Mathematics: Indispensable tool for successful and balance human existence on this planet

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ABSTRACT

Mathematics is the touch stone of wit and whetstone of intelligence. It is the master and servant of most disciplines and source of enlightment to human understanding of the universe. The importance of mathematics transcends all definitions and descriptions. Technological Advancement of any country depends on the volume and quality of mathematics offered in its school system. Without mathematics the understanding of national problems would be superficial. However, only a handful of people, even among those who have chosen mathematics as a life career are aware of the importance of mathematics to mankind and the entire universe. In this paper, the universal importance and application of mathematics to man and his immediate environment is highlighted. It is hoped that the submissions would kindle in people an ardent interest in mathematics, so much so that more and more people would begin to choose mathematics as a discipline to study. If it does, the purpose of the paper would have been achieved.

Keywords: Intelligence, technological advancement, interest, Mathematics.

INTRODUCTION

In all the entire history of education, mathematics has held its leading position among all other school subjects because it has been considered as an indispensable tool in the formation of the educated man. According to Griffiths (1974), the educated man, is the knowledgeable man, trained to approach the affairs of his daily life with sense of detachment and objectivity and to reason about them soberly and correctly. Mathematics is the only subject that can be used in all cultures of the world to produce the educated man. Mathematics is the means of sharpening the individuals mind, shaping his reasoning ability and developing his personality. It has helped to contribute immensely to the general and basic education of the people of the world.

The importance of mathematics is not restricted to the development of the individual alone. Mathematics has contributed to the development of society, it is the central intellectual discipline of any technological society. No society is static, as each society develops, its quantitative aspects assume ever greater and increasing influence and dominance over its quantitative

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features and a good account of the quantitative development can only be kept by means of mathematics understanding of the situation. It is therefore not surprising that mathematics has pervaded the entire organized activities of human society. It is the language used in all cultures of the world and in all works of life. It s used in musical composition and parlour games like the common Ludo games, the Scrable and Yoruba Chess (Ayo).

The importance accorded mathematics in the school curriculum from the primary school to the secondary school level reflects accurately the vital role played by the subject in contemporary society. At the most basic level, the knowledge of mathematics is essential in the conduct of everyday living and in commerce, engineering and the natural and social sciences, advanced mathematical concepts and techniques are indispensable tools.

Objective of this paper:
The main objective of this paper is to examine the importance of mathematics on the given below subtitle:
  – Mathematics and Human Daily activities
  – Mathematics and Personality Development
  – Mathematics and Reasoning
  – Mathematics as a tool for other subjects
  – Mathematics as a universal language.
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Mathematics and human daily activities
From the ancient Egyptian onwards, mathematics has had two aspects. One of which is the aesthetic, which is completely devoid of practical applications. This is the aspect which deals with the love for mathematics itself. Studies and researches are carried on in it for the sake of mathematics alone, motivated by a kind of scientific inquisitiveness. Man, beginning from the Greeks days has always enjoyed the contemplation of numbers and geometrical figures, the discipline of controlled imaginative thought and the thrill of discovering new mathematical relationships. It was the Greeks who began the science of mathematical reasoning.

Prior to their days, mathematics does transcend the boundary of practical usage. The early mathematics was purely empirical in nature, arrived at by trial and error and no proofs were given to explain any results obtained. There was no interest in the mental struggles needed to undertake to reach a result. People were merely contended if the result worked. If the result worked, that was a proof enough of the mathematical undertaking. The Greeks were not contended to show that the results worked. They wanted to explain the reasons and this they tried to do by the shortest logical experiment they could device. Thus the writing of proofs became an art in which it was a matter of pride to be economical as much as possible with the steps in reasoning and yet leave no loopholes. These led to the formulation of theorems. The Greeks accumulated a store of proved theorems, all of which could be arranged in an ever-widening inverted pyramid of knowledge. The point at the bottom of the pyramid could be firmly entrenched in everyday experience through a few self-evident axioms, such as "The shortest distance between two points is a straight line".

Mathematics today uses some of the assumptions and proofs of the Greek days, although there could be few changes here and there, but the basic Greek system of abstraction and proof remain intact. People have continued to derive joy and satisfaction from this aesthetic aspect of mathematics. Many studies were prompted by this desire of personal satisfaction and many more will be kindled in the heart of people by the same reason. From the foregoing, mathematics has offered people personal joy and satisfaction as music does to the mind, providing the higher

