GENDER SUMMARY

GENDER ACROSS THE PIPELINE: UNREALISED POTENTIAL

ENGAGEMENT OF WOMEN AND GIRLS IN MATHEMATICS REMAINS A KEY AMSI POLICY priority, as we seek to secure Australia's mathematical capability and capacity and future prosperity. Addressing the gender challenge, a deepening issue across all STEM disciplines, is critical to ensure skill supply can meet industry need into the future. Gender balance is also a critical priority to boost skill supply as ageing contracts the mathematical workforce.

Adult numeracy data paints a worrying picture with Australian men continuing to outperform women at every life stage. The gap is smallest in the younger age bands of 15–19 years and 20–24 years, but starts to rise in the 24–34 age band—see figure 3.3.

This feature provides a snapshot of female participation across Australia's mathematical pipeline from the classroom and higher education to research and the workforce. Links to fuller reporting in key sections of the Discipline Profile are provided.

SCHOOL EDUCATION

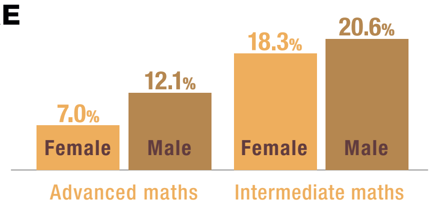
CLASSROOM BEGINNINGS

According to 2016 NAPLAN data the percentage of Year 9 students reaching the national minimum standard in numeracy has remained largely static, with 95.7 per cent of girls at or above minimum standard against 94.7 per cent of boys. However, the story changes in the higher achievement bands with the gender gap widening. Representation at band 9 was just 13.5 per cent for girls and 15.1 per cent for boys, with representation in band 10 falling to 9.7 per cent for boys and just 6.6 per cent for girls. Further analysis of NAPLAN data reveals a worrying trend with girls behind in the highest available band in every year level. That is band 6 and above for Year 3, band 8 and above for Year 5, and band 9 and above for Year 7. These figures suggest that girls don't excel in maths as often as boys. **See page 15**

Trends in International Mathematics and Science (TIMSS) and the Programme for International Student Assessment (PISA) confirm a small difference with a narrow gap between the performance of boys and girls. Comparatively girls outperform boys in literacy by a much larger margin. It should be noted that other factors such as school geographic location, indigenous status and parental occupation outweigh gender in their impact on numeracy achievement. **See pages 13–17**

MISSING THE MARK FOR A STEM FUTURE

Perhaps most concerning is the report card for Year 12 participation in mathematics, which threatens capacity to build a STEM workforce for the future. In 2016 only 7.0 per cent of female Year 12 students took advanced maths compared with 12.1 per cent of male students. These figures rise to 18.3 per cent and 20.6 per cent respectively for intermediate enrolments. **See page 22**



Year 12 participation in mathematics

HIGHER EDUCATION

A DEEPER DIVIDE

Further down the pipeline, the gender divide deepens at university level. In 2016 female students accounted for an estimated 33 per cent of undergraduate mathematics students, consisting of about 25 per cent domestic female students and 8 per cent international. **See Figure 2.15 on page 35**

Annual completion figures for domestic female students studying bachelor degrees in mathematical science have remained below 100 since 2012 **See Figure 2.18 on page 36**

This mirrors general gender trends for this century with the proportion of women completing bachelor degrees (Honours) declining to below 25 per cent. **See Figure 2.21 on page 37**

The proportion of domestic female students enrolled in honours courses in 2016 was 20 per cent, with domestic female students comprisng 18 per cent, and international female students 2 per cent of all enrolments. **See Figure 2.22 on page 38**

POSTGRADUATES

AN INTERNATIONAL BOOST

The news is not all bad with growth in the number of PhDs completed by women over the past 15 years. Since the beginning of this century the proportion of female students completing a PhD has increased from approximately 25 per cent to almost 35 per cent. This is largely attributable to a rising influx of international students—domestic female participation in PhD degrees has remained stagnant. **See Figures 2.24 and 2.25 on pages 38–39**

According to OECD reporting, the proportion of women awarded university mathematics degrees in Australia has risen from 37 per cent in 2000 to 39 per cent in 2012. Despite this, Australia continued to trail OECD and EU averages (42 per cent and 44 per cent in 2000, and 46 per cent and 50 per cent in 2012) by 5 points (OECD) and 7 points (EU) in 2000 and 7 points (OECD) and 11 points (EU) in 2012. **See Table 2.29 on page 41**

WORKFORCE

RECORDS BEST LEFT UNBROKEN

The academic mathematical workforce remains predominantly male, with only 23 per cent of reported staff (excluding casuals) female. This is one of the lowest percentages of women in any academic discipline. **See Figures 2.7, 2.8 and 2.9 on pages 31–32**

A WORKFORCE DEFICIT

Women account for approximately 40 per cent of Australia's mathematically qualified workforce. A low influx of younger women is negatively skewing the age distribution of the female proportion of the mathematical workforce, with a greater number of older female mathematicians. **See Figure 3.6 on page 46**

SOME SECTORS MORE EQUAL THAN OTHERS

Gender distribution across the mathematical sciences differs between employment divisions and occupations. Female mathematical scientists outnumber males within the Healthcare and Social Assistance sectors. The percentage of women in the Education and Training, and Finance and Insurance industries is about 40 per cent, while the proportion in Professional, Scientific and Technical Services drops to approximately 30 per cent. While gender balance is equitable for secondary school teachers, female representation drops significantly at university level to close to 25 per cent for lecturers and tutors. **See Figures 3.11 and 3.12 on page 49**

PART-TIME VERSUS FULL-TIME

Employment structure also differs with approximately 36 per cent of women with mathematical bachelor degrees working part-time compared to 19 per cent of males. At the doctorate level, 24 per cent of female PhDs work part-time compared to 15 per cent of males. The lower and middle-income brackets have the highest representation of part-time employment. If we look at full-time employees only, 33 per cent of men versus 15 per cent of women with bachelor degrees earn in the highest income bracket. Of the doctorate degree holders 49 per cent of men and 33 per cent of women are represented in the highest income brackets. **See Figure 3.13 on page 49**

AMSI AUSTRALIAN MATHEMATICAL SCIENCES INSTITUTE