MEASURING MATTERS: HOW MEASUREMENT CONCEPTS TAUGHT IN MATHEMATICS CAN IMPACT SCIENTIFIC UNDERSTANDINGS ABOUT MATTER

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THEME:

Innovative STEM pedagogy and curriculum

BACKGROUND

My interest in the topic of 'measurement' began with the supervision of research projects of two pre-service primary teachers. These students were researching 11-12 year-olds' thinking about the measurement of objects, using semi-structured task-based interviews (Ho & McMaster, 2019; Senzamici & McMaster, 2019). I was surprised how frequently children confused 'mass' and 'volume', as these measurement attributes had been introduced to them in mathematics in their first year of school and reflected on what might be causing the confusion (McMaster, 2019).

SIGNIFICANCE AND IMPLICATIONS

The ratio of the mass of a material to its volume is its density. The concept of density is essential to understanding the particle theory of matter. In the recently released version of the Australian Curriculum: Science, this theory will be taught, beginning in Year 5 (10-11 year-olds). Following the earlier research on mass and volume, other research students, studied children's conceptions of density in science contexts. Their projects were jointly supervised by a primary science educator, Christine Preston and myself. The children's thinking revealed concepts they had learnt in mathematics were inappropriately applied in science; causing me to advocate for a learning progression for 'Measuring matter', involving both mathematics and science concepts (McMaster et al., 2021).

OBJECTIVE

My objective in this workshop is to increase participants' awareness of how children's thinking about measurement in science contexts might be influenced by their learning about measurement in mathematics. For example, words such as 'heavy', 'capacity' and 'volume' can be given different meanings in mathematics and science.

WORKSHOP STRUCTURE

Target audience: Primary school teachers, primary and early secondary school science teachers, mathematics and science teacher-educators.

Participants will be shown excerpts of transcripts of researcher-student conversations during task-based interviews. They will also be shown students' annotated drawings of a science context. Participants will discuss these artefacts and from them, surmise the experiences and/or learning that might have led to the children's alternative conceptions.

2022. J. Bobis & C. Preston (Eds.), Proceedings of the 7th International STEM in Education Conference (STEM 2022), University of Sydney, Sydney, Australia, November 23-26. University of Sydney.

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