emotions and mental pleasures most needed by human being. The other aspect is the practical aspect of mathematics which stems from everyday life. Its very beginning and development have been motivated and guided by the application to these problems and everyday life situation. In this regard, mathematics has become a tool for other sciences and a provision of solutions to problems of everyday life. From its very beginning mathematical development has its roots in practical requirement. Man's first engagement in mathematics was prompted by the practical needs to count things around him, especially his possessions, such as flocks and farm products. The early men probably formed numbers with their fingers, matching their fingers with sets of objects. This support the view of some researchers like Fackuade (1981) who explained that the base ten numeration system, that is, the decimal system most probably came into existence because man has ten fingers that is quite certain, it's on the basis that the first ten numbers are called digits, as they can be represented on ten fingers of the hand. Writing as a practical application of mathematics by the early man, Alfred (1964) said that the early man not only counted his fingers but could transfer information or objects represented by a finger, by a single cut or stroke on walls of his home. He could therefore have many marks, each one representing an object. In this way, it would be possible for him to see at a glance the total number represented by a collection of these strokes, of course by counting them one by one. Records have it that many ancient caves have such markings which are revelation of man's earliest attempt to represent spoken numbers by written symbols.

As the quantitative aspect of the society became more complicated, man engaged in fairly elaborate calculations involving subtraction, multiplication and division. This then marked the humble beginning of arithmetic and methods of computing. The devices that were used for calculation were very simple. They include pebbles, sticks and the usual marking or drawings on the wall. These devices grew more advanced as the situation demanded and by the time of the ancient Greeks man had devised mechanical calculators which were invented as a result of application of mathematics in the UNESCO Publication on New trends in mathematics teaching (1973) the account on the importance of mathematics rus thus;

The arithmetical literacy, which is skill and understanding of the fundamental operations with whole and rational numbers in decimal notation, on the part of millions of inhabitants of our planet shows either a lack of school or failure in instruction at the elementary level. Because of the importance of this knowledge in every facet of everyday life, it goes without question that the acquisition of skill and understanding of arithmetical computation and its application to the solution of everyday problems is still the primary objective of elementary school mathematics.

Arithmetic literacy is a necessary tool for the daily living of the people of any society. In many situations of life, an individual is faced with the task of taking some decisions. Many of these decisions can be taken more rationally if approached quantitatively. At more personal level, a person going to the market would need to decide on whether he has enough money to get what he needs and hence plan within the limit of his purse. At community levels, firms and other establishments, some level of mathematical competence is required for executing decisions, making policies and taking decisions. Heads of departments in all forms of establishments, from the community through to the highest governmental levels take decisions from time to time as whether to spend money either in one way or the other. Such decisions would be better taken if such Heads have mathematical understanding of the financial position of the establishments and be able to make some predictions as to what gains could be made through such spending.

The need to have a mathematical understanding of financial situation explain the root of some daily problems arising from financial mismanagement by husbands and house-wives in time of

economic depression which could be traced to their lack of mathematical reasoning ability required to handle the family finances under their control. The importance of mathematics to the individual in his daily undertakings is so enormous that the knowledge of mathematics is an indispensable tool for a successful and balance human existence on this planet.

Mathematics and personality development
Personality, according to the principles of psychology evolves through a process of integration of the whole man. Psychologist describes the integrated beings as that person who is able to take a wider as opposed to personal or sectional view in most questions. Such a person will be constructive rather than just critical in a difficult situation. These qualities make the integrated person an individual who is always trying to unite things rather than separate them. For sure, he will seek connections rather than differences and perhaps most importantly, he will be able to make a good adjustment to his environment by establishing a fundamental identity of interest between himself and his fellow men.

Mathem provides the forum in which this process of integration could be held, developed and internalized. The faith in mathematics to produce integrative effects on human personality dated as far back as the days of Pythagora. Mathematics was to people of that age, a discipline of mind "disciplina mentis" and so it was clear to all who believed in education.

In the ancient Egyptian Society, mathematics was taught in order to achieve the desirable state of being a priest. The priests were highly honoured and considered as men of high esteem and personality who acquired their exceptional status through the discipline of mathematics. They were men of mathematics.

Mathematics and reasoning
There is the general belief that mathematics provides a model of precise, abstract and elegant thought and that the study of the subject helps to broaden and sharpen one's intellectual capabilities. Mathematics helps the individual to understand his environment and to give accurate account of the physical phenomena that happen around him. The learning of mathematics helps to train the mind in the same way that the learning of Latin Grammar or French irregular verbs have been claimed to train the mind to think Logically. The study of mathematics sharpens the mind and gives the individual the ability to react in the right direction in time of emergency. To this end, mathematics has been found to be very useful in warfare. For a combatant Soldier, there is the need to have the disciplined mind and mathematics is the only and right subject to do that military manocuures require persons of sharp mind, with a low reaction time, capable of reacting without delay to emergencies.

The French were particularly known in using mathematics selection tests for selecting their military men. By this means of selection, the French ensured the best abled men in body and mind in their army and at the battle field; they displayed thoughts from minds which are mathematically oriented.

