

INCULCATING VALUES AND ETHICS AMONG STUDENTS THROUGH STEAM EDUCATION

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Abstract— STEAM Education is an approach to learning that uses Science, Technology, Engineering, the Arts and Mathematics as access points for guiding student inquiry, dialogue, and critical thinking. Research shows that STEAM is a promising approach to positively impacting student achievement and teacher efficacy. A researcher's study conducted in 2016, investigated the impact of STEAM lessons on physical science learning in grades 3 to 5 in high poverty elementary schools in an urban district indicated that students who received just nine hours of STEAM instruction made improvements in their science achievement (Brouillette, L., & Graham). Another study in 2014 shows that connecting STEAM and literacy can positively impact cognitive development, increase literacy and math skills, and help students reflect meaningfully on their work and that of their peers (Cunnington, Marisol, Andrea Kantrowitz, Susanne Harnett, and Aline Hill-Ries). This is further supported by a study on the relationship between theatre arts and student literacy and mathematics achievement from 2014. "Results showed that students whose language arts curricula were infused with theatre arts often outperformed their control group counterparts, who received no arts integration, in both math and language arts" (Inoa, R., Weltsek, G., & Tabone, C.). The writer in this paper would like to give importance to STEAM education to the present generation children who are highly intelligent with less patience, discipline and values whose main aim is to not only provide students with the knowledge of Science, technology, engineering, art and mathematics skill but also inculcate in them the values of life that follows principles & ethics in their day today's life by providing them the projects that blend the values like integrity, patience, honesty, empathy, courage, virtues, self-respect, right conduct, truth, love, nonviolence, cooperation, computer ethics, environmental ethics etc. Which eventually bring peace on the planet earth. It's high time that these children who are the future generations of India should be given proper direction by channelizing their energy for productive use. Socrates and Aristotle are credited with the concept that the 'pursuit of knowledge is the highest good' and that this is the basis of education (Ulich, 1947). The first major educational philosopher who made significant statements that can give strength to the development of the STEM movement is Descartes. Comenius was a contemporary of Descartes who stated that 'education is a preparation for life (Comenius, 1947). Comenius made a strong argument for delivering a holistic approach to education with the following statement: 'individual sciences are badly taught unless a simple and general survey of the total knowledge is given before... one ought never to instruct anybody in such a way [of] perfecting one brand of knowledge to the exclusion of

others (Comenius, 1947).' This clause establishes a basis for applying integrative education.

I. INTRODUCTION

Steam Education deals with study of Science, Technology, Engineering, Arts, and Math as interdisciplinary subjects with focus on Project based learning and Collaborative approach to think creatively and critically in day today's problem-solving events. It fosters inclusive learning in which all students are able to engage & contribute. Steam education is a dynamic synergy between the visual arts, theatre, music, dance & the natural science. STEAM is an integrated approach to learning which requires an intentional connection between standards, assessments and lesson design/implementation. Inquiry, collaboration, and an emphasis on process-based learning are at the heart of the STEAM approach. Utilizing and leveraging the integrity of the arts themselves is essential. The [4Cs of 21st century skills](#) – Collaboration, Creativity, Critical Thinking and Communication – are the corner stones of STEAM education. This is where the active engagement really starts to shine with student groups, creating original solutions and compositions and exploring questions from multiple perspectives. Following are the pillars or components of STEAM education and their meaning:

Science: What exist naturally and how it is affected. Physics, Chemistry, Biology, Geoscience, Space science and Biochemistry (Including history, nature of concepts processes and inquiry) (AAAS, 1993, Hodson, 1991) (mixed) Biotechnology & Biomedical (ITEA, 2000)

Technology: what is human-made, Nature of Technology, Technology and Society, Design, Abilities for a Technological World, The Designed World (including: Medical, Agriculture & Biotechnology, Construction, Manufacturing, Information and

Communication, Transportation, Power & Energy) (ITEA, 2000)

Engineering:The use of creativity and logic, based in mathematics and science, utilizing technology as a linking agent to create contributions to the world Aerospace, Architectural, Agricultural, Chemical, Civil, Computer, Electrical, Environmental, Fluid, Industrial/Systems, Materials, Mechanical, Mining, Naval Architectural, Nuclear, Ocean (AAAS, 1989; ASEE, 2008; NAE, 2004)

Mathematics:Numbers and Operations, Algebra, Geometry, Measurement, Data Analysis & Probability, Problem Solving, Reasoning & Proof, Communication, (including Trigonometry, Calculus & Theory) (NCTM, 1989)

