

STEM FUTURES: WHICH WAY IS “UP”?

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THEME

STEM education research, policy & practice: Pathways for our future

AIMS AND BACKGROUND

In this presentation I will review international trends in research on interdisciplinary STEM education, with particular emphasis on the role of mathematics education research in advancing STEM education goals. This review draws on a forthcoming special issue of *ZDM – Mathematics Education* on the topic of interdisciplinary STEM education (co-edited with Susana Carreira and Immaculate Namukasa) that will bring together accounts of contemporary STEM education research from 11 different countries in Europe, Asia, North and South America, Africa, and Australia. My purpose is to identify challenges and opportunities for interdisciplinary STEM education, thus informing an agenda for future research in this field ... in other words, to work out which way is “up”.

In many countries, formal policies and reports by governments and business groups aim to incorporate STEM into the school curriculum, encourage young people to engage in STEM education, and advocate for STEM careers. However, as STEM education research is still in an embryonic state, the field is lacking a scientific evidence base that can inform the development of theory, policy and practice (Maass, Geiger, Ariza, & Goos, 2019). In addition, although it is common to claim that mathematics is the discipline that underpins STEM, it is not clear how mathematical concepts and practices contribute to a better understanding of the other STEM disciplines; nor do we understand well enough how STEM education experiences enhance students' learning of mathematics (English, 2016).

As a way of organising the research field, I will draw on the descriptive framework for integrated STEM education that was developed by Honey et al. (2014). The framework identifies four high-level features: (1) the *goals* of integrated STEM education; (2) the *outcomes* of integrated STEM education; (3) the *nature and scope* of integrated STEM education; and (4) *implementation* of integrated STEM education. While these features are clearly interconnected, representing them separately in the framework facilitates a systematic approach to review, analysis, and discussion of key aspects of the research landscape. Given the rapidly growing interest in STEM at all levels of education, and in both formal and out-of-school settings, there is an urgent need for research into interdisciplinary STEM education that builds deep connections between the constituent STEM subjects.

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