

Mathematics in Advancements of Science and Technology "Boon for Society"

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Abstract:

Literally, mathematics means "science of measurement and counting". It is clear that counting plays a vital role in our daily life; just imagine that if there were no mathematics at all, how would it be possible for anyone to count members of the family, number of students in the class, rupees in the pocket, runs in a cricket match, goals scored in a hockey match, days in a week , in a month, in a year , for a beggar to count the coins collected or even for a shepherd to count his sheeps ? On a basic level, you need to be able to count, add, subtract, multiply, and divide. To a scientist, mathematics is an analytic tool applied to experimental data, hoping to generate a formula describing some basic tendency of nature. Also, mathematics can be used with existing theory to deduce an unknown quantity. Mathematicians resolve and find out the truth or falsity of conjectures by mathematical proof. When mathematical structures are good models of real phenomena, then mathematical reasoning can provide insight or more precisely, predictions about nature.. The research required to solve mathematical problems can take years or even centuries of sustained inquiry ,systematic thinking,objective reasoning and sincere effort.

Roger Bacon (1214-1294), an English Franciscan Friar, philosopher, scientist and scholar of the 13th century, once stated: "Neglect of mathematics works injury to all

knowledge, since person being ignorant of it cannot know the other sciences or the things of the world."

Mathematics has not only played an important role in the development of modern technology but it still continues to play a critical role in expanding fields of science and technology because of the basic requirement that research needs to be able to quantify and precisely evaluate the results of changes/advances in a field of undertaking. Doctors not only have to use basic arithmetic to calculate what dosage of a particular drug will be effective for your height and body over a specific period of time. 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 soon as amounts are adjusted and the outcomes are analysed , the mathematical data thus created may be used to extrapolate further possible treatment procedures or doses for the patients. Medical scientists working with cardiologists use differential equations to study blood flow dynamics. As new methods of building or manufacturing goods are developed, mathematical formulae and models can be applied to test the structural and functional stability of the design before it is produced on large scales, thus saving millions of dollars and precious time.

Computer-aided design is becoming more and more important in this type of use and it is all based on application of mathematics. The areas like advanced semi-conductor devices, bio-technology, digital image technology, Nano-technology, artificial satellites, and rockets all are based on mathematical concepts. The recent success of ISRO's Polar Satellite Launch Vehicle is also based on mathematics.

Mathematics continues to lead the way in many scientific and technological developments. Architecture, navigation and mechanics are all examples of core components of our civilization that rely heavily on mathematics.

Keywords:

Medication, Architecture, Quantitative, Mathematical competence, Flow dynamics, Wavelets.

Mathematics may be defined as the study of quantity, structure, space and change. it has historically developed, through the use of abstraction and logical reasoning, from basic counting, calculation, measurement, and the study of the shapes and motions of physical objects.

Science and mathematics are part of the STEM (Science, Technology, Engineering,

and Mathematics)- a strategy in several dimensions that can effectively sustain our knowledge-based economy in twenty-first century and many more centuries to follow. Just like a stem is indeed important for any tree, 'STEM' provide a wide variety of opportunities to understand and address global issues prevailing today. Mathematics exhibits hidden patterns that help us to understand the world around us. Now, much more than arithmetic and geometry, mathematics today is a diverse discipline that deals with data, measurements and observations from science, with inference, deduction, proof and with mathematical models of natural phenomena, of human behavior, and of social systems.

The need to understand and be able to use mathematics in everyday life and in the workplace has never been greater and will continue to increase. Knowing mathematics can be personally satisfying and empowering. The underpinnings of everyday life are increasingly mathematical and technological. For instance, making purchasing decisions, choosing insurance or health plans, and voting knowledgeably all call for quantitative sophistication. Mathematics is one of the greatest cultural and Intellectual achievements of human-kind, and citizens should develop an appreciation and Understanding of that achievement, including its aesthetic and even recreational aspects. Just as the level of mathematics needed for intelligent citizenship has increased dramatically, so too has the level of mathematical thinking and problem solving needed in the

workplace, in professional areas ranging from health care to graphic design. Although all careers require a foundation of mathematical knowledge, some are mathematics intensive. More students must pursue an educational path that will prepare them for lifelong work as mathematicians, statisticians, engineers, and scientists. In this changing world, those who understand and can do mathematics will have significantly enhanced opportunities and options for shaping their futures. Mathematical competence leads to the doors of productive and shiny futures. A lack of mathematical competence keeps those doors closed. Generally, it is an assumption that mathematics is only for the few selected people. On the contrary, every one needs to understand mathematics. All students should have the opportunity and the support necessary to learn significant mathematics with depth and understanding.

