

STEM Education: An entail drift from Indian schools to Universities

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Abstract:

Science, Technology, Engineering, and Mathematics (STEM) education has significant benefits, not only in Indian schools but also in universities. The awareness of STEM subjects play a vital role in molding the career of the students. Awareness of the same can be spread by conducting camps, seminars and workshops which can enlighten the minds of the students if the management of the university opt for it. The expected social outcome can be reflected by the behavior of the student and the response received from them during the duration of the camp/workshops/seminars. The main motive of the paper is to highlight the usefulness of STEM education in universities, challenges to implement the same and provides a solution to overcome the challenge. If implemented, it can be an entailed drift and benefit the students to achieve their goals in an easy manner.

Keywords: STEM education, Information Communication Technology, SWOT

I. INTRODUCTION

The main challenge for the students is to identify the problem solving strategies in various disciplines. For the same, awareness of the problem plays a vital role. This is only possible, if the students are able to analyze and present the

technical or scientific information precisely. STEM (Science, Technology, Engineering, and Mathematics) enables the students to understand the field along with the practical application, theories and concepts. They should also understand that people engrossed in STEM are dedicated to improve the social and

environmental issues and resolve the societal problems. STEM is not only the responsibility of the tutors but rather the parents also need to take an active part in promoting STEM and shorten the gap. A seed of curiosity needs to be implanted in the minds of the students at an early age. By the time the students are in their teenage, their minds get cultivated in an adaptive manner. Middle school is where the gap begins and it widens in the universities as the students get more mature. So, it should be made mandatory to implement STEM in university level for better output and to make good citizens. Technology, engineering and other areas of STEM invades every aspect of our lives and reflect a whole new way of living. Section II deals with the literature work carried out to understand STEM, the third section of the paper focuses on the usefulness of STEM in Schools and colleges. Section IV deals with various ICT Tools and its impact on education. Section V highlights the challenges to implement STEM and the concluding part which mentions the drift is in Section VI. The last section concludes the drifting which could be beneficial to the universities if STEM gets successfully implemented.

II. LITERATURE REVIEW

Usually practice all through numerous countries that subjects[1], for example, science and arithmetic are instructed independently as solo through a control based methodology with restricted association with genuine circumstances. For educators to move from their usual ranges of familiarity of instructing in the performance and advance for a 'coordinated' STEM training learning model, there is a need to distinguish how instructors see such joining and execution notwithstanding recognizing the variables, from their perspective, which could encourage or frustrate the order of such incorporated practices. For educators to bring STEM instruction into their schools a few viewpoints ought to be thought about. These incorporate instructors' profound substance information, solid confidence in inventive instructing techniques that has at its center understudy focused educating, interdisciplinary figuring out how to building spans crosswise

over subjects, and the advancement of solid groups that can make a culture of achievement in schools through expert networks. There are claims that the quantity of arithmetic and science instructors with hands-on experience working in STEM training is constrained and educators may likewise need instructive foundation in STEM. STEM technique is a combination of multiple area of study by which the main four field of science, technology, engineering, and mathematics. STEM technique does not only covering the main four subjects. This is as opposed to what Hoachlander[7] says about the present status of STEM in many schools, as it comprises of science and math, with innovation and building being forgotten or a reconsideration. Hoachlander proceeds, "Where associations do get made to innovation and building, time after time they occur through a mess of separated undertakings that need cognizance or solid establishing in substance measures and understudy execution destinations". The requirement for such coordination emerges from the kind of issues that society is given which frequently requires a multidisciplinary approach. Both Hoachlander and Roehrig proceed to state that in spite of the fact that instructors comprehend the need for STEM joining, no regular methodology exists for completing it. One thought is to offer a building course and have its activities be the principle focal point of STEM.

Computer generated Reality [5] inundates the client just in a counterfeit situation; Augmented Reality (AR) enables the client to Overlay reality with a non-real world. The potential outcomes for instructive incentive in these overlays are extremely helpful. Instruction is a subject field with numerous issues and extremely unique ideas, which are tough for learner to get a handle on. AR based STEM applications, can be produced to make training additionally captivating and significant for learner. STEM instruction gives a scaffold for learner [6], training suppliers, and the industrialist to more adequately create learning pathways in innovation driven vocations. Schools in the country have chosen STEM based courses as the system for their STEM-based projects. Learner selected in STEM based

schools are being instructed to develop and skilled with enough information to be suitable for the job and educated nationals. These school programs mirror the necessities of their networks and the organizations that work in those networks.

On the off chance that STEM instruction will progress past a trademark [1], instructors in the STEM people group should clear up what the abbreviation really implies for instructive strategies, projects, and practices. The accompanying talk introduces a few things that STEM may mean for contemporary instruction. In the first place, it might mean acknowledgment that science instruction has been lessened amid the No Child Left Behind time, which is finishing. The reauthorization of the Elementary and Secondary Education Act (ESEA) could underscore the significance of science, and by their nearby affiliation, innovation and designing, in school programs.

