Guiding the way towards STEAM through innovative learning approaches and contemporary science

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POLAR STAR Methodology – STEAM Education

Towards a holistic student-centred learning approach

Technology in STEAM education

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Technology in STEAM education

The most spontaneous recall of an individual to the term "technology" retrieves cell phones and computers (or tablets), since both technological products have been part of people's daily lives for the past 20 years or so. But as the definition of the term implies, "Technology ("science of craft", from Greek τέχνη, techne, "art, skill, cunning of hand"; and -λογία, -logia[1]) is the sum of techniques, skills, methods, and processes used in the production of goods or services or in the accomplishment of objectives, such as scientific investigation"[2]. Consequently, Technology lies beneath any type of man-made product that has been developed to facilitate individuals' needs either at their daily life or workplace. These products range from simple tools such as pulleys, wheels, levers, scissors or more complex ones such as computers, cell phones, printing machines, microscopes, etc. In the context of teaching and learning, these tools support students' cognitive development, because as students interact with them, they come to understand cause and effect relationships (e.g., increasing or decreasing the slope of a ramp will affect the velocity of an object rolling down the ramp), and eventually they come to appreciate technology's impact into problem solving or accomplishing tasks. In the figure below the interrelation between science, technology and engineering is represented and the way the fields support and facilitate each other. As it is evident from the figure, technology is used by scientists to facilitate discoveries, whereas engineers utilize and design technologies, while taking into account scientific principles and related discoveries.

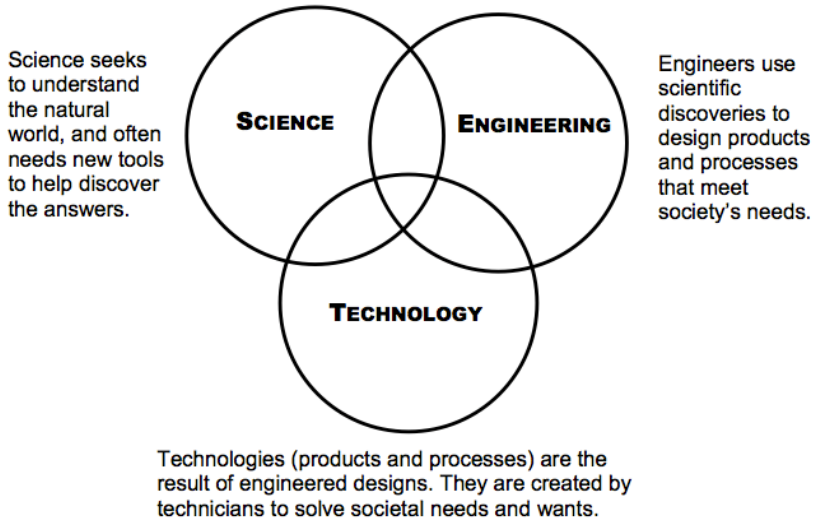

Figure 2. The Relationships Among Science, Engineering, and Technology. From Richards, Schnittka & Donohue. (October 2006). Massachusetts Science and Technology/Engineering Curriculum Framework. ASEE 2009 Math and Science Engineering Technology.

[1] Liddell, Henry George; Scott, Robert (1980). A Greek-English Lexicon (Abridged Edition). United Kingdom: Oxford University Press. ISBN 978-0-19-910207-5.

[2] Wikipedia contributors. (2020, February 8). Technology. In *Wikipedia, The Free Encyclopedia*. Retrieved 10:05, February 11, 2020, from https://en.wikipedia.org/w/index.php?title=Technology&oldid=939780641

In the context of STEAM education, teachers may provide their students with robust opportunities to utilize technology in ways that enhance their learning through a wide range of resources. By exploiting technological tools systematically while problem solving, students are expected to develop and eventually master the 4 C's of 21sy century skills– Creativity, Critical thinking, Communication, and Collaboration – and thus to be prepared to serve as active participants in tomorrow's global community needs.

Technological tools you can use during your STEAM activity/project:

For programming and/or robotics: Lego, Bee-bot, RoboBlockly, Arduino, Scratch, MakeyMakey, App Inventor, Python, micro.bit, Raspberry Pi, Algodoo, Microworlds

Applications to facilitate research (e.g. data collection, designing of experiment): Science Journal

For geometry: Geogrebra, Dalest, Cabri Geometry, EucliDraw

For algebra: SimCalc

Virtual and remote labs for Science and Maths: GoLab, Phet Interactive Simulations, National Library of Virtual Manipulatives, Gizmos, Illuminations

For creating presentations, evaluating, brainstorming etc.: Kahoot, Plickers, Padlet, Mentimeter, Glogster, Powtoon, Prezi, Canva