

*Acquisition of 21st Century Skills Through STEAM  
Education*

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## **INTRODUCTION**

The present world is constantly evolving and we must keep pace with it. It is imperative that our youth should be prepared to bring knowledge and skills to solve complex problems. It is widely acknowledged that the students of 21st century will increasingly require skills that many school students do not currently possess in Maths, technology, and science subjects. Furthermore, they lack the ability to apply knowledge to meet the ever-increasing demands of the modern era. Technological innovations are changing the way students learn, communicate, and converse with one another. The skills acquired through STEAM education provide students with opportunities to succeed in school and beyond.

## **STEAM (Science, Technology, Education, Engineering, Art, and Engineering)**

Before the STEAM, there was STEM which stands for Science, Technology, Engineering, and Mathematics. The credit of upgrading STEM to STEAM by introducing Arts to it goes to Georgette Yakman, an Engineer and technology teacher. He was the founding researcher of the STEAM Educational framework in 2006. STEAM is a progression of the original STEM plus an additional Subject i.e. art. However, the first version of combined discipline Method STEM was often associated with negative perception and learning difficulties (Danielle & Quigley, 2017; Epstein & Fisher, 2017; Schumm & Bogner, 2016), which was the key reason

for the curricula designer to change STEM by adding Art and promoting newer approach to STEM (Henriksen, 2019). This modern approach encourages students to move their passion from artistic work to research. In comparison, the difference is much closer to the creativity gap and may provide an additional channel to learn abstract and mathematics problem-solving tasks (Runco et al., 2017; Yakman & Lee, 2012).

By incorporating art into STEM, students can use both their analytical and creative minds to solve complex problems. Liberal arts, language arts, social studies, physical arts, fine arts, and music are all included in Art. The incorporation of art into STEM is necessary because practises such as developing explanations, modelling, and engaging in argumentation have been undervalued in the context of math and science education. Putting 'A' into STEM means incorporating critical thinking and applied arts into real-world situations. Its goal is to foster true innovations that result from combining the minds of scientists and artists. Consider an architect, who uses engineering, math, technology, science, and the arts to create a structure. The Art subject in STEAM allows students to unite the capacity of STEAM subjects. Students, for example, can use art to add graphics to their project. Furthermore, they can use their artistic talent to generate creative thinking. It means applying creative thinking to STEM projects by exploding imaginations and creativity through the art.

STEAM education is one of the most impressive educational movements in recent years (Kuenzi, 2008; Reiss & Holmen, 2007; Sanders, 2009). It is a multidisciplinary field that incorporates science, technology, engineering, art, and mathematics (National Governor Association, 2007). Instead of teaching different disciplines separately, STEAM integrates them into an integrated learning pattern along with real learning applications. It extends beyond the classroom to provide opportunities that shape how we think and behave. It produces critical thinkers, problem solvers, and next-generation innovators. As we know that there is a shortage of top-quality scientists and engineering's in India. In the last few years, STEAM education has seen remarkable growth. Therefore, these skills should be developed among the students right from the outset. STEAM education aims to improve human capabilities in the 21st century (Bybee, 2010).

STEAM education is a method of teaching and learning. It is intended as a means of directing students' research, discussion, and critical thinking. STEAM impresses students with the acquisition of expertise in teamwork, questioning, problem-solving, and critical thinking. This has led to rapid growth and disintegration of complex Maths and Science subjects, learned in the same manner that they are taught daily. STEAM education includes science, technology, engineering, arts, and mathematics, where science and technology are a system entity that creates and organizes knowledge in a descriptive and engineering way to predict a general use of information in the form of powerful facts. STEAM education teaches stu-

dents in the field of science, technology, engineering, arts, and mathematics in a multidisciplinary way, leading students to practice changing technological knowledge and social life skills quickly.

## **SKILLS FOR THE 21st CENTURY**

The 21st century is a century of skills and abilities. So if we want to succeed in this digital world, we need all the required skills and abilities. 21st-century skills are generally referring to core competencies of digital learning, critical thinking, and problem-solving in the real world. These skills are developed to help students to keep them with the evolving phase of the modern world. It is a wide range of expertise, abilities, work habits and character traits that educators, school's reformers, college teachers, worker and other considered to be essential to success in today's world especially in college and contemporary profession and workplace. These skills can be applied in all fields of study and all professions of teaching, as a civic environment in the life of the students. The skills of the 21st century are not different. However, how these skills are incorporated in the classroom and how technology is going to improve a lot is slightly different. Indeed, with technology, the classroom of modern time transcends all physical barriers and reaches around the globe.

