras. CCTV systems have expanded to facial recognition systems, infrared devices, computerized databases to track people, recording of sounds and voices (microphones), automated license plate identification, cellular alarms communication, roving video surveillance, unmanned aerial vehicles and wireless high-speed computer networks that transfer images at faster rates and improved quality. Currently, there is available software that translates facial features into simple mathematical formulas that can be checked against data banks at faster pace (Leman-Langlois, 2013).

Detection and epidemiology of Bioterrorist attacks involves a number of lines of Mathematics research. The development of mathematical models of how diseases spread is perhaps one of the most well known examples- well known in part because simple scenarios from standard examples in calculus classes. In fact, within days of the September 11 attack on the world Trade Centre Towers and The Pentagons, researchers at Los Alamos National Laboratory had taken a mathematical model of traffic flow they had been developing and applied it to predict the likely spread of disease following a possible attack. Another area where Mathematics will be important in countering a biological or chemical attack is in early detection that such an attack has in fact taken place.

The quantitative aspect of microbial inactivation, growth, of chemical, biochemical changes in food safety, quality, stability and nutritional value. These aspects have become even more important now, as new preservation technologies are being developed and concern about the safety of foods is growing. Safety nutrition and quality issues also affect the economics of food production, processing and handling. Maintaining of the safety of foods without sacrificing their quality and nutritional value requires accurate quantitative methods to assess what constitutes microbial safety, how it changes with time, how to accomplishing it and how the process and post process history affect the food's quality, and in some cases its chemical safety (Micha Peleg, 2014). Today's terrorists operate globally, maintaining contact by telephone and the internet. Identifying the occasional key telephone and internet conversation among the millions that take place daily can only be done (if it can be done at all) using sophisticated automation, with monitoring systems that are able to breakdown voices and words into digital patterns that can be scanned for keywords. These require the development of new algorithms to monitor communications channels in real time to provide the nation's defense authorities with early warnings of a potential threat. Similarly, methods need to be developed for the automated screening of images sent over the internet, to look for messages embedded pictures (Steganography) a technique believed to have been used by the September 11 terrorists. New and more sophisticated mathematical techniques for image processing and recognition will also be required to identify potential terrorists involved in suspicious activities and to improve screening at the airports and other checkpoints (Keith Devlin, 2002).

Role of Mathematics in the Alleviation of Poverty

Poverty includes deprivation (i.e food, shelter) and denial of access to basic services (i.e health, education). It also tends to encompass a range of non material conditions, such as, deprivation of rights, insecurity and dignity. The combination of these two types of conditions (i.e material and non-material) provides a more complete understanding of poverty (Chado & Bala, 2014). According to Abdullahi (2006), physical development is associated with performing physical tasks like the ability to move, lift, stand and manipulate objects. The ability to perform these tasks accurately is important in technology. Mathematics fosters physical tasks in geometrical construction. If a learner is exposed enough to mathematical activities requiring mathematical skills, then the learner could grow to become an industrious member of the society and thereby creating jobs for himself and some other people.

Anyakoha (2000) described poverty as an anti-developer of human intelligent, environmental polluter and stress builder. Those who are poor and hungry often destroy their environment in order to survive. This is why people engaged in all sorts of anti-social behaviour like stealing, duping, breaking oil pipes, and bribery and corruption e.t.c in order to make ends meet. Abject poverty can be eradicated, if an enabling environment for learning is put in place (Mushtaq, 2008). Applications of mathematical ideologies in alleviating poverty demand a conducive learning environment, establishment of mathematics laboratory for practical and demonstration of concepts from abstract to concrete (real), recreational centre for relaxation in achieving absolute thinking and logical building. In providing adequate assistance in solving the problem of poverty in Nigeria, the mathematicians must utilize some educational services such as; provision of instructional materials, computer-aided instruction and micro-credit facilities (Ahmed, 2000; Nnubia, 2006).

According to Abubakar, Charles-Ogan & Albert (2014): Mathematics knowledge quickens the formation of any business procedures as it helps in creativity as well as evaluating and remedial courses. To achieve this, the minimum resources should be matched with the objectives as a means of setting out for the goal for self-employment. No one involves himself into a meaningful business without calculating the gain or loss he might derive from it. He has to mediate strategies he would employ to achieve success. His success will depend on his mathematical ability to manipulate numbers and materials as his planning strategies. According to Inforplease.com (2013) in the ancient empires of Egypt, Mesopotamia, India, China, Babylon and Greece from 2nd to 3rd Millenia B.C, Mathematical skills were used for surveying and measurement on farm lands. Even in the modern world, especially in developed countries of Europe, America, and China, Mathematical skills are the pivot of their greatness in all areas of economy. Mathematical skills provided them with the knowledge of metal work which finally resulted into automobile production and weapons of mass destruction for defense. Mathematical skills provided them with talent to use earth materials to construct beautiful storey buildings (skyscrapers). Mathematical skills also provided them with talents for cloth weaving, drugs production and carpentry as well as advanced in mechanized agriculture.

Conclusion

The paper concludes that poverty, crime and security problems have been of utmost concern to the world especially Nigerians. Graduates from tertiary institutions should understand the situation in which they found themselves and be able to utilize the education they have acquired to take good decisions for their self-reliance and / or self-survival in the society.

Suggestions

The following recommendations were made:

- The Federal and state governments should offer financial assistance to any Mathematics graduate who wishes to start something on his/her own for self-reliance.
- Government should continue to provide functional Mathematics education at all levels of education since it is paramount on poverty alleviation, crime and security problems and provision of foods.
- Private sectors of the economy should employ people whereby reducing poverty, crime and insecurity problems.
- Government at all levels should encourage the use of CCTV systems in public places to reduce crime and security problems.
- Government should organize training for farmers in the field of Mathematics in order to acquire mathematical skills necessary to help them in their agricultural work.
- The use of ICT in the teaching and learning of Mathematics cannot be properly done with inadequate ICT infrastructure in schools. Therefore, equipped and functional ICT laboratory should be provided in schools.

- Teachers should adapt better instructional strategies for enhancing interest in learning. Students should therefore need to have a change of attitude to Mathematics in schools and be serious in learning it. Teaching mathematics alone is not sufficient in itself. When the utility value or usefulness of the subject is made known to students their interest would be enlisted and this augurs well for better performance in Mathematics.

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