Editorial – Welcome to Volume 23, Issue 3

Abstract

This special edition of the International Journal of Innovation in Science and Mathematics Education focuses on science, technology, engineering, and mathematics (STEM) Education. Specifically, the papers included postulate on authentic enactments of STEM in schools, which remains an unconquered challenge.

Discussion about science, technology, engineering, and mathematics (STEM) education has resulted in some clear consensus and division amongst STEM researchers and STEM educators. What is clearly consensual, in Western societies, is the need to increase the number of emerging scientists with problem-solving and collaborating skills in order to solve global issues using their combined science, technology, engineering and mathematical knowledge. Major think tanks in Europe and the United States have endorsed this need as a panacea to current world crises (European Union, 2015; National Research Council, 2012). To achieve this, STEM Education in primary, secondary and tertiary classrooms needs to be promoted and supported, and authentic, future-proofed pathways in STEM fields need to be created and advocated for. The *call to arms* in Australia by successive Chief Scientists (Chubb I, 2015) to increase STEM participation and engagement has seen a ground swell of support and initial action. Divisions arise when STEM educators and STEM researchers differ in how to answer this call. Whilst there is much discourse about the need to teach a cohesive and integrated STEM approach, there is little consensus on how this can be achieved.

It is relatively easy to discuss STEM engagement by examining the numbers of students in science mathematics classrooms or those who are undertaking technology-based or engineering-related jobs or career pathways (Hackling M, Murcia K, West J, & Anderson, 2014), but we believe that STEM Education is much more than this simplistic number-crunching. After much discussion and investigating, we believe that authentic STEM Education requires an innovative, integrated approach:

> *STEM education is not simply a new name for the traditional approach to teaching science and mathematics. Nor is it just the grafting of "technology" and "engineering" layers onto standard science and math curricula. Instead STEM is an approach to teaching that is larger than its constituent parts; it is…a "meta-discipline. STEM education removes traditional barriers erected between the four disciplines, by integrating the four subjects into one cohesive means of teaching and learning* (Kennedy T. J & Odell, 2014 p. 253) .

How can this lofty goal be achieved by teachers faced with the reality of a congested curriculum that often turns teaching into a race, with pressure to complete tasks and cover content before exams and with assessments separated into distinct disciplines with no prospect of change? Furthermore, is some STEM better than no STEM, and for whom?

This special STEM edition of IJSIME features six approaches that consider stepping 'outside the box' to address the STEM Education conundrum. They argue for a coherent and integrated approach, and consider a range of alternative enablers: from a whole school

approach, the ‘re-imaging’ of the ‘E’ in STEM to a breakdown of the mathematics curriculum and the subsequent embedding of it across the disciplines. Whilst we do not have *the* solution, we present these papers for consideration and vigorous debate.

We think that the answers, and we feel there are many answers, will come from new pedagogical approaches and alternative situating of instruction. Possibly one answer is to move STEM Education outside the realm of mainstream classrooms in schools, and into ‘Makerspaces’ or even into tertiary initial teacher education spaces to create special STEM-focused units that address the needs and fire the imagination of students studying to teach STEM Education (Sheffield & Blackley, 2015).

References

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