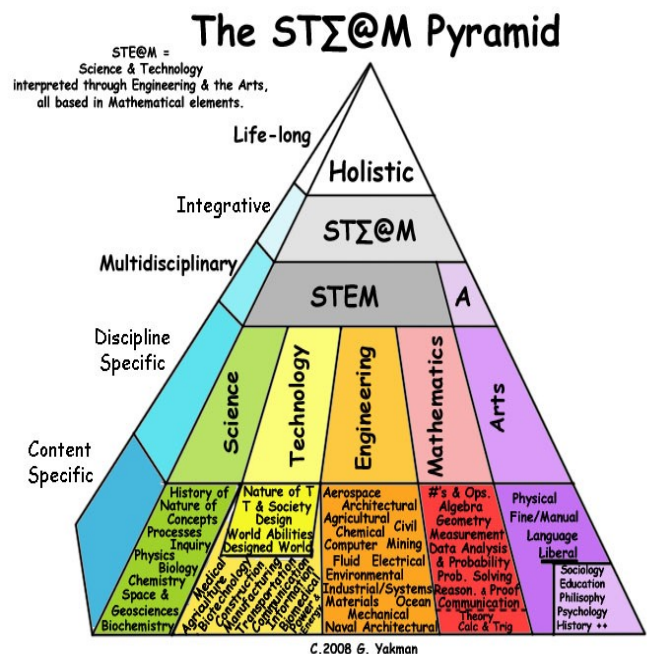
Arts:How society develops, impacts, is communicated and understood with its attitudes and customs in the past, present and future,Physical, Fine, Manual, Language & Liberal (including; Sociology, Education, Politics, Philosophy, Theology, Psychology, History & more...) (CNAEA, 1994; Featherstone, 1986; IRA-NCTE, 1996; ITEA, 2000; NASPE, 2004; NCSS, 1994)

In addition to the main pillars of STEAM education it could be supplemented with ethics, value education which eventually brings peace on planet earth. Many international schools in abroad have already started the concept of holistic education of including values, ethics in STEAM education. Australian government have introduced Value education studies from 2002 with the aim of implementing value education in Australian schools. There are nine values nominated in their curriculum framework.

“A value is defined as a principle that promotes wellbeing or prevents harm”. Values are our guidelines for our success- our paradigm about what is acceptable. Personal values are defined as: “Emotional beliefs in principles regarded as particularly favourable or important for the individual. “Our values associate emotions to our experiences and guide our choices, decisions and actions.Values are the scales we use to weigh our choices for our actions, whether to move towards or away from something. Values are most visible in what people do. It involves taking life seriously with humour in order to find meaning in life. Value education need to be taught through STEAM education right from elementary level. Although child starts learning different values from the family members at home and the second stage is the primary school where he learns from Teachers and peers, and the next stage is from society.

With different models, approaches and techniques that are prevalent in STEAM education it is possible to provide values & ethics of humanity to be an ideal citizen of India.

According to Dale Hudson, Peace education is defined as education that actualizes children’s potentialities in helping them learn how to make with themselves & with others, to live in harmony and unity with self, humankind and with nature. The common goal of education should be to produce functionally literate people who know how to learn and are adaptable to their rapidly changing environments. Given below is the Pyramid of STEAM education showing content specific, multidisciplinary, integrative approach to Teaching learning process.



Some researchers have shown that Empathy teaching through literature (Kehret,2001) through art (Philips,2003), through cooperative learning (Teich,1994), role playing the study of famous empathic people and music (Levine,2005) Empathy has been addressed in values learning (Freakley,et al.,Rice,1995).There is potential for compassion to be employed towards particular issues like in teaching in history class (trentecoste,2006) or with respect to animals(Weil,2004;Bekoff,2008).With some renowned institutions realising the importance of values & ethics in students life have started especial courses for their degree level engineering students of B.E./B.Tech,one such institution is Anna University, Chennai.

Methodology:

The methodology involved in the study was collection of secondary data from various sources like internet, journals, and websites of various institutes like MHRD

II. CONCLUSION

Although, today's Computer savvy generation is born intelligent with different skills and talents at young age they also are born with royal attitude, with less physical activity and indiscipline where STEAM education concept plays an important role of teaching Science, Technology, Engineering, Arts, Mathematics with inclusion of Ethics, value education to have peaceful world. STEAM is not about what, where or when it's about why and how. STEAM is a process of application of scientific attitude in solving day today's problem by allowing our students to create meaning for themselves and others.

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