TIMSS

AUSTRALIA

2019

HIGHLIGHTS

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This document provides the highlights from Volume I of the main report *TIMSS 2019 Australia. Volume I: Student performance*.

Volume I and these *Highlights* focus on the achievement results, detailing Australia's results within the international context, as well as the results for the Australian jurisdictions, and for different demographic groups within Australia.

Volume II will present the results from the contextual questionnaires, examining the contexts in which learning and achievement occur, including home, school, and classroom contexts, as well as student attitudes.

1 What is TIMSS?

Australia participated in the seventh cycle of Trends in International Mathematics and Science Study (TIMSS). TIMSS is an international sample study that assesses the mathematics and science achievement of Year 4 and Year 8 students every four years. Australia has participated in all cycles of TIMSS since it commenced in 1995 and over this 24-year period has collected rich data about trends in mathematics and science achievement.

TIMSS is directed by the International Association for the Evaluation of Educational Achievement (IEA), an independent international cooperative of national research institutions and government agencies that has been conducting studies of cross-national achievement in a wide range of subjects since 1959. As well as the assessment of mathematics and science, TIMSS collects extensive background information that addresses concerns about the quantity, quality and content of instruction. This background information is collected through a series of questionnaires for students, parents, teachers, principals and curriculum specialists.

TIMSS 2019 was the first cycle that offered a computer-based assessment (eTIMSS). Countries could choose either computer-based or paper-based assessments (Australia participated in the paper-based assessment). Over 60 countries participated in TIMSS 2019, about half of which participated in the computer-based assessment. Computer and paper were designed to be equivalent and have been reported as one assessment on the already established TIMSS Grade 4 and Grade 8 mathematics and science scales.

TIMSS is part of the National Assessment Program

In Australia, TIMSS is a key part of the National Assessment Program (NAP) and complements other NAP assessments. Results from these NAP assessments allow for nationally comparable reporting of progress towards the *Melbourne Declaration on Educational Goals for Young Australians* (until 2019)¹ and the *Alice Springs (Mparntwe) Education Declaration* (from 2020).² These declarations set out a vision for education in Australia that promotes excellence and equity to enable all Australians to become confident and creative individuals, successful learners, and active and informed community members.

1 Ministerial Council on Education, Employment, Training, and Youth Affairs (Australia). (2008). *Melbourne Declaration on Educational Goals for Young Australians*.

2 Council of Australian Governments Education Council. (2019). *Alice Springs (Mparntwe) Education Declaration*. Education Council Secretariat.

2 Who participated in TIMSS 2019?

- ▶ At the Year 4 level, 58 countries participated, of which 30 undertook eTIMSS.
- ▶ At the Year 8 level, 39 countries participated, of which 22 participated in eTIMSS.
- ▶ More than 330 000 students, 11 000 school principals and 22 000 teachers participated at Year 4.
- ▶ A further 250 000 students, 8000 school principals and 30 000 teachers participated at Year 8.

Which Australians took part?

TIMSS is a sample assessment. It isn't possible to test every Year 4 or Year 8 student (that would take too long and cost too much) so we take a sample of these students. We know how many Year 4 and Year 8 students there are in Australia, which lets us extrapolate the results to make inferences about the populations of Year 4 and Year 8 Australian students. In all, 5890 Year 4 and 9060 Year 8 students undertook the assessment, representing the populations of around 302 574 Year 4 and 276 051 Year 8 students in Australia.

Figure 2.1 gives a snapshot of the Australian TIMSS 2019 sample.

FIGURE 2.1 The Australian TIMSS 2019 sample

3 What does TIMSS assess?

TIMSS assesses mathematics and science as separate subjects and uses national curricula as the major organising concept. The assessments are based on comprehensive frameworks that are built in collaboration with participating countries to describe the knowledge and skills expected of students at Year 4 and Year 8. In addition, the TIMSS school, teacher, student, and home questionnaires gather extensive information about the contextual factors at school and home that are associated with learning and student achievement.

TIMSS is based on a research model that uses the curriculum, in broad terms, as its foundation. The TIMSS curriculum model includes three curriculum levels, considered in relation to the context in which they occur. These levels are shown in Figure 3.1.

The TIMSS assessment frameworks for mathematics and science are organised around two dimensions:

- ▶ a content dimension specifying the subject matter to be assessed
- ▶ a cognitive dimension specifying the thinking processes to be assessed as students engage with the content.