Principles and Standards call for a common foundation of mathematics to be adopted and followed by all students. This approach, however, does not imply that all students are alike. Students possess different talents, abilities, achievements, needs and interests in mathematics. Yet, all students must have access to the highest-quality mathematics instructional programs. Students with a deep interest in pursuing mathematical and scientific careers must have their talents and interests engaged. Likewise, students with special educational needs must have the opportunities and support they require to attain a substantial understanding of important mathematics. Man is a social

animal and human life depends upon the co-operation of each other. Group work helps social skills. The ability to work together on tasks with others can build various social skills. In order to live a social life, mathematical knowledge is needed, because of the give and take process, business and industry depends upon the knowledge of mathematics. The change in the social structure with regards to the modern facilities like mode of transport, means of communication and progress in the field of science and technology is due to mathematics only. In this way mathematics has played an important role in not only understanding the progress of society but also to develop the society.

Mathematics teaching is very important for intellectual developments there is no other subject in the curriculum likes mathematics which make students brain active. Problem solving helps in the development of mental faculties. Mental work is needed to solve mathematical problems. Each problem of mathematics poses such sequence which is necessary for constructive and creative process. In this way, all-mental abilities of child are developed through mathematics. Moreover, mathematics makes the man very calculating. It develops a strong will power, patience and self-reliance. It also develops the habit of discovery and invention. In education system, mathematics plays an important role in shaping the future probability of youth. Education is to develop an individual, to make him self-reliant, to make him wise, to make him a social contributor and in our education system, for

almost every subject, we study in school and university; we need to study mathematics too e.g., Physics, Chemistry, Life-Science, Economics, Business and Accountancy, Geography, History, Psychology, Architect, Designing, Computes, Statistics, Commerce etc.

Also in vocational areas like Tailoring, Carpentry, Cooking, Beauticians, Sportsperson, Farming etc, mathematical knowledge is needed. Even the professions like, Conductor, Shop Keeper, Drivers, Musicians, Magicians, Cashiers etc use basic mathematical concepts.

Mathematics is of central importance to modern society. It provides the vital underpinning of the knowledge of economy. It is essential in the physical sciences, technology, business, financial services and many areas of ICT. It is also of growing importance in biology, medicine and many of the social sciences. Mathematics forms the basis of most scientific and industrial research and development. Increasingly, many complex systems and structures in the modern world can only be understood using mathematics and much of the design and control of high-technology systems depends on mathematical inputs and outputs.

Economics of the society is developed by establishment of industries. The applied mathematics like computational science, applied analysis, optimization, differential equation, data analysis and discrete mathematics etc are essential in industrial field. By application of mathematical

methods, the exploration cost of oil and communication cost of images could be reduced. Techniques of wavelets and fractals are used for this purpose. Numerical simulation of mathematical models helps to manufacture super conductor cables to reduce the cost of electricity.

In particular, mathematics has contributed to progress in science and technology for thousands of years and still continues to do so. It finds useful applications in development of infrastructure i.e., business, industry, music, politics, sports, medicine, agriculture, engineering, and the social and natural sciences. The physical appearance and development of infrastructure is crucial in a society. Thus, for the construction of roads, buildings, stadiums, fly-overs, airports, dams, bridges, vehicles, airplanes etc. in mechanical engineering, civil engineering, electrical engineering etc.

The "functional" aspect of mathematics originates from its importance as the language of Science, Technology and Engineering, and its role in their development. This involvement is as old as mathematics itself and it can be argued that, without mathematics, there can be neither science nor engineering. In modern times, adoption of mathematical methods in the social, medical and physical sciences has expanded rapidly, confirming mathematics as an indispensable part of all school curricula and creating great demand for university-level mathematical training. Much of the demand stems directly from the need for mathematical and statistical

modeling of phenomena. Such modeling is basic to all engineering, plays a vital role in all physical sciences and contributes significantly to the biological sciences, medicine, psychology, economics and commerce. Mathematics has been successfully used in the development of science and technology in 20th-21st century. The areas like advanced semi-conductor devices, bio-technology, digital image technology, Nano-technology, artificial satellites, and rockets all are based on mathematical concepts. The recent success of NASA's Mars Rover is also based on mathematics. Mathematics is applied to agriculture, ecology, epidemiology, tumor and cardiac modeling, DNA sequencing and gene technology. It is used to manufacture medical devices and diagnostics, opto-electronics and sensor technology. There are positive senses which makes mathematics very special. First, by virtue of its fundamental nature as a universal abstract language and its underpinning of the sciences, technology and engineering, mathematics has a claim to an inherently different status from most other disciplines. Secondly, as we have discussed above, mathematics is fundamentally important in an omnipresent way, both for the enterprise and for an individual .

Galileo Galilei (1564–1642) said, "The universe cannot be read until we have learned the language and become familiar with the characters in which it is written. It is written in mathematical language, and the letters are triangles, circles and other geometrical figures, without which means it

is humanly impossible to comprehend a single word."

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