AMSI CHOOSEMATHS RESEARCH

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CHOOSEMATHS Days

for Year 9 and 10 students 2018

in brief

AMSI AUSTRALIAN MATHEMATICAL SCIENCES INSTITUTE

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CHOOSE**MATHS** Days for Year 9 and 10 Students

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Executive Summary

Choose Maths Days are events conducted at schools and universities around Australia, aiming to raise mathematical enjoyment and aspirations of girls in Year 9 and 10. Initial surveys undertaken at these events provide information about students' prior engagement with mathematics, their career ambitions, and their expectations around Year 11/12 subject selections. Second surveys completed at the end of Choose Maths Days show how the activities and speakers at these events have changed students' opinions around these topics.

A total of 942 students attended Choose Maths Days in 2018. Of these, 392 female students at university Choose Maths events completed the two surveys. This report describes the analysis of and findings from these data from the university events.

The number of students reporting that they "enjoyed maths" or "enjoyed maths very much" increased from 62% to 70%. Among students who said that they did not like maths or weren't sure if they liked maths in the initial survey, 87% said in the second survey that they "quite liked", "enjoyed" or "enjoyed very much" the mathematics at the event. Over 90% of students reported that the university Choose Maths Days had given them a more positive view of mathematics than before.

Around 60% of the students said that the university Choose Maths Days had influenced the level of mathematics they wished to take in Year 11/12, with a quarter of students explicitly stating that they now want to take a higher level of mathematics than they had previously decided upon.

Our surveys have found that about half of the students attending university Choose Maths Days are interested in STEM careers. There is, however, a disconnect between career aspirations and engagement with STEM at school, which worsens as students transition from Year 9 to Year 10. Out of those students who list mathematics or science as a favourite subject at school, the proportion wanting to pursue a STEM career drops from 64% in Year 9 to 52% in Year 10.

The events which had the biggest impact on students' reported levels of mathematics enjoyment were those which targeted students with lower levels of mathematics enjoyment and future mathematics aspirations. Year 9 students were also more influenced than Year 10 students.

Choose Maths Days will continue in 2019, and will be informed by the results from the 2018 days regarding the target audience and activities which have maximum effect. Future plans and directions including planned changes for these events in 2019 are described in the Conclusions.

Contents of full report

Conclusions and Recommendations

Choose Maths Days are events which very positively influence students' perceptions and enjoyment of mathematics, and their aspirations for choosing mathematics in Years 11 and 12. The analysis of our survey data shows that the events are more beneficial for some categories of students than others. We will use our analysis to make recommendations for future Choose Maths Days and for further potential research into the attitudes of female students towards mathematics in school.

The target audience for CHOOSE**MATHS** Days

In 2018 the Choose Maths Days were targeted equally at Years 9 and 10, with a view to the current Year 9 students potentially being able to attend two such events before their subject selections towards the end of Year 10. Although Choose Maths Days had a positive effect on both year groups – both in terms of improving enjoyment of mathematics and in influencing subject selections – the Year 9 students were more influenced in both aspects. Where there is a question of deciding who to invite for future events, therefore, Year 9 students should be prioritised over Year 10s.

The Choose Maths Days had a greater positive effect on those students who began the day with a low-to-medium level of mathematics engagement, and with those with lower aspirations for their level of Year 11 mathematics. When marketing the event to schools in the future, emphasis should be put on inviting those students who are less engaged with mathematics but who have the potential to engage and achieve, and/or those who are planning to select an elementary level of mathematics in Year 11.

We intend to increase the number of events in 2019, including holding more events in regional and rural schools to complement those held in cities at universities. Events held in schools are more likely to include a broad range of students and to include those who are not already interested in mathematical study or STEM careers.

Changes to the CHOOSE**MATHS** Day format

The university Choose Maths Days in 2018 apparently did not have a very strong influence on students' career choices. It is important to assess how we can improve the Choose Maths Days for 2019 in this respect.

It would be instructive to look at the selection of careers suggested by the students, inviting speakers who can talk about the most common non-STEM ones and the ways that mathematics is needed for them. For example:

- Art and design careers, such as architecture, interior design, game design, and fashion design;
- Medical and veterinary sciences and caring professions, such as optometry, nursing, physiotherapy, midwifery, dermatology, and paramedics;
- Law-related careers, such as criminology, forensic science, barrister;
- Finance and business careers.

While mathematics and science were the most common 'favourite subjects' of the attending students (across both year groups), the students also named art, English and sport as common favourites. This should be taken into account when designing workshops, showing not only that mathematics is interesting and important, but also how it can be embedded within

other disciplines. This would help to emphasise the message that students do not need to label themselves as either a ‘mathematics person’ or a ‘humanities person’, but that mathematics is an important skill no matter the choice of career.

The survey responses will inform changes to the survey design in 2019 in order to capture ambiguities and to decrease missing responses.

Proposals for further research

The analysis of the responses at the different universities has revealed some interesting results which would benefit from further surveys and analysis. For example, at event A, the pre-surveys showed that the students had simultaneously the highest proportion of those who listed mathematics as a favourite subject, the lowest average enjoyment of mathematics and the lowest proportion of those considering taking advanced mathematics in Year 11. What does it mean for a student to list a subject as their favourite, and what relationship does this have towards their plans for further study and careers after school?

The other interesting anomaly in the university data was that the two events where the students had the highest aspirations in their Year 11 mathematics level were also the two events where the students were least likely to want to go into STEM careers. We recommend further research into the reasons behind students’ subject selections in Year 11 in order to investigate this finding.

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