The content domains for mathematics and science at Year 4 and Year 8 are detailed in Tables 3.1–3.2.

In addition, the cognitive domains (thinking processes) are: *Knowing*, *Applying*, and *Reasoning*.

FIGURE 3.1 The TIMSS curriculum model

TABLE 3.1 TIMSS Year 4 and Year 8 mathematics content domains

Mathematics Year 4	
Content domains	Topic areas
Number (50%)	<ul style="list-style-type: none"> ▶ Whole numbers ▶ Expressions, simple equations and relationships ▶ Fractions and decimals
Measurement and geometry (30%)	<ul style="list-style-type: none"> ▶ Measurement ▶ Geometry
Data (20%)	<ul style="list-style-type: none"> ▶ Reading, interpreting and representing data ▶ Using data to solve problems
Mathematics Year 8	
Content domains	Topic areas
Number (30%)	<ul style="list-style-type: none"> ▶ Integers ▶ Fractions and decimals ▶ Ratios, proportions and percentages
Algebra (30%)	<ul style="list-style-type: none"> ▶ Expressions, operations and equations ▶ Relationships and functions
Geometry (20%)	<ul style="list-style-type: none"> ▶ Geometric shapes and measurements
Data and probability (20%)	<ul style="list-style-type: none"> ▶ Data ▶ Probability

Sample items from Year 4 and Year 8 mathematics

FIGURE 3.2 Year 4 mathematics example item
– Data, Knowing

FIGURE 3.3 Year 8 mathematics example item
– Geometry, Applying

TABLE 3.2 TIMSS Year 4 and Year 8 science content domains

Science Year 4	
Content domains	Topic areas
<i>Life science</i> (45%)	<ul style="list-style-type: none"> ▶ Characteristics and life processes of organisms ▶ Life cycles, reproduction and heredity ▶ Organisms, environment and their interactions ▶ Ecosystems ▶ Human health
<i>Physical science</i> (35%)	<ul style="list-style-type: none"> ▶ Classification and properties of matter and changes in matter ▶ Forms of energy and energy transfer ▶ Forces and motion
<i>Earth science</i> (20%)	<ul style="list-style-type: none"> ▶ Earth's physical characteristics, resources and history ▶ Earth's weather and climates ▶ Earth in the Solar System
Science Year 8	
Content domains	Topic areas
<i>Biology</i> (35%)	<ul style="list-style-type: none"> ▶ Characteristics and life processes of organisms ▶ Cells and their functions ▶ Life cycles, reproduction and heredity ▶ Diversity, adaptation and natural selection ▶ Ecosystems ▶ Human health
<i>Chemistry</i> (20%)	<ul style="list-style-type: none"> ▶ Composition of matter ▶ Properties of matter ▶ Chemical change
<i>Physics</i> (25%)	<ul style="list-style-type: none"> ▶ Physical states and changes in matter ▶ Energy transformation and transfer ▶ Light and sound ▶ Electricity and magnetism ▶ Motion and forces
<i>Earth science</i> (20%)	<ul style="list-style-type: none"> ▶ Earth's structure and physical features ▶ Earth's processes, cycles and history ▶ Earth's resources, their use and conservation ▶ Earth in the Solar System and the universe

Sample items from Year 4 and Year 8 science

Tina and Mary need to move identical heavy boxes. Tina has to pull harder on her box to move it than Mary does.

Why is it easier for Mary to move her box?

- (A) Gravity acting on Tina's box is much stronger.
- (B) Air resistance acting on Tina's box is much greater.
- (C) The cart increases the magnetic force acting on Mary's box.
- ☒ The cart's wheels decrease the force needed to move Mary's box.

FIGURE 3.4 Year 4 science example item – *Physical science, Applying*

Dixon read a fact sheet about crocodiles.

Crocodile Facts

1. Crocodiles have a lifespan of up to 75 years.
2. Crocodiles today look like ancient crocodiles found in fossils.
3. Crocodiles have an angle of vision of 290° as shown in the diagram.

How can a crocodile's angle of vision help it to survive in its environment?

Give one reason.

The crocodile can see predators and prey almost all of the way around its body without moving its head.

