



Need and Importance of STEM Education in Indian Schools

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ABSTRACT

STEM is an acronym for Science, Technology, Engineering and Mathematics. Rather than teach the four disciplines as separate and discrete subjects, STEM integrates them into a cohesive learning paradigm based on real-world applications. STEM education—are vital to our future—the future of our country, the future of our region and the future of our children. Besides, STEM is everywhere; it shapes our everyday experiences. In this paper, Need and importance of STEM Education in Indian schools have been presented.

KEYWORDS

India is a nation on the move, slowly making its place among the top nations of the world. One of the biggest challenges facing this nascent power is the science education of its sizeable young population. A majority of India's population still lives in economically challenging conditions. Under such circumstances, for educational institutions to keep pace with scientific and technological innovations is a challenge in itself. More importantly, including latest developments in STEM in their curricula in a holistic manner keeping in mind both students' employability as well as social development is a key challenge.

The term "STEM Education" is being heard frequently nowadays in educational space. STEM is an acronym for Science, Technology, Engineering and Mathematics. It is gaining popularity day by day owing to rapid advancements in these fields. Many studies confirmed that not only a majority of our future jobs would fall under this category but also many new jobs are going to be created in these fields. It is to be noted that STEM fields have equal effects on all other areas be it arts, humanities or any other field. In a world that is quickly evolving and inclined towards technology, STEM skills would be of great economic impact. At a crucial stage when Indian government is promoting initiatives such as Make in India, Skill India, digital India to encourage manufacturing, technology usage and skill development in the country, STEM is turning out to be an essential and integral component of our education.

However, when we look at the current Indian educational system, even from a very broad perspective, we clearly notice that we are far behind in adapting to the changes in global educational arena. Still today, a major emphasis on our school education system is learning through text book and in most cases, marks secured is the only criteria to assess the knowledge. Critical thinking, inquiry based learning and hands-on learning is something which is far from implementation especially in a majority of K-12 educational institutions. Curiosity, innovation and thirst for knowledge towards Science, Technology, Engineering and Mathematics (STEM) in kids can be encouraged by an early exposure to hands-on learning and practical knowledge in a more engaging and fun to learn environment. Once a kid develops a passion for STEM fields, it smoothen the decision making process to choose a right field to pursue career. It will help to create great thinkers, innovators, engineers and scientists that our society and industry needs. As said earlier, it is needed for our future prosperity and to our nation in order to develop competitiveness and play a vital role in global economy. STEM is a curriculum based on the idea of educating students in four specific disciplines — science, technology, engineering and mathematics — in an interdisciplinary and applied approach.

Science is our natural world— sun, moon and stars...lands and oceans...weather, natural disasters, the diversity of nature, animals (large, small, microbial)...plants and food... The list is

almost endless. In today's world, technology means computers and smartphones, but it goes back to television, radio, microscopes, telegraph, telescopes, the compass, and even the first wheel. Engineering designs buildings, roads, and bridges, but it also tackles today's challenges of transportation, global warming and environment-friendly machines, appliances and systems. We only have to look around to see what improvements to our lives and our homes have been engineered in the last decade alone. We encounter mathematics at the grocery store, the bank, on tax forms, in dealing with investments and the family budget. Every other STEM field depends on mathematics. STEM is important, because it pervades every aspect of our lives.

STEM education begins while students are very young:

- **Elementary school** — STEM education focuses on the introductory level STEM courses, as well as awareness of the STEM fields and occupations. This initial step provides standards-based structured inquiry-based and real world problem-based learning, connecting all four of the STEM subjects. The goal is to pique students' interest into them wanting to pursue the courses, not because they have to. There is also an emphasis placed on bridging in-school and out-of-school STEM learning opportunities.
- **Middle school** — At this stage, the courses become more rigorous and challenging. Student awareness of STEM fields and occupations is still pursued, as well as the academic requirements of such fields. Student exploration of STEM related careers begins at this level, particularly for underrepresented populations.
- **High school** — The program of study focuses on the application of the subjects in a challenging and rigorous manner. Courses and pathways are now available in STEM fields and occupations, as well as preparation for post-secondary education and employment. More emphasis is placed on bridging in-school and out-of-school STEM opportunities.