It was this that ensured the supremacy of the French army over those of other nations. The military success of Napoleon has been attributed to the mathematical education of his officers. We could thus see that it has been an old experience that mathematics could be useful to military art. For example a general commanding officer must be able to work out when to meet an approaching enemy and what front-line formation would be used to attack the enemy. Thus mathematics helps to develop the intellect and also train the mind.

Mathematics as a tool for other subjects

Mathematics is one of the essential aid by means of which the other sciences, pure and applied are able to forge ahead.

Mathematical techniques are constantly being developed to meet the Channing requirements of Physics, Chemistry, Biology, Social Sciences, Psychology, Engineering and even law to mention a few. To end, mathematics has been described as the queen and as well as the handmaid, the master and servant of the sciences because of the leadership and service roles it plays. Studies have shown that no other subject forms a strong binding force among various branches of science, namely Physical, Biological and social as mathematics and without it, knowledge of the sciences often remains superficial. We may now look into the leading and service functions of mathematics in a number of disciplines.

Among the physical Sciences, physics is the one that is most served by mathematics. From its very elementary stage, there are the mathematical operations of measurement of distances, areas, volumes and masses using various types of instruments. A greater number of these measurements are followed by calculations for which a good knowledge of mathematics is essential. At higher levels, physics and mathematics are married into a unit whole. It is observed that the important objective of a first course in mechanics, a branch of Physics, is to train the student to think about physical phenomena in mathematical terms. Studies have shown that the study of mechanics should aim at developing an intuitive feeling for the precise mathematical formulation of physical problems and for the physical interpretation of the mathematical solutions. In treating most of these physical phenomena, a good knowledge of elementary differential equations and vector analysis are very essential. Use is made of Complex Numbers to present oscillating quantities and on the principle of superposition; Fourier series constitutes an essential tool. In order to be able to describe the motions in a plane or space the physicists must have a good understanding of vector algebra. More advanced mathematics is need in the treatment of collision problems and the general theory of coupled oscillation is best treated by means of linear transformation in vector spaces. In the treatment of vibrating strings and of the motion of fluids, emphasis is on the fundamental concepts and mathematical methods used in treating the mechanics of continuous media. Langrage's Equations are the fundamentals of advanced dynamics. Hamilton's Equations and the concept of phase space are prerequisites to courses in quantum mechanics or statistical mechanics. Mention any section of physics, optics, electricity or thermodynamics, mathematics forms the basis of understanding it and also of its application.

In chemistry, the ability to carry out elementary calculation involving items like direct and inverse proportion, decimals percentages, indices, logarithms, graphs and so on are necessary prerequisites for the understanding of the subject- mathematics.

At a higher level, a good knowledge of calculus is essential in understanding problems in chemical thermodynamics, chemical kinetics and the laws of mass Action.

The functions of mathematics to the study of the biological Sciences cannot be overemphasized. Statistics is extensively used in elementary biology, agricultural science and the medical sciences to resolve statistical problems. The growth of micro-organisms is an exponential function which can be explained using the methods of calculus. For example, the rate of growth of a culture at a given moment is directly proportional to the number of cells present at that moment. This relationship is given by the equation $dN/dt = KN$ and upon integrating this equation, we obtain

another equation, $N = N_O e^{kt}$ where N_0 is the number of cells at time zero and N is the number of cells at any later time t.

In a further manipulation of the equation we get $K = ln\, N/N_O t$ and here K represents the rate at which the natural logarithm of cell number increases with time. If we further rearrange the equation, we obtain, $ln\, N/N_o = K_1$ and the graph of the natural logarithm of cell can be plotted against time and the slope gives the value of K. we can thus see how extensively mathematics can be used in the biological sciences. There are a lot of examples that can be cited to show the dependence of science on mathematics but few have been given for lack of space.

In social science, mathematics plays an important role in understanding most of the concepts and theories, especially as they apply to everyday occurrences.

For example in Geography, mathematics is employed in the measurement of distances and areas which are used in map projections. The laws governing the heavenly bodies are mathematically deduced. The first and the third kepler's laws state that;

(a) The planets move in ellipses with the sun at one focus.
(b) The squares of the periodic time (the times required for the orbital revolutions of the planets) are proportional to the cubes of the mean distances (the semi-major areas of their orbits)

These laws are stated in mathematical terms and for a good comprehension of them, a person must have knowledge of geometry and trigonometry. The dimension, form and orientation of a planet's orbit as well as the position of the planet at any time are defined by six parameters which are purely mathematical in nature - some aspects of co-ordinate geometry.

