

Following is the full text of the speech –

“I am indeed very pleased to come to the Institute of Mathematical Sciences, Chennai. It is very energizing to physically interact with the faculty and students of this hallowed institution. As we continue to fight against COVID and maintain safe distancing, we have also come to appreciate the value of real relationships and real interactions in our lives. I am hopeful that this event is a sign of better things to come, and I wish you all a happy, prosperous, safe and most importantly, a healthy new year.

Dear sisters and brothers,

The great German mathematician Gauss has been often quoted as saying that “Mathematics is the queen of sciences”. Mathematics is perhaps the main driving force behind scientific discoveries. Indeed, the progress of human civilization over the ages can be marked by corresponding progress in mathematical thought and discovery.

India has a rich history of practicing mathematics since ancient times. We had stalwarts like Aryabhata, Varahamihira and Brahmagupta who made discoveries and used algebraic techniques that were well ahead of the rest of the world. The earliest source on Indian mathematics was the Sulbasutras from the Vedic period. Sutras like Apastamba and Baudhayana contain the geometric detail for construction of sacrificial altars and for other rituals.

In the spirit of our philosophy of ‘share and care’, our knowledge was shared. Our numerals were borrowed by Arab traders, which later spread to medieval Europe and are now known as the ‘Hindu-Arabic numeral system’. Acknowledging these contributions, Albert Einstein once said, “We owe a lot to the Indians, who taught us how to count, without which no worthwhile scientific discovery could have been made.”

This rich legacy in mathematics continued in modern times too. The great Indian mathematician Ramanujan had captured the imagination of the people world over. With almost no formal training, he made important contributions to mathematical analysis and number theory. Without employment and living in the ordinary conditions, he continued his work undeterred. Finally, only when the English mathematician G.H.Hardy noted his work, Ramanujam travelled to Cambridge, England and became one of the youngest Fellows of the Royal Society. Hardy considered that Ramanujam’s genius could only be compared to mathematical greats like Leonhard Euler. In a short but eventful life, Ramanujam produced nearly 4000 amazing original results; His notes had original theorems that took years for other mathematicians to prove! His genius of looking at the specialty in each number is unmatched and legendary.

His inspirational story must motivate us to discover many more Ramanujams in our children. Always remember: there is no dearth of talent... there is a dearth in finding and nurturing this talent.

No doubt, mathematics and science as subjects are enticing, exciting and invigorating to the human mind. But more than just being numbers and tool for finding new discoveries, they have, more importantly, been the lifeline of human progress. Mathematics and science drive technological innovations, which in turn advances the mode of production of goods and ultimately propels the economy. Thus, mathematics and science can bring innovations that will make the common man’s life comfortable.

Brothers and sisters,

We all know that mathematics is introduced at a very young age in our school curriculum. It is deemed as part of a child's basic or elementary education. Unfortunately, many children get intimidated by the subject and simply develop fear and anxiety at the prospect of learning mathematics. This fear can be removed only by arousing the interest of the child in the subject. Therefore, the method of teaching plays a crucial role in making children passionate about maths. An important issue that needs to be addressed is rote memorization even in mathematics. Many a time, children simply memorize the answer from a textbook and reproduce it in the exam. This has to be stopped and the child must be trained to think creatively and analytically. Undoubtedly, better teacher training and revamped curriculum are crucial to revitalize primary education. But more importantly, educators must adopt creative methods to invigorate young minds. Puzzles, demonstrations and other hands-on activities could be utilized to make children become friends with numbers. A pedantic manner of teaching should be replaced with a more interactive and inclusive method.

The New Education Policy seeks to do away with rigid separation between arts and sciences, curricular and extra-curricular and vocational and academic streams. We must fully capitalize on this vision document and bring in pedagogical changes that will ignite the passion of the young learners in subjects like mathematics.

Foundational mathematics and science form the basis for STEM (Science, Technology, Engineering and Mathematics) education. We must nurture and encourage children to take up careers in science. Any country that aspires to be at the forefront of human knowledge needs to invest in fundamental scientific research, including mathematics.

In order to strengthen STEM education, we must look beyond government funding. The private sector has an equal opportunity and responsibility to fund and partner with institutions and to collaborate on STEM projects. This is the global best-practice which has been bringing a lot of benefits for the investor too. Easy IP and patenting regime will also go a long way in encouraging STEM research and the government has been taking many initiatives in this regard.

Dear sisters and brothers, a major issue of concern in STEM-related employment is the under-representation of women. While about 40 per cent of STEM graduates in India are women, which is the highest in the world, women's share in STEM jobs in India is a mere 14 per cent. Even more worrisome is the poor women's participation in post-graduate and doctoral studies. Diversity in STEM is absolutely necessary and the need of the hour is to bridge the gender divide in employment. We must look at the cause for this dismal under-representation of women in science and technology jobs and take steps to rectify the situation expeditiously.

I am happy to note that with government's efforts, the number of girl students in IITs, which was just 8 per cent in 2016 has increased to nearly 20 percent now. The Department of Science & Technology's 'Women Scientists Program' is a laudable initiative that encourages women to take up careers in science and maths. We must celebrate our women scientists and mathematicians and showcase them as role models to our young girls so that we can discover many more talented and hidden Asima Chatterjees, Janaki Ammal and Shakuntala Devis.

Mathematics and statistics were once looked at as niche fields of research and were not popular career domains. Much has changed in the past few years. There has been a revolutionary change in the way business is done with the advent of data science and data-driven decision making. This was aided by advancement in computing facilities and the emergence of artificial intelligence. Now, mathematical modelling and statistical analysis have become an indispensable skill-set in many industries. This field is only expected to

grow in the coming years as more and more businesses, governments and other organizations seek to leverage the power of data.

Our young demography and a growing economy imply that there is both an increasing demand for work and a skilled workforce. In this context, data science is an important area that needs to be fully tapped for ensuring job-creation. We must look beyond our traditional science and engineering curricula and we must equip young graduates with these new skill-sets. Else, they will become out-dated and the degree will remain only on paper. For this, institutes such as yours and others could offer micro-courses in statistics, computer science and related subjects. The proliferation of distance education courses offered by national institutes like IITs is a good augury. But most of these courses are still in English. We need to offer them in regional languages so that more students get benefited from such courses.

Brothers and sisters,

This institute was founded in 1962 as a National Institute of Higher Learning to pursue quality fundamental research. I must say that it has done outstandingly well in research and is well recognized both-- nationally and globally.

I am aware that this institute has been involved with the proposed mega-science project called India-based Neutrino Observatory (INO). This project aims to build a world-class underground lab close to Madurai to study the exotic and elusive particles called neutrinos. The detectors to be located there will be built indigenously with active participation from industry. There will be a lot of positive takeaways from this ambitious project, and it will elevate India's global position as a leader in scientific research. I am also pleased to note that research is being undertaken by IMSc in other important areas like quantum computing, condensed matter physics and high energy physics.

I must also compliment this institute for contributing to the growth of science in Tamil Nadu through various research collaborations and science outreach programs like "science at the sabha". This is the need of the hour-- to inculcate scientific temper in people, especially in children. I must congratulate this institute for excelling in its mandate and leading the development of mathematical sciences in India.

Once again, I am very glad to be present with you all today. I am also happy to have virtually inaugurated the New Residential Wing of the IMSc Campus.

My best wishes to the IMSc fraternity for all the future endeavours.

May you continue to find magic in numbers!

May the country prosper, guided by science and reason!

May we all collectively thrive in this new world!

Jai Hind!"