FIGURE 3.5 Year 8 science example item – *Biology, Reasoning*

4 Australia's performance results in an international context

TIMSS results are reported as mean scores – a measure of average performance – and other statistics are given that reflect the distribution of performance. This provides a summary of student performance and allows different countries and subgroups to be compared.

In this report, the focus is on differences that were statistically significant (in other words, are unlikely to have arisen by chance). Where the commentary states that there was a difference between sets of numbers, whether these were score, percentage or percentage point differences, it means that the difference satisfied this condition. Where the commentary states that there was no difference, or where no comment is made regarding a possible comparison, it indicates that the difference was not statistically significant.³

³ For more information about statistical significance, refer to the Reader's Guide in *TIMSS 2019 Australia. Volume I: Student performance*.

Year 4 Mathematics

Australian students achieved an average score of **516 points**.

Australia's score was around **110 score points below** that of the highest performing country, Singapore.

There were **22** countries whose performance was **significantly higher** than Australia's.

There were **12** countries whose performance was **not significantly different** to Australia's.

There were **23** countries whose performance was **significantly lower** than Australia's.

Year 8 Mathematics

Australian students achieved an average score of **517 points**.

Australia's score was around **100 score points below** that of the highest performing country, Singapore.

There were **6** countries whose performance was **significantly higher** than Australia's.

There were **7** countries whose performance was **not significantly different** to Australia's.

There were **25** countries whose performance was **significantly lower** than Australia's.

FIGURE 4.1 Mean Year 4 and Year 8 mathematics scores, selected countries

Year 4 Science

Australian students achieved an average score of **533 points**.

Australia's score was around **60 score points below** that of the highest performing country, Singapore.

There were **8** countries whose performance was **significantly higher** than Australia's.

There were **10** countries whose performance was **not significantly different** to Australia's.

There were **39** countries whose performance was **significantly lower** than Australia's.

Year 8 Science

Australian students achieved an average score of **528 points**.

Australia's score was around **80 score points below** that of the highest performing country, Singapore.

There were **6** countries whose performance was **significantly higher** than Australia's.

There were **5** countries whose performance was **not significantly different** to Australia's.

There were **27** countries whose performance was **significantly lower** than Australia's.

FIGURE 4.2 Mean Year 4 and Year 8 science scores, selected countries

5 Australia's proficiency results in an international context

To interpret the results on the Year 4 and Year 8 mathematics and science achievement scales, TIMSS describes achievement at four points along each scale as *international benchmarks*. Table 5.1 summarises the skills and knowledge that students are able to display at each of the international benchmarks for each scale.

TABLE 5.1 The TIMSS 2019 international benchmarks

The TIMSS international benchmarks for mathematics		
	Year 4	Year 8
Advanced international benchmark 625 points	<i>Students can apply their understanding and knowledge in a variety of relatively complex situations and explain their reasoning.</i>	<i>Students can apply and reason in a variety of problem situations, solve linear equations and make generalisations.</i>
High international benchmark 550 points	<i>Students can apply conceptual understanding to solve problems.</i>	<i>Students can apply their understanding and knowledge in a variety of relatively complex situations.</i>
Intermediate international benchmark 475 points	<i>Students can apply basic mathematical knowledge in simple situations.</i>	<i>Students can apply basic mathematical knowledge in a variety of situations.</i>
Low international benchmark 400 points	<i>Students have some basic mathematical knowledge.</i>	<i>Students have some knowledge of whole numbers and basic graphs.</i>

The TIMSS international benchmarks for science		
	Year 4	Year 8
Advanced international benchmark 625 points	<i>Students communicate their understanding of life, physical, and Earth sciences and demonstrate some knowledge of the process of scientific inquiry.</i>	<i>Students communicate understanding of concepts related to biology, chemistry, physics and Earth science in a variety of contexts.</i>
High international benchmark 550 points	<i>Students communicate and apply knowledge of life, physical, and Earth sciences.</i>	<i>Students apply understanding of concepts from biology, chemistry, physics and Earth science.</i>
Intermediate international benchmark 475 points	<i>Students show knowledge and understanding of some aspects of science.</i>	<i>Students show some knowledge of biology and the physical sciences.</i>
Low international benchmark 400 points	<i>Students show limited knowledge of scientific concepts and limited knowledge of foundational science facts.</i>	<i>Students show limited understanding of scientific principles and concepts and limited knowledge of science facts.</i>

Australian proficiency in mathematics and science

This report groups the international benchmarks that describe performance in a different way: by very low performers, very high performers and students who attained the National Proficient Standard.