The dependence of economic, accounting and business administration on mathematics is such that for anybody to claim competence in any of these areas, he must possess a basic knowledge of mathematics beyond the secondary school level.

In law, although mathematics is not read in direct forms as in other disciplines, the principles of mathematical reasoning forms the basis for its understanding. It has been shown form studies that prospective law student with mathematics background would perform better in the examination.

In the sections of data interpretation, quantitative comparison and logical reasoning the lawyer depends on his mathematical skills. Mathematical skills also apply to practical judgment and ease principle. In practical judgment, questions in a law school examination for example, persons are asked to identify major objectives, major and minor factors, major assumptions and important issues relating to a decision in a hypothetical business situation. It requires looking for the narrowest rules which justifies a given court decision. This is not all unlike finding the defining characteristics of a given set and some of its proper subsets as applicable in pure mathematics.

Mathematics as a universal language
The language of mathematics is sometimes distasteful to some people. The grammar of the language, its proper usage is determined by the rule 8 logist. Its vocabulary consists of symbols such as +, for addition −, for subtraction ÷, for division ∑, for summation √, for square root ∫, integration and so on. These symbols do not appeal to many people and even the sight of them puts many off. These symbols are more devices to aid human thinking and reduce the use of

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verbal expression to the bearest minimum. To laymen, these symbols constitute a strong barrier between the realm of thoughts and the process of verbal expressions. It is interesting to note that people do not only apply mathematics but think and speak mathematics most of the time in personal reflections and interactions with others.

Math is a universal language. It is a means of communication and description and it is used by economists, geographers, scientists, businessmen, market women and people of all works of life. From time, mathematics has been the language of precise communication. No matter in what native tongue, mathematical precision remains the same. We may consider a record of mathematical instruction in the Bible. That was the occasion in which God instructed Noah on the size and shape of the ark he was to build. (Genesis 6:14-16) reads "Make thee an ark of gopher wood, rooms shall thou make in the ark, and shalt pitch it within and without with pitch. And this is the fashion which thou shalt make it of; THE LENGTH of the ark shall be THREE HUNDRED CUBITS, the BREADTH of it FIFTY CUBITS and the HEIGHT of it THIRTY CUBITS. A window shall thou make to the ark, with LOWER SECOND and THIRED stories shall thou make it".

This instruction was purely in mathematical language for the purpose of precision, neatness and fewness of words. Today more and more mathematics vocabularies are used in human instructions, at home, in office and in sending messages in order to achieve precession in communication.

CONCLUSION

Mathematics is a universal language that cuts across cultures and serves as a means of expressing thoughts in neat and precise form. It is a language used in games, in market, in establishments and all places where there are interactions between people. Mathematics is a means of shaping and sharpening man's thinking and as a discipline worthy of studying for its own sake, capable of giving pleasure and satisfaction to those who are able to study it. Mathematics is needed for the proper understanding, quantification and record keeping of our daily activities.

Therefore, to develop a society of men and women who are knowledgeable, able to approach the affairs of daily life with sense of objectively and reason about them correctly, great emphasis must be placed on the teaching and learning of mathematics from the primary school level of the nation's educational system. It is only then can we have a society of disciplined appraisal of themselves in relation to living in the society.

There is no doubt at tall that all other disciplines are serviced and sometimes controlled by mathematics. The importance of mathematics cannot be more realized than when in Nigeria, Modern Mathematics was introduced in the Schools. The change in mathematical language and symbolism and its presentation as a natural body of knowledge became serious barriers to the teaching of the sciences. There were difficulties and the confusion that ensured probably led to the tagging of modern mathematics as "modern mess" because it was found net relevant to the needs and aspiration of the learners and the society at large.

Developments in most other subjects are explainable in the language of mathematics without which no reasonable communication can be made. It is therefore not only necessary but imperative that the present generation of school children should have good knowledge of mathematics at least to that level of competence which will make them cope comfortable with the mathematical requirements of other disciplines.

Thus, we have seen how mathematics has come to be regarded as a language - a means of communication and description which is increasingly being used by people of all works of life; as of course of study for its own sake and which is capable of giving pleasure and satisfaction to those who able to study it. Mathematics is needed for the development, maintenance, understanding, quantification and record keeping of our society, since no society is static and the desire for higher heights in science and technology will continue to increase. The demand on mathematics will ever be on the increase. In view of the universal importance of mathematics to man on earth, it becomes compulsory that those charged with education should find ways of involving more of the younger generation of our days in the study of mathematics.

Any nation that cannot gather school children involved and be interested in mathematics, will never attain true social, economic, scientific and technological independence. Such a nation will continue to look up to those other nations of the world which through sound mathematics education have become world powers, with sound economics, scientific and technological bases for her needs even in matters of political guidance.

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