In light of the perception that STEM is regularly a term for science or arithmetic, STEM should mean expanded accentuation of innovation in school programs. With reference to innovation, there are not too much different things that impact our ordinary presence. The time has come to change this circumstance. It is alluded to a point of view and instruction programs bigger than Information Communication Technology (ICT).

III. USEFULNESS OF STEM IN SCHOOL AND COLLEGES

The ability to analyze and interpret the data can be increased by integrating the STEM approach into education system. Considering the future success of the students, STEM education should be imparted in a proper manner. By incorporating the STEM education in universities/colleges, the performance of the students can be increased and they tend to lean more towards the Mathematics, Science, Technology, and Engineering Subjects. One of the merits of STEM education is that it can play an important role in enhancing problem-solving skills, critical thinking and analytical thinking ability in students.

IV. ICT TOOLS AND ITS IMPACT ON EDUCATION

Nowadays, teachers need to transform themselves from conventional classroom settings to open and participatory, active learning scenario. Moreover, they are also expected to work not only as guide, but also as facilitator, mentor, helper, leader, inspiration and role model for students. A teacher should be ideal for his students and he must lead to them towards honesty, ethics and values [11].

Making students attentive to the last minute of lecture session is tough task, also to make them engage with the ongoing topic and have their interest is also important for a teacher. Hence, a teacher need to be apart from being sound in his/her subject, innovation and creativity in teaching methods becomes vital. In the era of internet where subject knowledge is easily available, so it becomes more challenging for a teacher to conduct classes. There are many ways to having quick revision as a form of quiz and to some eyes breaking activities to grab the attention of the students in class.

In such cases, ICT tools are very advantageous for teachers. Some of the tools for educations are listed below and their usage:

- SurveyMonkey: This tool helps to design teaching methodologies' and execution of subject. Teacher can take a survey for some advance subject so that he/she can have a clear idea of the basic knowledge required for the subject. Survey can be done before beginning of course, in between and at the end of the course.
- Piazza: This is an online discussion forum, where students and teachers can have discussion about the subject anytime, anywhere. If any student is shy to raise doubt in class can do it here as anonymously.
- Socrative: It is a website (Socrative.com) for conducting quiz and it can generate report of the students.
- Moodle: Conducting online examinations
- Turnitin: Checking Plagiarism
- Google Classroom: Announcements, assignments, uploading study materials, etc.

- Kahoot: Online game quiz, good for quiz revision.

Usage of above some of the tools will help teachers to shift from conventional teaching methods to innovative and creative teaching.

V. CHALLENGES TO IMPLEMENT STEM

Most of the engineering programs offer various subjects which in some way or the other are related to STEM as the main focus of these subjects are on Mathematics and Sciences. There is a choice based credit systems which is followed in various institutions wherein certain number of credit hours is dedicated for the subjects of Mathematics and Science. It is preferred that the design of the course structure should be such that it includes all the necessary prerequisites [12].

To renovate STEM education for undergraduates, the following issues related to the students' needs to be addressed: [12]

1. Motivate the students to opt for project-based valuation modules by giving them a variety of designs and alternative options [8].
2. The students should be able to understand the real-time problems and be able to design practical solution to it.
3. Ask students to perform SWOT (Strengths, Weakness, Opportunities & Threats) analysis for the final product as well as for their team and feedbacks to be taken in the form of surveys from the experts in the same field.
4. The students must be kept known regarding the evaluation criteria of the performance and fair grading to be implemented. [9].
5. The students should be rewarded for the work done by them in conferences, galleries or any other public event.

Lot many challenges occur when trying to achieve the above noted aims. The challenges exist at many levels such as students, faculty members, and the administration of the

organization. These challenges can be underlined in the following facts [12]:

1. The faculties can be asked to give extra time after the regular class time and office hours in order to closely monitor the performance and the progress of the students.
2. Some students feel hesitant to approach faculties and learn new things and to ask them to devote extra time for a nontraditional learning process [2].
3. Enough capitals should be allocated in order to support various activities to assemble, purchase and build the necessary prototypes for the projects.
4. Grant for free tutorials, open lab hours and peer review after the office/college hours.
5. Encourage the participation of students in workshops, conferences, competitions and vocational courses and make them enroll to some online teaching materials.

These challenges need to be cautiously analyzed and possible solutions must be proposed, mainly for institutions those want to transform STEM from primary school to undergraduate education system.

VI. CONCLUSION

It can be seen from the above mentioned content that the students face barriers when they enter college to earn 3-years or 4-years degree in an area of science, technology, engineering, and mathematics (STEM). These barriers affect the students from underrepresented minority groups but if STEM is implemented in the way as suggested in the paper then it can lead to an easy path of success and can give rise to better citizens in the near future. The institutions should be ready to take on the challenge to provide high quality education in STEM and provide an opportunity to the students to diversify and expand the nation's science, technology, engineering, and mathematics (STEM).

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