Very low performers are students who scored below the Low international benchmark and struggled to display even basic mathematical or scientific knowledge and understanding.

Very high performers are students who scored at the Advanced international benchmark and were highly proficient in mathematics or science for their year level.

In Australia, students who achieved the **National Proficient Standard** were those who scored at or above the Intermediate international benchmark in mathematics and science. This level represents a 'challenging but reasonable' level of performance where students need to demonstrate more than the minimal skills expected'.⁴

Performance in mathematics

The proportions of very low performers, very high performers and students who attained the National Proficient Standard in Australia for Year 4 and 8 mathematics and science are presented in Figure 5.1. Singapore (the highest performing country) and the International median (by definition, half the countries have a percentage above the median and half below the median), are included for comparison.

Note: In cases in which the proportion of students in a benchmark band is 1% or less, the numeric label is not shown.

FIGURE 5.1 Proportions of students who were very low performers, very high performers and attained the National Proficient Standard in mathematics and science at Year 4 and Year 8

⁴ Australian Curriculum, Assessment and Reporting Authority. (2019). Measurement framework for schooling in Australia 2019.

6 Australia's performance over time

From TIMSS 2015 to 2019

Australia's mean performance increased in Year 8 mathematics and Year 4 and Year 8 science, but did not significantly improve in Year 4 mathematics. The increases in mean performance appear to be mainly due to an increase in the proportion of high performing students.

TABLE 6.1 Changes in performance over time for Australia, TIMSS 2015–2019

Changes in...	Year 4 Mathematics	Year 8 Mathematics	Year 4 Science	Year 8 Science
Average performance	*	▲ 12 points	▲ 9 points	▲ 16 points
Proportion of very low performers	*	*	*	*
Proportion of very high performers	*	▲ 5 pp	▲ 3 pp	▲ 5 pp
Proportion of students who attained the National Proficient Standard	*	*	*	▲ 5 pp

pp= percentage points; * There were no significant differences between the two cycles.

Other key points

- ▶ Australia was one of 23 countries that had no change in average Year 4 mathematics achievement.
- ▶ Australia was one of 13 countries that improved in average Year 8 mathematics achievement.
- ▶ Australia was one of 10 countries that improved in average Year 4 science achievement.
- ▶ Australia was one of 11 countries that improved in average Year 8 science achievement.

From TIMSS 1995 to 2019

Australia's mean performance in Year 4 mathematics has improved significantly since TIMSS 1995. This improvement was across the board at all levels of achievement and occurred mainly between TIMSS 1995 and 2007.

TABLE 6.2 Changes in performance over time for Australia, TIMSS 1995–2019

Changes in...	Year 4 Mathematics	Year 8 Mathematics	Year 4 Science	Year 8 Science
Average performance	▲ 21 points	*	▲ 11 points	▲ 15 points
Proportion of very low performers	▼ 5 pp	*	▼ 4 pp	*
Proportion of very high performers	▲ 4 pp	▲ 5 pp	*	*
Proportion of students who attained the National Proficient Standard	▲ 8 pp	*	▲ 7 pp	▲ 5 pp

pp= percentage points; * There were no significant differences between the two cycles.

Other key points

- ▶ Australia was one of 13 countries that improved in average Year 4 mathematics achievement.
- ▶ Australia was one of 5 countries that had no change in average Year 8 mathematics achievement.
- ▶ Australia was one of 11 countries that improved in average Year 4 science achievement.
- ▶ Australia was one of 8 countries that improved in average Year 8 science achievement.

7 Australia's performance in the content domains

Figure 7.1 shows the relative mean achievement across the content domains (comparing the domain score against the overall score) for each of mathematics and science for Australian Year 4 and Year 8 students in TIMSS 2019.

- ▶ Year 4 mathematics – students were stronger in *Data*, but weaker in *Number*.
- ▶ Year 8 mathematics – students were stronger in *Number* and *Data and probability*, but weaker in *Algebra* and *Geometry*.
- ▶ Year 4 science – students were stronger in *Life science*, but weaker in *Physical science* and *Earth science*.
- ▶ Year 8 science – students were stronger in *Earth science*, but weaker in *Chemistry*.

