
STEM Education Vs. STEAM Education

The arts, whether it is music, drama or fine art, all provide a channel for great creativity and imagination. Within STEM education (Science, Technology, Engineering and Mathematics) the focus is on improving the status quo within science and technology to increase the number of educated workers for the future. When STEM was introduced it was to tackle the apparent decline in support for science. Has STEM gone too far? Has the equilibrium become unbalanced once more?

Creativity and innovation are crucial to tackle the problems we all face today. Therefore, the arts should be integrated into STEM; it would bring an exponential gain to sciences, arts and education together. Creativity could be channelled into sciences thus creating a healthy partnership through STEAM for a better future in science and arts alike. Is STEM systematically pushing arts out of the equation? Is it not time we gave our arts some of the spotlight? Education in Scotland and the UK is finely tuned yet it is difficult to keep a balance. STEM is an education system, which was firstly introduced in the UK in 2010⁴ to fuel the cultivation of sciences to tackle the decline in graduates qualified for high-spec jobs such as specialised engineering. In 2002 Sir Gareth Roberts, the head of Science and Engineering in the UK at the time originally cited this. However, in the opinion of many, particularly those involved in the arts and arts education, the STEM education system has already begun to negatively impact the arts, which should have an equal importance in schools.

Furthermore, this debate has led to questioning whether STEM, in fact disturbs the balance of a rounded education, which is especially promoted by the SNP's 'Curriculum for Excellence' in Scotland². Since STEM was firstly introduced 8 years ago there has been a positive reaction in the science world to students going into STEM jobs but the arts are taking a hit. STEM, over time, has directly pushed out funding for the arts and let support for the arts diminish in schools. Ideally a rounded education should provide students access to science, language, literary subjects and the arts, which a STEAM education could vastly improve on. The arts should have equal importance and an equally good spread of opportunities. Supporters of STEAM agree that the need for specialised training in sciences has already been met (and more) by 2018³.

Furthermore, many of those in favour of STEAM do not wish to shift the focus from core subjects in STEM but simply to add the arts as one of those core topics to achieve a balanced and more enriching education. The STEM system does not consider the practical imaginative skills needed for its jobs. Engineering addresses difficult and varied challenges from global warming to micro plastics which all require people to push boundaries in innovation with creativity – which the arts can provide - to devise new lateral ideas to tackle these problems. Furthermore, the arts and creativity is a tool that all people can benefit from: those in education, those in the world of work or those who wish to have a career in the arts themselves. For example, business needs innovation to create new sales pitches and come up with new products. Those who wish to follow music, art or drama should have equal opportunities to those in the sciences. The emphasis on STEM means schools are forming a hierarchy of subjects where the arts are continually scrambling for a place. Scotland's vibrant cultural background includes the distinctive sound of the bagpipes. This iconic cultural feature is one of many threatened by budget cuts from councils providing free music tuition. In Scotland, 2016/17

the combined local budget for music was cut by just under £1 million.⁹ These drastic cuts that I, myself have witnessed not only mean it is harder for schools to even provide free music tuition and opportunities but also to retain teachers.

This means a decline in those playing instruments but also the vibrant musical culture prevalent in areas like the North East and West of Scotland. Implementing STEAM would mean that tuition and practical music education is supported by schools, maintaining a key part of Scottish culture. A great deal can be said for the vast benefits from the arts for people in all sorts of lives and professions¹. Studies have shown music vastly increases concentration and productivity, and can enhance a person's cognitive ability in all fields. Furthermore, a study taken by Stanford Cognitive and Systems Neuroscience Laboratory⁵ strongly suggested that music employs sections of your brain in control of attention span, pre-judgement and the strengthening of your memory's capabilities and retaining information. In this study alone, there are already several incredibly valuable traits, which can be exploited through music. Another study¹¹ shows how children given music tuition had better differentiation between distinct sounds; for example, the words 'bill' and 'pill' are a key skill in learning to read.

To put the arts into STEM could mean that the traits channelled through art can allow young people especially, to gain skills like memory and pre-judgment in order to apply them in other subjects, certainly complimenting the sciences and their need for educated guessing within problems, retention of facts and figures and a general large cognitive capability. Not only does an art like music have benefits for learning but it also has several health benefits⁷. Studies suggest that listening to or playing music reduces stress - particularly prevalent in higher education and work. It can also provide comfort, suppression of anxiety, reduced pain, lessening of insomnia and a boost in one's confidence, which I have experienced over my eight years of playing cello. Playing an instrument has an incredible effect on your brain function during all activities due to the neural pathways and connections that are created from playing⁸. Music scientists have recently discovered that unlike reading or maths, which use one or two parts of the brain, music employs almost every section of your brain to focus and play music spontaneously.

There are many tasks that your brain must perform while playing music: fine motor skills (stimulating both left and right sides of the brain), strong visual usage and auditory systems. Not only is there the melodic aspect of music but also the emotional idea behind every piece that musicians must understand. This can increase 'executive function' ¹⁰: the ability to manage oneself to achieve a goal. Executive function from music helps to develop planning skills, design and the spotting of detail. Musicians exercise this skill organising practice time, working to deadlines or recitals, arranging practice routines plus developing the ability to read and understand very intricate music. Due to the many complex tasks your brain performs to play and understand music, it means music is one of most stimulating activities for the brain. Musicians have an increased function in brain capability and skills that are transferable to all forms of learning.

Therefore, a STEAM education that focuses on arts like music or drama with the same importance as that of Maths would increase development and skill within all subjects. In conclusion, the evidence indicates that STEAM and the arts alongside each other, cumulatively promises increased productivity, efficiency and imagination in both fields. Where STEM upsets the equilibrium; STEAM would introduce equal opportunity and funding for arts and sciences letting both thrive and support each other. Instead of the narrow STEM system, advertising and

developing musical talent and skill not only opens further career opportunities but also has many health benefits that can help with the stresses of school and work beyond education. Compelling evidence suggests that STEAM offers an education for the future with many promising possibilities.

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