Quantitative Skills and Computational Skills in Software Engineering

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Introduction

21st century biologists need quantitative and computational skills. Biology students' skills and attitudes toward mathematics have been extensively studied, but less is known about their corresponding attitudes toward computer science (CS). Understanding how students perceive the subjects of mathematics and computer science, and whether these perceptions are related or conflicting, is important for determining the best teaching methods. This study aims to determine biology students' perceptions of mathematics and computing in a biological context, measure the interrelationships between these perceptions, and examine additional factors that influence attitudes. Students completed the original and CS-adapted versions of his Math-Biology Values to determine interest, perceived benefits, and perceived costs of mathematics and computer science in a biological context investigated using Instrument. Mixed-effects models were used to determine correlations between task scores and to examine the effects of subject and demographic factor engagement.

Description

Mathematics and Computer Science scores were positively correlated, but the benefits and costs of CS were more negative, probably due to less exposure to Computer Science prior to college, and overall attitudes toward Computer Science. Influenced by background and gender based on these results, we provide educational recommendations for early and frequent integration of computer science and mathematics into biology curricula. A challenge to such efforts is the negative attitude students have toward mathematics, which is thought to be particularly common among biology students. It has been suggested that a student's personal values of using mathematics in the classroom influence student performance and behavioural outcomes, but empirically determining this requires validated tools. We developed the Math-Biology Values Instrument (MBVI), an 11-item college-level self-report tool based on expected value theory, to help life science students use mathematics to understand biology. We assessed the interest of measuring the perceived benefits of mathematics for careers in the life sciences and the costs of using mathematics in biology courses. Using a process that integrates multiple forms of validation, we have shown that MBVI results can be used as a valid measure of a student's mathematical value in the context of biology. Teachers and researchers use the MBVI to identify educational strategies that influence mathematics and biology scores and how mathematics and biology scores influence student performance and decisions to pursue more advanced quantitative-based courses. Expected value theory of achievement motivation predicts the value of a student's task. This includes interest in and enjoyment of the task, perception of the usefulness (utility) of the task, and perception of the cost of engaging in the task (B. Additional exercise, anxiety, etc.) may affect performance and school-related decisions affect.

Conclusion

Furthermore, the value of these tasks is assumed to be influenced by the sociocultural background of the students. Biology students are often seen as math-phobic, but there is little empirical evidence to value math in the context of biology (mathematics and biology task scores). To address this knowledge gap, we explored 1) the task values of the life sciences mathematics biology major, 2) how the mathematics biology task values differed based on the socio-cultural background of the students, and 3) Mathematics-biology task value-biology Predicts a student's likelihood of taking a quantitative biology course. Aimed at life science majors, their interest in choosing a quantitative biology course and their interest in using mathematics to understand biology, the benefits of mathematics for careers in life sciences, and the use of mathematics in biology courses. I researched the cost of doing so. On average, students reported costs related to biology mathematics. However, they also reported greater utility and were more interested in using mathematics to understand biology than previously thought. First-generation females and students gave more negative scores for math and biology tasks than males and next-generation students. Finally, students' mathematics and biology task scores predicted their likelihood of taking biomodeling and biostatistics courses. Educational strategies that result in positive scores for mathematics and biology homework may be particularly beneficial for women and first-generation students, and may increase the likelihood that students will choose advanced quantitative biology course.