

Progress and achievement and the context of mathematics and statistics learning in New Zealand (English-medium education)



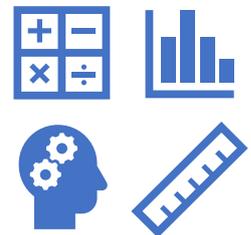
A picture from across our large scale research from primary through to senior secondary

Mathematics and statistics play an important role in our everyday lives, allowing us to make sense of the world around us and to manage our lives.

This flyer provides a summary of the latest key findings across a range of large national and international sources. These findings give us a broad picture of student achievement and progress in mathematics and statistics learning in English-medium early learning and schools. This paper also presents information from these studies about teachers' knowledge and experiences and common practices in teaching mathematics and statistics.

This paper draws upon both national and international data sources, including:

- Growing Up in New Zealand (GUINZ)
- National Monitoring Study of Student Achievement (NMSSA)
- The electronic assessment tool for teaching and learning (e-asTTle)
- National Certificate of Educational Achievement (NCEA)
- Trends in International Mathematics and Science Study (TIMSS)
- Programme for International Student Assessment (PISA)



What did we find?



Achievement and progress

- » **Looking across several data sources**, we can see that:
 - many New Zealand students are performing well against both national and international benchmarks of mathematics achievement
 - many are making good progress at an expected pace throughout year levels, and
 - many young people achieve at least some level of mathematics credential prior to leaving school.
- » **At the same time, however...** we also found wide variations in both achievement and progress against the curriculum expectations among learners. More specifically, we found that:
 - the range of achievement in maths at each year level is wide and many students are achieving lower than either expected or desired
 - the proportion of students working and attaining at curriculum level reduces as they get older
 - many children and young people are not getting an opportunity to learn all the material that would help them succeed, and
 - there is also a significant variation in the amount of measured progress students make over a school year.
- » **Internationally**, some New Zealand students do very well. However, on average, mathematics achievement of New Zealand students is at best moderate with a wide range in achievement among our learners. There hasn't been an improvement in mathematics achievement in recent years. **Compared to other countries:**
 - the mathematics achievement of Year 5 students is relatively low internationally and hasn't changed much in recent years
 - the mathematics achievement of secondary students is about the middle internationally, but few students are working at the appropriate curriculum level at lower secondary level
 - there has been a decline in mathematics achievement and increases in lower achievers in recent years among secondary students
 - the gap between learners in economically affluent schools and those in economically disadvantaged schools was large compared with other countries.

- » The **wide variation in achievement was also evident across sub-populations**, as our findings indicate:
 - children aged 4.5 from poorer homes were less likely to demonstrate counting skills
 - learners in homes with many economic resources had higher average achievement than those in homes with fewer economic resources
 - in many analyses, there is no difference between girls' and boys' average mathematics achievement and progress, though some studies show boys scoring higher on average
 - our Māori and Pacific learners are over-represented among lower achievers and under-represented among higher achievers, and
 - many students identified by their schools as having special education needs achieved at or above curriculum expectations but there is still work to do to help many of these learners succeed.



Student confidence and interest

- » **Liking maths, being confident in doing maths, and valuing maths** were all associated with higher achievement in maths. But confidence was more strongly associated with achievement than liking or valuing, particularly for older learners. In general:
 - primary students liked learning mathematics, and many felt confident in their mathematics abilities
 - as they grow older, they become less positive about doing maths
 - more New Zealand students were negative about maths than their international counterparts, but slightly more lower secondary students valued mathematics, compared to the international average
 - more boys were confident in their maths ability than girls, and
 - for all ethnic groupings, students who had more confidence tended to have higher achievement but there was no consistent pattern when confidence and attitude to maths were examined for each ethnic grouping.



Teachers' confidence and preparation

- » **Teachers' confidence and preparation**, along with their **teaching methods**, appeared to have an impact on students' opportunity to learn and academic outcomes in mathematics. In New Zealand:
 - many primary teacher trainees couldn't do the maths they would be expected to teach to Year 7 and 8 students, though this motivated some to do better for the children they taught
 - New Zealand had lower levels of teacher specialisation in maths than other countries and many primary and Year 9 teachers expressed feelings of being unprepared, which appeared to impact students' opportunity to learn and therefore their outcomes
 - students in New Zealand performed better on statistical questions than on other areas of the curriculum, though this was only relative to New Zealand performance (not that of other countries)
 - New Zealand teachers had high levels of professional development compared with other countries, but we found that fewer teachers experienced these opportunities in 2018 than in 2014.



Teaching practices

- » From early learning through to secondary, **there are areas where New Zealand teaching and instruction differ from international practices**, or from what some writers suggest is best practice and evidence shows works. For example:
 - many New Zealand students reported teachers were clear and easy to understand in mathematics lessons, but the proportions were lower than their international peers
 - the methods and strategies used by teachers in lessons varied greatly across New Zealand classrooms and between primary and secondary teachers
 - compared with other countries, New Zealand teachers were less likely to explain things to students or ask them to memorise
 - more New Zealand primary teachers use same ability grouping regularly for mathematics instruction, which has been associated with lower achievement; this use had decreased since 2014 while the use of mixed grouping ability had increased
- » While this paper does not intend to identify the best practice for teaching maths, this indicates **areas of practice that we may wish to examine further**.