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Assessing the impact of a statistics course on undergraduate science students' perceptions of self-efficacy in statistics, and statistics anxiety.

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Introduction: Statistics anxiety negatively effects performance and may deter students from enrolling in statistics courses. Academic self-efficacy is a student's perception of their ability to engage and complete academic tasks, which contributes to performance and metacognition. The objectives of this study were to: 1) investigate the impact of an undergraduate statistics course on statistics anxiety and self-efficacy in statistics, 2) to understand ways to enhance self-efficacy around statistics.

Methods: Participants were students enrolled in an undergraduate applied statistics course (McMaster University, Canada). Statistics anxiety was assessed using the Statistical Anxiety Rating Scale (STARS) questionnaire, and self-efficacy was assessed using a 10-point confidence Likert scale at the beginning and end of the course. Focus groups were conducted to determine themes related to ways that self-efficacy can be modified: mastery, vicarious experience, social persuasion and physiologic state. Median (interquartile range) was determined for STARS and self-efficacy, and the Wilcoxon signed-rank test was used to determine difference between timepoints. Thematic analysis was used to identify main themes related to modifying self-efficacy.

Results: 39 participants (72% female, 69% level 3) responded to questionnaires. There was no difference between baseline and post-course STARS scores (baseline = 164 [19], course completion = 158 [36], p= 0.211). Students self-efficacy increased for 12 of 15 statistics tasks ($p<0.05$). Themes that emerged from focus groups (n=5) were: repeating quizzes, chunking assignments (mastery); modeling, students as guest speakers (vicarious experience); constructive feedback, verbal encouragement (social persuasion); stress as a motivator, self-paced breaks (physiologic state).

Discussion: Self-efficacy improved for most tasks, reinforcing that the applied, lab-based nature of this smaller class works well, but focus groups revealed practical strategies to improve self-efficacy around statistics for this course, and similar courses. Consideration should be given to the range of STARS scores and the use of a standardized questionnaire in a course.

Is the first author also the speaker?

Yes

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