Executive Summary

In 2017 the Australian Council of Deans of Science commissioned a study into enrolment trends in science and technology in Australian universities. This continues a series of studies that date back to 1989.

Unlike previous studies, which focused on the Natural and Physical Sciences, this latest study extends the analysis to include all areas of science, technology, engineering and mathematics (STEM).

The following report covers trends in STEM enrolments from 2002 to 2015 and compares these with growth in other fields.

During this period Australia's higher education sector has been through enormous change and continues to grow across most fields. Total enrolments increased from 948,461 to 1,482,990 – an increase of 56 per cent.

A snapshot of sector-wide trends across all fields of study shows:

- Overseas student enrolments almost doubled to 363,000 or 26 per cent of all enrolments.
- Women make up more than half total enrolments but are under-represented in STEM fields, in particular engineering and information technology.
- More students are choosing full-time over part-time study.
- More of them are also opting for off-campus or multi-modal study - mixing internal and external modes of study.
- The bachelor's degree remains the most popular degree across the sector, growing from 623,453 enrolments in 2002 to 928,449 in 2015.
- More students are seeking postgraduate qualifications, with postgraduate enrolments increasing 71 per cent between 2002 and 2015.

A number of other significant system-wide changes have occurred during this period, including the introduction of the graduate school model at the University of Melbourne and the University of Western Australia, commonly referred to as the Melbourne Model. This has impacted on the way student data are reported and the national consistency of data: for example, students at these universities wanting to become engineers (or seeking to enter several other professions) are first awarded a bachelor's degree in the natural and physical sciences before completing a graduate level qualification in engineering.

Taken together with changes to the way the Commonwealth collects data, the diversity in university reporting of data, and the classification of data, these changes make longitudinal comparisons less reliable.

Sector-wide STEM enrolments by Broad Field of Education 2002-2015

The Broad Fields of Education are the categories used by the Commonwealth to collect and analyse student data in higher education.

In STEM these comprise:

- Natural and Physical Sciences (including mathematics)
- Information Technology

- Engineering and Related Technologies
- Agriculture, Environmental and Related Studies

The total number of enrolments across the STEM fields grew by 73,000 between 2002 and 2015 - a 32 per cent increase over the study period.

However, they did not keep pace with the rapid growth in several other fields - some such as health more than doubled over that period – and were below the average sector-wide growth of 56 per cent.

The growth in STEM enrolments was restricted to Natural and Physical Sciences, which rose by 67 per cent, and Engineering, which had a 73 per cent increase. Enrolments declined in Information Technology by 23 per cent over the study period, or 18,267. As a proportion of total enrolments across all fields, Information Technology fell from 7 per cent in 2002 to 3 per cent in 2015.

Numbers in Agriculture, Environmental and Related Studies appear to have stayed the same over the period. However, this is deceptive, because many future architects from the University of Melbourne were inexplicably enrolled in a bachelor's degree in a course linked to the Agriculture, Environmental and Related Studies broad field of education.

Gender

- Women comprise 32 per cent of enrolments in STEM subjects compared with 61 per cent in non-STEM fields. While the actual numbers of women in STEM increased by 21,755 the percentage of women in STEM fields overall hardly changed.
- Men continue to outnumber women in engineering and information technology: women make up 17 per cent of enrolments in engineering and 19 per cent in IT.
- Men are more likely to undertake subjects in mathematical sciences, and physics and astronomy.
- Women are more likely to study biological sciences and "other natural and physical sciences".
- The relative uptake of mathematical sciences stayed the same for men and women over the study period but there were small declines in physics and astronomy and chemical sciences for both genders, and a decline in those taking biological sciences subjects.
- Women made up half of enrolments in Natural and Physical Sciences and in Agriculture, Environmental and Related Studies.

Overseas students

Within the STEM fields, both overseas and domestic student enrolments increased by more than 36,000 between 2002 and 2015. However, the proportion of overseas students grew significantly.

- Overseas student enrolments in STEM subjects rose from 24 per cent to 30 per cent of total enrolments. This compared with non-STEM fields of 18 per cent to 23 per cent.
- Growth in overseas students was strongest in Engineering and Related Technologies – 180 per cent.
- Overseas students are also more likely than domestic students to be enrolled in postgraduate courses.

Medical students

As the number of medical schools increased across Australia over the study period, so too did the number of students studying and completing medical degrees. Australia now has 19 medical schools. A number of these have switched to graduate entry but most still offer undergraduate medical degrees.

In 2002 the number of students graduating from medicine was 1420. By 2015 this had risen to 3733, an increase of 163 per cent.

The strongest growth was in Queensland, which now has four medical schools. The number of medical students enrolled in that state increased by 277 per cent or 3191 enrolments.

In summary, a notable finding of this study is that STEM enrolments have not grown as a proportion of total university enrolments over the study period. While the number of students enrolled in STEM subjects continues to grow, these have not kept pace with stronger sector-wide growth. For example, fields such as Health, Management and Commerce and Society and Culture had much stronger growth.

The continued expansion of overseas students since 2002 is a stimulus for some of that growth, particularly in fields such as Management and Commerce. This cohort of students also contributed to strong growth in Engineering and Related Technologies – about 180 per cent.

The largest provider of STEM courses among Australian universities continues to be the University of NSW. The other major STEM players are the University of Melbourne, the University of Queensland, the University of Sydney, Monash and RMIT. If the University of Technology, Sydney (UTS), and Curtin University are added, Australia had nine universities with more than 10,000 STEM students in 2015.