ATTITUDES TO PROGRAMMING IN AN INTERDISCIPLINARY SCIENCE COURSE

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SUBTHEME: Other

BACKGROUND

All science students at our institution take a compulsory first-year interdisciplinary course covering quantitative approaches to science, programming (using the Python language) and philosophy. Over five years, we have measured students' attitudes and perceptions of science, mathematics, and computer programming in the course. This work builds on a smaller study by Piggott et al. (2019).

AIMS

We study whether students' attitudes and perceptions of computer programming change after taking an interdisciplinary course at the tertiary level, and whether prior programming experience has any impact. We also aim to determine which learning activities are associated with changes in attitudes.

DESIGN AND METHODS

Students enrolled in the course were given anonymous surveys in Week 1 and at the end of semester, in all three semesters each year from 2019 to 2023. Data was collected from consenting students who were 18 or older. The surveys consisted of three sets of 12 questions regarding their perceptions and attitudes toward science, mathematics, and computer programming, based on the instrument developed by Eccles, Addler and Meece (1984). In the Week 1 survey, students were also asked whether they had prior programming experience while, in the post-survey, students were asked to indicate whether various learning activities positively, negatively, or neutrally affected their attitudes towards the disciplines. We investigate incoming Overall Attitudes and Perceptions (OAP) using students' mean responses to the 12 questions for each discipline in the pre-surveys. We use the matched data to investigate the change in OAPs across the semester.

RESULTS

Over the five-year period, we collected 3777 Week 1 responses, of which 1062 were matched to end-of-semester responses. We find that there are significant positive changes in OAP in computer programming for those with prior (Cohen's $d = 0.44$, $t(356) = 9.07$, $p < .001$) and no prior experience (Cohen's $d = 0.47$, $t(668) = 11.75$, $p < .001$). There is no significant difference between the extent of the positive change between those with prior and no prior experience ($t(734.83) = -0.75$, $p = .453$). Overall, we also found a very small negative change in science OAPs and no change in mathematics OAPs. Evaluations of an assignment on programming and communication are found to be the most predictive of changes in computer programming OAPs ($r^2 = .10$), followed by tutorials/workshops ($r^2 = .07$), and programming lectures conducted as part of the course ($r^2 = .03$).

CONCLUSIONS

We find that embedding computer programming information and applications within an interdisciplinary science course is effective in improving computer programming OAPs in both those who have and have not had prior programming experience. We identify that the major programming assessment item most explains changes in programming OAPs, according to student's self-reporting.

REFERENCES

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