Why do students fail university mathematics?

Informing teachers through the student perspective

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For more than a decade in Australia concerns have been raised about our declining interest and ability in mathematics, and subjects requiring higher levels of numeracy.

“Australia’s distinguished tradition and capability in mathematics and statistics is on a truly perilous path. The decline has already taken its toll: the university presence has been decimated, in part by unanticipated consequences of funding formulas and by neglect of the basic principle that mathematics be taught by mathematicians, and the supply of students and graduates is falling short of national needs.” National Strategic Review of Mathematical Science Research in Australia 2006

“For decades, support for research has been rationed; and interest in science and mathematics in schools and universities has declined...... There is an urgent need to act if we are not to be left behind.”

Ian Chubb, Chief Scientist (2013)

“Mathematics is in a death spiral in Australian schools. Just one in 10 students studied advanced maths in year 12 last year.”


The problem

The proportion of non-school-leavers entering university has increased. Many have been away from mathematics for some considerable time, and school-leavers are now arriving less prepared. Many university courses mandate the study of a mathematics unit in the first year, but unprepared students find these challenging. In 2010, Murdoch University integrated a voluntary online diagnostic quiz (Figure 1) into the enrolment process for units that required numeracy, enabling students to assess their own mathematical ability, and further direct them to the extra-curricular, pre-commencement ‘Bridging Maths’ program (Figure 2). Students who have insufficient background in mathematics are encouraged to study MAS164 ‘Fundamentals of Mathematics’, and there are support programs and help-clinics for this and other mathematics units. Despite the perceived availability and success of extra-curricular support programs, every year a considerable number of students fail mathematics in their first year at university. Are we missing something? What could we be doing differently?

Our proposal

The majority of studies in this field focus on quantitative methods using self-report questionnaires to measure students’ perceptions (the ability to know or understand something) of mathematics. In this study, we propose a different approach by using a teacher-student partnership to inform teachers of the issues faced by students who fail mathematics. Using grounded theory methodology and following semi-structured interviews we will ask students why they failed first-year university mathematics, (MAS164) from their perspective (a particular attitude towards or way of regarding something).

Aims

• To generate theory on the perspectives of students on why they fail first-year mathematics.
• Review diagnostic and support programs in light of students’ perspectives.
• Assess the consequences for pedagogy in mathematics.

We hope to follow up with a broader quantitative study to investigate the relative importance of factors contributing to failure in 1st-year maths. By asking some guiding questions and listening to the students’ stories in this study, we will gain an insight to inform future developments of both learning support and mainstream teaching of first-year mathematics.