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# STEM EDUCATION AND ITS BENEFITS ON TEACHING FIELDS

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**ABSTRACT: -** In this article you will be aware of many aspects of STEM education, that is the article provides a historical perspective regarding the roots of STEM and then follows up with the contemporary aspects of STEM education. The “T & E” of STEM education are also explored. The article culminates with the roles teaches play in STEM education.

**KEYWORDS:** Open-ended, problem based design , global technology, Sputnik’s effect, STEM labor, fellowships, contemporary aspects

## INTRODUCTION

At the time being no one can imagine the life without technology and its impact on daily life. Fist of all we should identify what is STEM itself? The term “STEM education” refers to teaching and learning in the fields of science, technology, engineering, and mathematics. It typically includes educational activities across all grade levels— from pre-school to post-doctorate—in both formal (e.g., classrooms) and informal (e.g., afterschool programs) settings. What is this term they call STEM education? Most people are in the dark and moreover, most educators and students are as well. When one hears the acronym “STEM” within an educational setting, they may think along the lines of stem cell research or something dealing with flowers . However, STEM stands for Science, Technology, Engineering and Mathematics.

Technology was an initiative created by the National Science Foundation (NSF). This educational initiative was to provide all students with critical thinking skills that would make them creative problem solvers and ultimately more marketable in the workforce. It is perceived that any student who participates in STEM Education, particularly in the K-12 setting would have an advantage if they chose not to pursue a post-secondary education or would have an even greater advantage if they did attend college, particularly in a STEM field (Butz et al., 2004). Although the use of STEM concepts (historically) were being implemented in many aspects of the business world; i.e., the Industrial Revolution, Thomas Edison and other inventors, it was not being utilized in traditional educational settings. The use of STEM was primarily used in engineering firms to produce revolutionary technologies such as the light bulb, automobiles, tools and machines, etc. Many of the people responsible for these innovations were only slightly educated and/or were in some type of apprenticeship. For example, Thomas Edison did not attend college , nor did Henry Ford; although Ford did work for Thomas Edison for a number of years. These "giants" of innovation used STEM principles to produce some of the most prolific technologies in history: however, STEM in education was virtually non-existent .STEM Education was the result of several historical events. Most notable was the Morrill Act of 1862. This Act was responsible for the development of land grant universities that, in the beginning, focused mostly on agricultural training, but soon engineering based training programs formed. For example, The Ohio State University was established in 1870, but 3 was originally named the Ohio Agricultural and Mechanical College . As more and more land grant institutions were being established, more and more STEM Education training was ultimately being taught and eventually assimilated into the workforce. Other historical events pushed STEM Education to grow and flourish. Two such events were World War II, and the launch of the, then, Soviet Union's Sputnik.

The technologies invented and implemented during WWII are almost immeasurable. From the Atomic Bomb (and other types of weaponry) to synthetic rubber to numerous types of transportation vehicles (both land and water), it was clear that American innovation was flourishing. Scientists, mathematicians, and engineers (many from academia) worked hand-inhand with the military to produce innovative products that helped win the war and to further STEM Education. It must also be noted that the NSF was formed at the end of the WWII in an effort to not only recognize the immense contribution of the talented men and women who created prolific commodities, but to preserve the research and documentation of those commodities . Sputnik In 1957, the (then) Soviet Union attempted and was successful in launching Sputnik 1. This was a satellite that was the size of a beach ball and orbited the earth in about an hour and a half. This was a technological milestone that started the "Space Race" between the United States and the Soviet Union. The significance of this event propelled the United States to look at initiating and furthering technological advances in terms of space travel and exploration. "The Sputnik launch changed everything. As a technical achievement, Sputnik caught the world's attention and the American public off-guard". Sputnik became a national defense issue and in 1958, Congress passed the "Space Act" that formed the National Aeronautics and Space Administration (NASA). NASA's mission was to "expand and improve" the United States space presence and to use science and engineering in the most effective ways to complete that mission. Since the birth of

NASA, the space industry obviously has thrived and produced several technological triumphs including putting a man on the moon; however, NASA has been responsible for many STEM Education initiatives. Funding through NASA grants has been responsible for bringing STEM Education initiatives to both pre and post secondary education for the past five decades.

**Contemporary Aspects of STEM Education**

Although history has played and continues to play a part in STEM Education, there are many variations and opinions of what STEM Education is and how it should be taught. This section will attempt to wade through the complexities of STEM in education fields and how they are imparted to students and other stakeholders. STEM Fields Defined The four strands of STEM; Science, Technology, Engineering, and Mathematics, have been staple forms of all students' academic careers; particularly science and mathematics. They are defined as: Science: the systematic study of the nature and behavior of the material and physical universe, based on observation, experiment, and measurement, and the formulation of laws to describe these facts in general terms .Technology: the branch of knowledge that deals with the creation and use of technical means and their interrelation with life, society, and the environment, drawing upon such subjects as industrial arts, engineering, applied science, and pure science . Engineering: the art or science of making practical application of the knowledge of pure sciences, as physics or chemistry, as in the construction of engines, bridges, buildings, mines, ships, and chemical plants. Mathematics: a group of related sciences, including algebra, geometry, and calculus, concerned with the study of number, quantity, shape, and space and their interrelationships by using a specialized notation. Although these definitions are the well known usual and/or established descriptive terms for STEM fields, there is obviously more to them. Science and Mathematics are at the forefront of STEM Education mainly because these are the most recognizable fields that most people can relate to in terms of academia. Technology and Engineering are the fields that are not only the most underrepresented, but also the most underfunded in education, specifically in the k-12 arena.

The Difference Between Technology Education and Educational Technology As stated, Technology Education is problem-based learning by students utilizing math, science, engineering, and technology principles. Educational Technology (also referred to as Instructional Technology) is the use of technology to educate students. Seels and Richey , state: "Instructional Technology is the theory and practice of design, development, utilization, management and evaluation of processes and resources for learning." Thus, Educational Technology uses technology (mainly computer-based) in pedagogical methods of instruction and assessment. This can include the use of PowerPoint, Blackboard, digital assessment programs, Web searches, DVDs and videos in addition other instructional multimedia. Technology Education teachers may use educational technology to deliver lessons and for assessment; however, the confusion between the two disciplines is clearly a problem for most educators. The ITEEA and other leaders in Technology and Engineering Education recently made a name change from "Technology Education" to "Technology and Engineering Education" in an attempt to alleviate the confusion and have a solid identity within the educational community.

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