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Research Article

THE IMPORTANCE OF MATHEMATICS IN THE PROSPERITY OF SOCIETY

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ABSTRACT

This research article illustrates the importance of learning mathematics and the significance of understanding mathematical principles and concepts in the modern global environment through thinking critically. The article talks about the great encyclopedist-scientists Muhammad al-Khwarizmi and Abu Rayhan Biruni, and their great discoveries and valuable contributions in the field of mathematics. Moreover, it includes some quotes from Shakuntala Devi, popularly known as the Human Computer, a Mathematician and author who became popular for her incredible and almost supernatural calculation skills. Additionally, this paper provides information on "dyscalculia" as well as its impact on humans' overall well-being and mathematical research to come up with a cure in the period of COVID-19.

KEYWORDS

Numbers, mathematics, critical thinking, problem-solving skills, dyscalculia, advanced mathematical calculations.

INTRODUCTION

From the beginning of documented history, the discovery of numbers has played a fundamental role in the creation and development of every civilized nation. It would not be an exaggeration to say that mathematics is the history of the world we all live in. As early humans became more rational and started performing more complicated tasks, they needed a tool to carry out advanced mathematical calculations. These needs triggered the commencement of arithmetic. They utilized it to track the number of their livestock or when measuring how much milk their cows produce. As the society progressed, the need for math escalated. In today's day and age, due to the concepts of numbers, all human beings deal with time, currency, and measurements and enjoy the latest technological media. It is also an undeniable fact that it marked the beginning of all other fields including astronomy, physics, engineering, and geology. Numbers have transformed the life of humanity for the better.

Mathematics is one of the subjects that help students instill critical thinking and problem-solving skills, the most important real-life competencies of the modern world.

Mathematics is considered a tool for the development of science, technology, and industry; accordingly, it is one of the compulsory subjects to study for every student in primary and secondary schools in Uzbekistan. As already stated, any country should pay great attention to the teaching and learning of mathematics to achieve social, economic, and technological progress. Mathematics as a discipline can be directly or indirectly applied to all aspects of human activities depending on students' level of understanding of mathematical principles and concepts. Since ancient times till now people have used math to measure temperature, weight, length, capacity, speed, distance, area, volume, and so on. The simplest examples are as follows: in our daily lives, we use mathematics to measure time, use ingredients in moderation in cooking, buy or sell something, and in general satisfy our material and biological needs. And this is a fact that does not require any proof.

Understanding mathematics requires an understanding of its branches, including algebra, geometry, trigonometry, statistics, calculus, numbers, and numeracy. Moreover, it is important to note that complete comprehension of Math is also associated with the ability to think critically.

LITERATURE REVIEW

Regarding the mathematical branches highlighted above, Al-Khwarizmi appears first of all as a great mathematician who summarized the mathematical knowledge collected by the entire Eastern science, enriched them with his results, and founded a new branch of science - Algebra. In the period before al-Khwarizmi, only the simplest algebraic equations were studied, problems were considered as separate equations, and the laws between them were ignored. Al-Khwarizmi developed algebraic methods and formulas that can be applied to any linear and quadratic equations in the history of science, classified them, and gave their precise definitions. It was from al-Khwarizmi that symbolic literal expressions were introduced in mathematics, and its completely new field - Algebra - emerged as an independent science. His works were later translated into Latin in Europe and greatly influenced the development of European science during the Renaissance. In medieval Europe, al-Khwarizmi's treatises and books were taught as the main mathematical textbooks. The famous Belgian-American science historian George Sarton calls al-Khwarizmi "the greatest mathematician of all time" and highly appreciates his contribution to the popularization of science. It can be seen from the objective assessment of this foreign historian that al-Khwarizmi and his works are among the most important scientific sources in the history of world civilization.

Al-Khwarizmi developed trigonometric tables with the most accurate calculation books for his time. In these tables, the important functions of the sinuses are clearly described, as well as comments and formulas with important instructions for the reader. Based on al-Khwarizmi's trigonometric tables and treatises, the work "Carmen de Algorismo I Algorismus vulgaris" a Latin poem on "The Art of Algorismus", which is the art of calculating, using newly introduced Hindu-Arabic numerals. It was written by French author and Latin scholar Alexander de Villa Dei in the 11th and 12th centuries, and it served as the main mathematical textbook in all higher educational institutions of Europe until the 17th century. By the 16th century, all scientific works of al-Khwarizmi were translated into

European languages. The last of them, "Treatise on Indian Arithmetic", was included as a translation in the first part of the "Treatise of Arithmetic" published by Prince Baldassarre Boncompagni-Ludovisi, an Italian historian of mathematics, in 1857.

One more great mathematician and polymath of the Islamic Golden Age is Abu Rayhan Biruni. The scholar left behind numerous works in astronomy, physics, mathematics, geodesy, geology, mineralogy, history, and ethnography, making significant contributions to the development of these sciences.

