



## **2.1 WHAT IS STEM, STEAM, STREAM**

Science, Technology, Engineering and Mathematics. When we take the first letter of each of these disciplines, we get the acronym term “STEM”. The STEM acronym was introduced in 2001 by scientific administrators at the US National Science Foundation (NSF) although evidence of talks regarding policy initiatives addressing improving education in mathematics, science, engineering, and technology can be found around 10 -15 years earlier. The NSF previously used the acronym SMET until biologist and assistant director of education and human resources, Judith Ramaley rearranged the word to form the STEM acronym. Findings from international studies such as TIMSS (Trends in International Mathematics and Science Study) and PISA (Programme for International Student Assessment) indicated that a notably comparable large percentage of students in the United States was underperforming. That fuelled discussions for competitive educational reform strategies.

In January 2016 former US president Barack Obama in one of his weekly speeches stated his goal of a 1 billion US dollars private investment plan for improving STEM education. This was not just because of what the international findings had shown regarding academic performance but also because of how those findings translated to a corresponding lack of interest in pursuing STEM fields and the catastrophic effects that could have on the country on a national and global level. The United States of course were not the only nation to acknowledge that future challenges demand innovation, creativity and problem-solving skills which is why many countries worldwide started working on educational reforms that would reevaluate and rearrange curriculum connected to STEM so that among other things a better link with the relevant work fields would be established.

According to Chatzopoulos (2019) the definition of STEM still remains unclear and ambiguous which is why the focus has shifted towards the several directions and approaches one can take when tackling STEM education. The STEM term itself is open to changing to many variations to make it more attractive based on context and interests so as to foster students’ innovation and creativity. Such variations include

STEAM - STEM + Arts

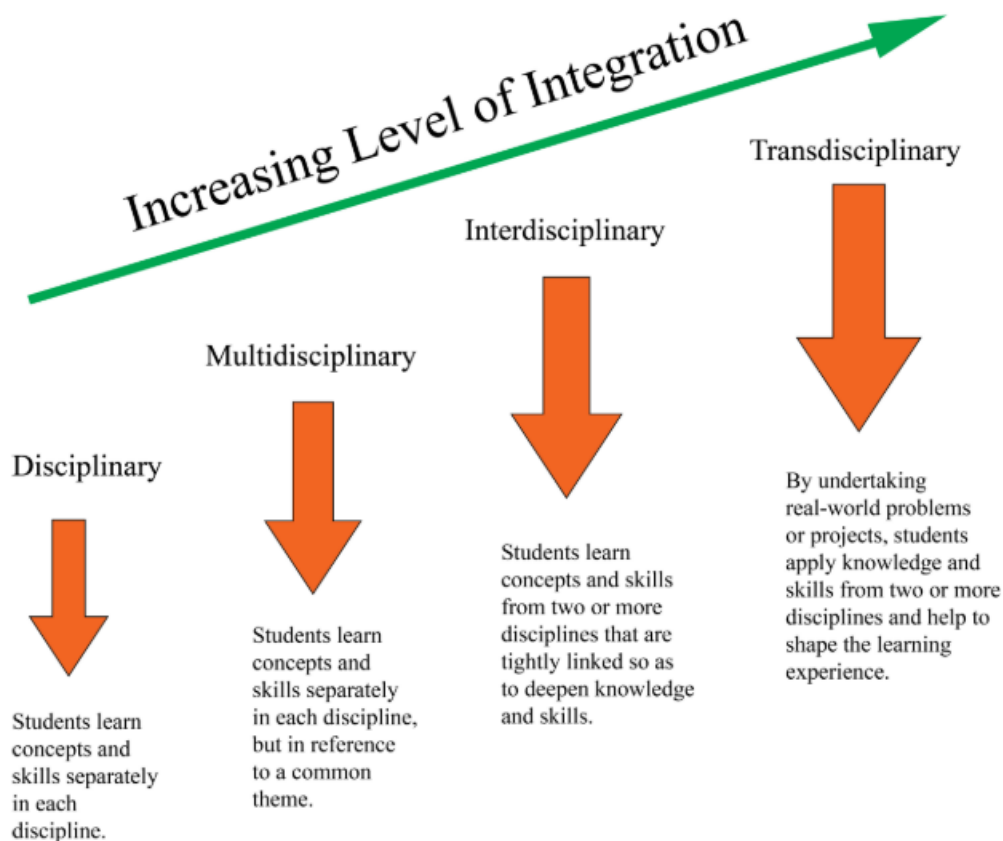
STREAM - STEM + Arts + Reading/Research

And then there is STEMM with a double M, the extra one being Medicine.

Going back to the directions for STEM efforts (Vasquez, Comer & Sneider) state that there are four levels of STEM integration. Disciplinary, Multidisciplinary, Interdisciplinary and Transdisciplinary.

(Reads out figure)





In any approach or definition however there seems to be a common denominator that shows STEM representing an integrated approach where the academic, scientific and technical aspects are studied in the context of real-life aiming to the creation of “stable relations between school, society, work and the whole world contributing to the competitiveness in world economy”. That is why the definition of STEM we will be using as a general reference and guide will be the one provided by the National Science Teachers Association (NSTA) which is the following:

“A common definition of STEM education [...] is an interdisciplinary approach to learning where rigorous academic concepts are coupled with real-world lessons as students apply science, technology, engineering, and mathematics in contexts that make connections between school, community, work, and the global enterprise enabling the development of STEM literacy and with it the ability to compete in the new economy.”

Some of the STEM education goals include the following

- Stem Literacy
- 21st Century Competencies
- Employability Skills/Readiness
- Stem Field Interest, Engagement & Employment
- Increased Pedagogical Content Knowledge for Educators
- Upgraded STEM Teaching Methods for Educators
- Connections



- Multidisciplinary Culture
- Productive Teamwork/Community Development

The next two segments will incorporate two external videos in order to stimulate and focus the conversation around the two main issues surrounding our reason for using STEM or rather STREAM in this project. Those are - the bigger picture and the job market/entrepreneurship.