Because STEM is so important for our children, we need to encourage the students currently in our educational systems, as well as future generations of students, to understand and embrace the technology that affects them every day of their lives. Students should be advised on the merits of taking as many math and science courses in middle and high school as possible. And these courses need to be taught by engaged and enthusiastic teachers using hands-on and minds-on activities. Making science and math courses fun and interesting will not only help students to learn, but might also plant the "seed of interest" that could grow into an exciting and rewarding STEM career.

Let's consider how STEM effects what is closest and dearest to

us—our children. STEM is their future—the technological age in which they live, their best career options, and their key to wise decisions. In 2009, the United States Department of Labor listed the ten most wanted employees. Eight of those employees were ones with degrees in the STEM fields: accounting, computer science, electrical engineering, mechanical engineering, information sciences and systems, computer engineering, civil engineering, and economics and finance.

- It teaches problem-solving skills. “STEM helps kids analyze a problem”.
- It is infiltrating pop culture. In an age when techie greats like Mark Zuckerberg are household names, it’s never been cooler to be a member of the school computer club. A study by the Afterschool Alliance found that participants in STEM-themed clubs have “improved attitudes toward STEM fields and careers.” The study also found that these kids have an increased knowledge of STEM skills, such as computer and technological aptitude, communication, teamwork, and analytical thought.
- It instills creativity. “It’s important to realize that creativity can co-exist with science and technology,” Chan says. STEM skills also lead to creative careers, not just lab coats. Art and architecture are great examples, according to Chan, of the two scopes co-existing.
- It gives kids the edge they need to flourish in growing career fields. Workforce projections by the U.S. Department of Labor show that by 2018 nine of the 10 fastest growing occupations that require at least a bachelor’s degree will require significant scientific or mathematical training. In an economically rocky climate, students can look toward STEM careers with confidence and optimism.

Today’s students are tomorrow’s leaders. Occupations in STEM-related careers are some of the fastest growing and best paid of the 21st century, and they often have the greatest potential for job growth. As America strives to keep up with the current and projected demand for STEM output, it is important that our country remains competitive in fields of science, technology, medicine, and all of the other STEM fields we have mentioned so far. The best way to ensure future success and longevity it is to make sure that American students are well versed in these subjects. Building a solid STEM foundation through a well-rounded curriculum is the best way to ensure that students are exposed to math, science, and technology throughout their educational career. Students are extremely curious and impressionable, so instilling an interest at an early age could spark a lasting desire to pursue a career in any of these fields. By the time a student is ready to enter the work force, they must have enough knowledge to make invaluable contributions to our nation’s STEM industries.

It is also important that schools have an ample amount of teachers who are experts in STEM, and these subjects should always be considered as high demand subjects. Teachers who follow an alternative route to teacher certification are at an advantage to teach in a STEM field if they majored in one, or are transitioning from a STEM-related career. If you are interested in becoming a teacher and you have studied chemistry, biology, physics, calculus, engineering, or any other STEM subject, you will be a great asset to your school. Research shows that children are natural explorers and active participants in their own development, and that they are surprisingly sophisticated thinkers. Through a series of conceptual hands-on lessons, teachers will guide students as they learn important STEM content and investigative skills. Each unit design fosters cooperative learning and critical thinking. Teachers facilitate teamwork as students actively discuss their findings, record data and assess their understanding. STEM Champ has the power to transform even hostile schools into places of inspiration; as a community where students are intrinsically motivated, can develop collaborative behavior and succeed academically.

To build a skilled workforce taking advantage of the “demographic dividend”, India needs to reach out to young students in the middle school to high school level, and provide them research training opportunities. India can take a leaf or two out of the success stories of the United States, which leads the world in research output and R&D investment.

One of the main challenges for STEM education is the infrastructure and, in turn, the funds needed to create quality infrastructure. That is the main reason why the corporate world needs to collaborate with the world of education. The cost of doing quality research has indeed exploded over the decades. And for cutting edge innovations to happen, the facilities need to be cutting edge. The opportunity for training and participating in research should reach all corners of the society, including the minorities, the underprivileged and the economically backward classes. The Higher Achievement program in the U.S. provides opportunity to underrepresented groups to learn about research and organizes regular visits to research labs in participating Universities. These initiatives also target female students in order to increase their numbers in the research work force, to encourage innovation among them⁶ and to help them stay and grow in these careers.

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