INDIGENOUS AND REGIONAL **ENGAGEMENT**

TACKLING DISADVANTAGE ACROSS THE MATHEMATICAL PIPELINE

ADDRESSING ENTRENCHED INEQUALITY ACROSS Australia's education system is critical to securing Australia's future mathematical capability and capacity. This requires a coordinated approach to lift standards and close the gap for disadvantaged, regional and indigenous students. Importantly, with many of these schools in regions dependent on STEM industry, this gap threatens future economic stability and skill supply across regional growth areas. AMSI's own work with regional and high-indigenous population schools confirms that interactive approaches contextualised with real-world application is key to strengthening student engagement, in particular when working with indigenous students.

Australia's minority group of well-resourced, high-performing schools cannot bear the sole burden of mathematical skill supply.

Critically, with a majority of the nation's future teaching workforce unlikely to be produced by these schools, failure to address educational disadvantage will only deepen the current teacher shortage and increase rates of out-of-field teaching.

The following provides a snapshot of mathematics participation from the classroom to higher education and beyond across regional Austalia, low SES regions and Australia's indigenous population.

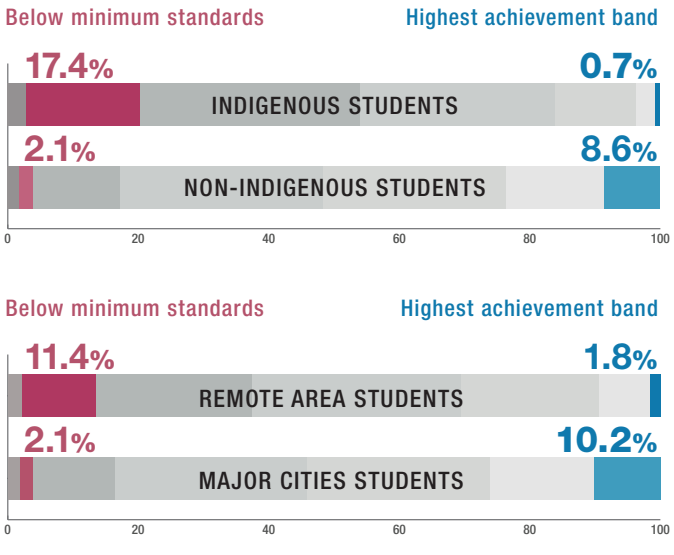
DISADVANTAGE IN THE CLASSROOM

The mathematical capability gap is widening for Australia's indigenous student population. Recent NAPLAN data reveals 17.4 per cent of Year 9 indigenous students failed to achieve minimum maths standards (Year 5) in 2016, compared to only 2.1 per cent of non-indigenous Year 9 students. While indigenous students in major cities and inner-regional areas tend to perform better than those in remote communities, the gap is still significant. In the highest achievement bands, percentages of indigenous students are extremely low with only 0.7 per cent of indigenous students reaching band 10 compared to 8.6 per cent of non-indigenous students. **See page 15**

Recent PISA, NAPLAN and TIMSS data reveals the impact of geographic location in deepening the mathematics gap with students in metropolitan and inner-regional areas significantly outperforming those in regional and remote areas. NAPLAN 2016 revealed over 11 per cent of students in remote regions were below minimum standards (Year 5). This figure soared to 37.9 in very remote areas. The number of students in the highest bands in remote and very remote areas is vastly lower than in major cities and inner regional schools. Only 0.6 per cent of students in very remote areas achieved band 10 climbing to 1.8 per cent in remote areas. This is in comparison to 10.2 per cent of students in major cities**.** **See page 17**

THE WIDENING CAPABILITY GAP

Year 9 Numeracy



Figures reproduced from table 1.9 and 1.14, Year 9 Numeracy in 2016

The application of the Grattan Institute's time-based measure *equivalent year levels* to interpretation of Victorian NAPLAN data revealed some worrying discrepancies. As shown in figure 1.22 of the Discipline Profile low numeracy achievers almost never catch up, falling further behind by Year 9 with a gap of on average 3 years and 8 months. As well as geographic location, parental education remains a significant factor in student progress. **See pages 19-20**

The gap between students whose parents have low versus high levels of education increases from 10 months in Year 3 to 2.5 years in Year 9. Those whose parents have a degree or above significantly outperform those who have no or limited tertiary education.

These figures increase to 1 year and 3 months in Year 3 and 3 years and 8 months in Year 9 for those in disadvantaged schools. Even those who score highly in Year 3 numeracy at disadvantaged schools will fall behind, making at least 2 years and 5 months less progress by Year 9 than those in high-advantage schools. This serves to highlight entrenched disadvantage in the Australian education system, as it is the school attended rather than student capability that determines outcomes. **See page 20**

STRENGTHENING TEACHER SUPPLY

In Australia, at least 26 per cent of Year 7 to 10 maths classes do not have a maths-qualified teacher. Unfortunately regional and remote schools are the most likely to have severe out-of-field teaching. Data dating back to 2010 illustrates the wide variance of teacher training between metropolitan, regional and remote areas. Table 1.37 in the Discipline Profile shows the proportion of Years 7 to 10 teachers with three or more years of tertiary maths was 45 per cent in metro areas falling to 37 per cent in regional and 40 per cent in remote areas. In Years 11 and 12 this gap widens with 57 per cent of regional and 43 per cent of remote teachers having three or more years of tertiary maths compared to 64 per cent of metropolitan teachers. **See page 27**

FAILING TO MATHEMATICALLY EQUIP STUDENTS CREATES BARRIERS TO EMPLOYMENT AND **RISKS LOCAL AND REGIONAL PROSPERITY**

While not specific to maths, PISA 2015 findings show teacher shortages and out-of-field teaching are highest in disadvantaged schools. With many of these schools producing future generations of teachers, this issue quickly becomes systemic. Engagement of students in low SES, disadvantaged, regional and remote schools needs to be part of a broader strategy to address out-of-field teaching in mathematics. **See page 27**

Delivery of training and personal development to build capability and confidence of the existing teacher workforce and skill continuity, in particular indigenous teacher support staff, is critical to improving engagement and retention of maths-qualified teachers.

In addition to training existing teachers, a national effort to recruit indigenous students from Australia's mathematical sciences departments must be a priority. A recent Queensland report shows social contribution and equity plays a more powerful role in indigenous students selecting teaching as a career than for their non-indigenous peers. Recruitment of indigenous mathematics teachers from Australia's mathematical sciences departments remains a significant priority.

RESEARCH & HIGHER EDUCATION

Disadvantage is also reflected in the numbers of ATSI staff and students in Australia's university mathematical sciences departments. In 2015, AMSI members reported just four staff members who identified as ATSI and 151 students out of more than 10,000 studying mathematical sciences subjects at university. This under representation does not bode well for the supply of indigenous mathematics teachers for ATSI communities.

MATHS IN DEMAND: REGIONAL GROWTH CORRIDORS

Many of the top mathematics graduate employers in the Office of the Chief Scientist's *Australia's STEM Workforce 2016* report have a strong regional presence. From manufacturing, transport, warehousing, wholesale trade to mining and resources and agriculture, there is clear demand for these skills in regional growth corridors. **See page 49**

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