The gap between the skills people acquires and the skills that are needed is becoming more apparent. Traditional learning is not enough to equip students with the knowledge they need to bloom (World Economic Forum Report, 2020). More recently the NSW Department of Education (DoE) published an evidence-based review regarding the key skills for the 21st century. It was found that the five skills and four dispositions were consistently focused across all the existing research, practice, and policy examined. These were distilled down into problem-solving, metacognition, creative thinking, self-efficacy, motivation, perseverance, and conscientiousness.

There are 16 core skills for 21st-century learning in three primary areas: foundational literacy, competencies, and character qualities. 21st-century skills have great value for the schools and business success (Washer, 2007). Moore (2009), argued that with the transition in schooling in the 21st century, the skills to be learned by the students would also be changed. It aims to acquire basic skills such as speaking, writing, and social, educational, and technical skills (Jukes & Mac-Donald, 2007). These skills allow the learner to easily adapt to a new situation while teaching new knowledge (Dede, 2010). Along with these skills, students can adapt to an evolving and welcoming community (Pearson, 2014). The curriculum, content, and evaluation should be adopted to the needs and based on the skills of the 21st century (Friedman, 2005). Jukes & Mac-Donald (2007), suggested that the skills of the 21st century should be un-

derstood by the teacher and taught to the students with appropriate instructional style. While the educational field continues to explore new strategies to empower students with these skills and knowledge, they require for successful innovators and creators. There has been a growing emphasis on STEAM and similar learning tactics as a way for making this possible.

## **DEVELOPING SKILLS THROUGH STEAM EDUCATION**

The world is rapidly evolving in terms of technology and knowledge. The students need to learn the skills they need for the changing world (Darling, H. 2010; Wanger, 2008) to get a better education, a competitive environment around the world, and to create classrooms and schools with 21st-century skills and competencies. To prepare the students for their life and career, they need to discuss the real-life topic that is important. STEAM education requires that students need to be an active learner who masters critical principles through an innovative and creative approach.

STEAM education develops critical thinking among the students, by allowing them to think critically on various issues. Student's involvement in the critical thinking and the problem-solving process has built up a culture of inquiry, in which asking and answering their questions become the counter piece of the learning process. The problem solver students use a high level of thinking as they apply the content knowledge innovatively. The new way to adopt all these skills together among the students is to adopt STEAM education right from the beginning. It is a curriculum philosophy that empowers science teachers to engage in school-based curriculum development. It also provides a creatively designed space for the teacher in different learning fields to work together to develop an integrated curriculum.

STEAM education incorporates 4 C's of 21st-century skills: Creativity, Critical thinking, Collaboration, and Communication. Students work together to develop a creative approach to their real-life challenges and communicate their ideas to others. This will develop communication skills among the students. They carry out their investigations and projects, as they use the knowledge to complete their learning tasks. While learning with the tasks they develop essential life and job skills to handle their time and become self-directed. Even education is needed to meet the needs of workers in the focussed sectors (Gooderham, 2014), its aims is to educate the students who can adapt to the need of the 21st century through the acquisition of skills needed in the field of education. STEAM education provide free environment to the students allowing them to feel free and take risks. The congenial and free environment enable the students to share novel ideas, it will develop creativity among the students. STEAM education also include group discussion, it enables the child to develop interaction and collaboration. Interaction and collaboration is need of the 21st century.

Interdisciplinary curriculum programs also offer an alternative to formal education for the development of the 21st century (Daviesandryan, 2011). It is very important to introduce STEAM education at an early stage of the child's life. It helps the child to develop curiosity and other skills right from the beginning. As a child grows older he/she acquire important skills such as reflection, problem-solving, critical reasoning, and digital literacy, etc. It helps to improve a child's capacity to make choices that are important to his/her preferences. There has been a growing focus on STEAM –an instructional discipline that engages students in the field of scientific technology, engineering, art, and Mathematics. It allows the teacher to build and promote an inclusive learning environment in which all the students can participate and contribute. STEAM education allows students of all backgrounds to build their mind-sets and their ability to think and learn.

A large number of schools are now incorporating teaching methods that are more in line with STEAM education. It has been clear that STEAM education makes learning more joyful and keeps children engage in the activity. STEAM learning is essential to the growth of skills for young people, and they need these skills when they enter in workforce. This is the time to starts preparing our youth and our economy for our future by helping students in acquiring the skills and competencies of the 21st century.

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