CHANGING EARTH SCIENCE STUDENTS' PERCEPTIONS OF MATHEMATICS AND PROGRAMMING THROUGH CONTEXT-BASED EDUCATION

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KEYWORDS: mathematics, context-based learning, numeracy, modelling

SUBTHEME: Modes of learning

Many students studying geography, earth science & environmental science do not have a strong background in mathematics, and also do not appreciate how important mathematics is in fields of earth sciences. Notably, students often think that mathematics is (a) not important for the field of study; (b) too hard for them to understand with their limited backgrounds; and/or (c) not useful for their chosen career path.

We present a second-year undergraduate unit that teaches mathematical concepts to earth & environmental science students entirely in the context of examples relevant to students' geography, earth science & environmental science degrees and careers.

We present a subset of practical tasks from *EAE2011: Environmental Problem Solving and Visualization* focusing on introducing statistical, numerical and computational methods to science students with little to no mathematical or programming background. These tasks see students involved in active learning to understand and reinforce a concept, for example using current weather observations around Australia to understand statistical testing, and using an augmented reality sandbox to understand partial derivatives. This is followed by applying these skills computationally using the computer language *R*.

To evaluate the effectiveness of such a unit, we also present longitudinal surveys through the 2022 and 2023 deliveries of the unit. These track the changes in students' perceptions towards mathematics in the context of their degrees and future careers over the course of the unit.

Responses from 164 students showed an improvement in both students' confidence in their numerical skills and perceptions of the usefulness of those skills to their careers.

This study shows that the teaching approach and tools used are effective at changing students' perception of mathematics. Thus, these methods could help to improve numeracy among geography, earth science & environmental science graduates and more widely in science cohorts who are fearful of or uncomfortable with numeracy.

Proceedings of the Australian Conference on Science and Mathematics Education, The University of Canberra, 18 – 20 September 2024, page 57, ISSN 2653-0481.