Biruni also made a considerable contribution to the science of mathematics. He was the first to define trigonometry as an independent branch of mathematics. In his book "Al-Qanun al-Masudi" ("The Laws of Mas'ud") - a mathematical-astronomical treatise Biruni described the smooth and spherical types of trigonometry and created the linear and square interpolative rules of trigonometric functions. The book also encompasses fundamental mathematical definitions, calendars of various population groups, constellations, latitudes and longitudes of cities, the movements of stars and planets, as well as discussions on trigonometry.

RESULT AND DISCUSSION

As mentioned above, any country should invest in mathematics for its economic, social, and technological development and pay special attention to the teaching of this subject. Presidential schools, and lots of specialized schools such as Al-Beruni International School, established in our country, are clear examples of the matter. As a student of Bukhara Presidential School, I can proudly say that our school ranks first in the best results from A-level in math among other regional presidential schools. Math is one of my best disciplines of mine, due to the specific way

of teaching by our teachers almost all students are becoming not only smart in math but also enhancing their critical thinking.

According to Shakuntala Devi, an Indian woman who was famous as a human computer: "I cannot transfer my abilities to anyone, but I can think of quicker ways with which to help people develop numerical aptitude". I believe that numerical aptitude creates the most significant competencies and skills that bring success as well as prosperity throughout one's life. Here I would like to share a piece of my research about what would a world without mathematics be like, which I wrote in the Immerse Essay competition and won a grant: "But, let us imagine what would the world where numbers and mathematical terms do not exist look like. That is an everyday experience for people suffering from dyscalculia or what is commonly referred to by experts as "math dyslexia", causing a disability for understanding math-related concepts ranging from basic calculating operations to more intricate formulae. The prevalence rate of dyscalculia has often been found to be from 3.5 to 6.5% in epidemiological studies (Gross-Tsur, 1996; Shalev, 2000). As Line Rothmann (2015), a woman with this exact syndrome states:" A color-blind person can not explain what they see. They explain what others tell them they are unable to see.", trying to elucidate what life is like for her.

Math has also come in handy when combating a global issue that arose in 2019, the coronavirus pandemic. Models created by epidemiologists illustrated valuable inputs to visualize how the infection is spread among people. Insights gained from those models facilitated disease management and finally assisted scientists in coming up with a cure. "Models can help answer several questions that impact policy. In most cases, they are the only rational way of formulating such

questions and evaluating how different interventions might shape the spread of the disease," says Gautam I Menon (2020), professor of departments of physics and biology at Ashoka University. As a result, it saved millions of lives across the globe. Without math, we would still probably be attempting to find a vaccine, which has already been done with the assistance of those models based on mathematics."

Admittedly, the achievements of al-Biruni International School specializing in teaching mathematics are commendable. Since its establishment in 2018, the international school has set itself the goal of providing quality preschool and secondary education services according to world standards. The educational institution is accredited by Pearson, the world leader in the field of education. Accordingly, today the educational process at Al-Beruni International School is based on the general education programs of our country and the principles of educational institutions of Great Britain. Regular monitoring of students' knowledge based on international test programs is seen as the main task. To successfully solve this task, school experts studied several international research programs, such as TIMSS, PIRLS, and PISA, and found it appropriate to use the approaches of the PISA program.

The fundamental difference between the studies conducted on the PISA methodology and the traditional test system for Uzbekistan is that with the help of the specified tasks, not the amount of knowledge, but their quality, the student's literacy level is checked: the ability to apply the acquired knowledge in life, based on logic analysis, critical thinking skills are identified, - says Catherine Altundal, Al-Beruni International School the main coordinator of STEM and Pearson programs.

During 2020, specialists studied the curriculum of Uzbekistan and the main subjects taught in grades 1-11 of high school: mathematics, physics, chemistry, biology, and English language textbooks. Based on this material, test tasks for each topic were developed in close cooperation with experienced foreign colleagues. Experienced foreign experts assessed how well the developed assignments correspond to the methods used in international systems of monitoring the quality of education.

In this way, tests based on the idea and methodology of PISA became the basis for the Mathematics Olympiad organized by Al-Beruni International School at the end of December. About 800 students of the 2nd-10th grades from Tashkent schools applied for participation in the Olympiad, and about 700 of them tested their knowledge, the winners were 37 students with the best results 35 got the right to receive a scholarship of up to a million soums.

According to the school administration, tests of basic subjects are regularly held at the end of every month. Such a comparative evaluation of the results is important because it allows teachers to identify weaknesses in the educational process in time, and to take necessary measures in time when the student's knowledge indicators are decreasing or remaining stagnant. After all, the main task of education is to notice the knowledge and talent of each student in time, to create perfect conditions for their development, and to eliminate the factors that prevent their realization.

CONCLUSION

Overall, math has revolutionized the way we perceive the world. It has a crucial and irreplaceable role in human societies and depicts a definite key in the development and progress of the entire mankind. As

Devi (1929) states "Without mathematics, there is nothing you can do. Everything around you is mathematics. Everything around you is numbers."

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