



## STEM Education: A call to action

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### Abstract:

*Global age is rapidly changing due to the interference of technology in all spheres. Technology and artificial Intelligence has changed entire employer market. It is the prime responsibility of education system to nurture future generation in this direction. Education system is driven majorly by two stakeholders: Teachers and students. Any change has first to be adopted and practiced by teachers and then it has to be penetrated in the classrooms for young generation. Recently, India is encouraging the support to education system for promoting STEM education keeping the importance of development of 21<sup>st</sup> century skills in mind. UGC and NCERT have advocated the use of experiential learning mode in classrooms, a step in this direction. Several resources have been setup, curriculum framework is being reviewed, and teachers training have been planned for smooth and effective penetration of STEM education. To support and empower teachers to teaching STEM, we need to identify teacher's efficacy, problems and needs for implementing STEM in real classroom setting.*

*In this research, STEM survey was developed and administered to primary in-service teachers (n=50) of Gujarat, India to identify teacher's efficacy, problems and needs for implementing STEM in real classroom setting. It was found that 95% of teachers were unaware of the STEM concept. After a brief introduction to STEM education, 87% of teachers believed that it is difficult to implement due to time and resource constraints. But 90% of teachers were ready to participate in the workshops and training regarding STEM education. They agreed that resource materials will be helpful to them for enacting STEM approach in classroom.*

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**Keywords:** *STEM education, Teachers belief, In-service teachers*

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### 1. Introduction

Global goals call upon universal action for peace and prosperity across the globe. The objective for defining the goal is for the sustainable development in context of social, economic and environment. The fourth goal of United Nations Sustainable Development (SDGs) is to ensure inclusive and quality education for all and promote lifelong learning. This goal has three fragments like inclusivity, quality education and lifelong learning. Policies and practices have made education accessible and dropout rate has been declined but quality education followed by lifelong learning is still unreached. Mission towards delivering quality education demands a prerequisite set of skilled work force, futuristic curriculum and well trained teachers. All these are interwoven and hence a holistic integrated approach can be the way to gain quality education. Education is one of the most powerful and proven vehicle for transformation. Quality education means to eliminate gender disparities, demographic disparities and ensure equal access to all. Further, quality education shares the responsibility to equip future generation with the knowledge and skills needed to promote SDGs. Transforming education into quality education demands sharper focus on teaching-learning process. Formal education setup is not compatible with the contemporary needs. Moreover, industrial revolution has given birth to the need of new model of learning for 21<sup>st</sup> century. It is

clear that future generation have to be skilled for unseen jobs. Main goal of education is to build learning capacity of learner and create independent learners. Critical thinking, collaboration, creativity are the competencies which lay the foundation of independent learners. Due to this, it has been argued that formal education must be transformed to enable new forms of learning that are needed to tackle global challenges.

To believe the fact that teachers are literacy designers and hence it is evident to make teachers competent enough as they are the real grass root workers. Any education policy framed can dwell fruits only if it is transformed well in classroom settings and so teachers are the primary source. Since teachers thinking and competence play an important role in their classroom practices and influence their learning and teaching interactions (Borko and Putman, 1995), it is necessary ways of exploring teachers pre-knowledge, their notions and needs. Therefore, following research questions were framed:

- What is the current status of teacher’s pre knowledge regarding STEM approach?
- What is teacher’s belief about implementing STEM approach in classroom transaction?
- What difficulties are visualized by teachers in implementing STEM approach?
- What are the needs for empowering teachers and classroom setting towards STEM approach?

## 2. Methodology

To get the data, survey method was implied. Self constructed tool was developed and administered to 50 primary in-service teachers teaching maths-science subject in government schools. On the basis of primary talks with teachers, nearly 95% of school teachers were unaware of STEM approach. Hence before administrating tool, teachers were explained regarding meaning of STEM approach, need of integrating STEM approach from primary education and ways to implement it.

## 3. Data Analysis

After data collection, quantitative and qualitative data was obtained. To address the research questions, primary statistical technique of defining percentage to each question was computed.

## 4. Result

Following result was obtained after administrating the tool:

**Table-1 % of teachers who agree to the survey items**

Items	% of teachers to agree
I am aware about STEM	5%
STEM approach is suitable to my classroom	97%
STEM approach will be useful	96%
STEM approach is integrating subjects like maths and science	90%
STEM approach means doing practical	98%
NCERT wants to inculcate experiential learning	50%
I know the meaning of experiential learning	50%
STEM approach will advocate experiential learning	45%
STEM approach will be time consuming	90%
STEM approach will be difficult for students	90%
STEM approach will be just a fun activity	92%
Learning through STEM approach will be	96%

difficult to assess	
STEM approach is important only for those students who want to become engineers	87%
I agree that my knowledge regarding STEM approach is limited	98%
I am eager to attend workshops, seminars, training sessions regarding STEM approach	92%
Resource materials regarding STEM approach needs to be developed	90%
Specially trained teacher should be appointed	91%

## 5. Discussion and Implication

As per table-1, the pre knowledge scenario among primary school teachers was very depressive. After a session of brief information about STEM approach, teachers started developing positive approach for it. Their level of readiness to adopt and adapt was seen satisfactory. Although there still persist various mis concepts and beliefs regarding STEM among them. The word “technology” and “engineering” in STEM approach drag the entire thinking off the path. It was observed that teachers were not well aware with the latest developments in the field of education, which indicates that they have more or less stagnant work culture. Latest trends and methodologies of education were not popular among teachers. Result also indicates that teachers have lot of doubts about implementing STEM approach and they still do not want to come out from the traditional teaching structure. Lot of myths regarding STEM approach is prevailing which calls upon action to make STEM approach enter the classroom.

To rapidly mobilize STEM approach in education, certain parameters needs to be focused and plan of action needs to be framed.

- **Spread awareness:** In Indian context, formal education only teaches but doesn't prepare a lifelong learner. Assessment is not qualitative but only quantitative. Hence only bookish knowledge is emphasized. This declines the market value of a degree. Drastic change in job market needs to start focusing right from young minds.
- **Teacher readiness:** Teachers work with lot much delimitation. Teachers need to be exposed to the changing scenes and latest developments and trends. Major mass of young children study in local medium schools. Teachers of these schools require well planned training. It is very important to change the mindset of teachers. Teachers training indifferent modes can be a boon in this area.
- **Generating Resources:** Local language resources need to be developed keeping real classroom situation in mind. Wide spread of resources and proper track of utility of resources should be maintained. Human resources can be pooled and under graduate science students can be offered fix duration internship for promotion of STEM approach.

So, STEM education is not only about the future, it is about today. STEM jobs are expected to continue to grow at a faster rate than others in the coming decade. STEM-related industries are a major economic component of India's economy. Students and teachers in the twenty-first century must have the skills and abilities today to succeed.

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