FIGURE 7.1 Relative mean achievement across the content domains

From TIMSS 2015 to 2019

- ▶ Year 4 mathematics – the score for *Measurement and geometry* dropped 11 points.
- ▶ Year 8 mathematics – scores for all domains increased (*Number* by 10 points, *Algebra* by 11 points, *Geometry* by 13 points, and *Data and probability* by 14 points).
- ▶ Year 4 science – the score for *Physical science* increased by 10 points.
- ▶ Year 8 science – scores for all domains increased (*Biology* by 9 points, *Chemistry* by 22 points, *Physics* by 24 points, and *Earth science* by 11 points).

8 Australia's performance in the cognitive domains

Figure 8.1 shows the relative mean achievement across the cognitive domains (comparing the domain score against the overall score) for each of mathematics and science for Australian Year 4 and Year 8 students.

- ▶ Year 4 mathematics – students were stronger in *Reasoning*, but weaker in *Knowing*.
- ▶ Year 8 mathematics – students were stronger in *Applying*, but weaker in *Knowing* and *Reasoning*.
- ▶ Year 4 science – students were stronger in *Knowing* and *Reasoning*, but weaker in *Applying*.
- ▶ Year 8 science – students were stronger in *Applying* and *Reasoning*, but weaker in *Knowing*.

FIGURE 8.1 Relative mean achievement across the cognitive domains.

From TIMSS 2015 to 2019

- ▶ Year 4 mathematics – there were no significant changes on any of the cognitive domains.
- ▶ Year 8 mathematics – the score for *Applying* increased by 19 points.
- ▶ Year 4 science – the scores for *Knowing* and *Reasoning* increased by 15 and 10 points, respectively.
- ▶ Year 8 science – the scores for *Applying* and *Reasoning* increased by 20 and 23 points, respectively.

9 Results for the Australian jurisdictions

Year 4 mathematics

Table 9.1 provides the Year 4 mathematics performance results for the jurisdictions (states and territories). The performance of students in the Australian Capital Territory was higher than that of students in all other jurisdictions except for New South Wales. Students in the Northern Territory were outperformed by those in all other jurisdictions.

TABLE 9.1 Multiple comparisons of Year 4 mathematics achievement, by jurisdiction

Jurisdiction	Mean score	SE	ACT	NSW	VIC	TAS	WA	QLD	SA	NT
ACT	540	7.2		●	▲	▲	▲	▲	▲	▲
NSW	522	6.6	●		●	●	●	●	▲	▲
VIC	522	4.7	▼	●		●	●	●	▲	▲
TAS	514	7.6	▼	●	●		●	●	●	▲
WA	510	6.2	▼	●	●	●		●	●	▲
QLD	508	5.7	▼	●	●	●	●		●	▲
SA	503	5.9	▼	▼	▼	●	●	●		▲
NT	461	9.6	▼	▼	▼	▼	▼	▼	▼	

Read across the row to compare a state/territory's performance with the performance of each jurisdiction listed in the column heading.

▲ Mean performance significantly higher than in comparison jurisdiction.

● Not significantly different from comparison jurisdiction.

▼ Mean performance significantly lower than in comparison jurisdiction.

Figure 9.1 shows the proportions of students who were low performers, high performers and those who attained the National Proficient Standard in Year 4 mathematics, by state and territory. The percentages of students who attained the National Proficient Standard ranged from 46% in the Northern Territory to 80% in the Australian Capital Territory.

FIGURE 9.1 Proportions of students who were very low performers, very high performers and attained the National Proficient Standard in Year 4 mathematics, by jurisdiction

Year 8 mathematics

Table 9.2 provides the Year 8 mathematics performance results for the states and territories. The performance of students in New South Wales was higher than that of students in all other jurisdictions except for the Australian Capital Territory and Victoria. Students in the Northern Territory were outperformed by those in all other jurisdictions except for Tasmania.

TABLE 9.2 Multiple comparisons of Year 8 mathematics achievement, by jurisdiction

Jurisdiction	Mean score	SE	NSW	ACT	VIC	QLD	WA	SA	TAS	NT
NSW	534	9.5		●	●	▲	▲	▲	▲	▲
ACT	521	4.8	●		●	▲	●	▲	▲	▲
VIC	515	5.7	●	●		●	●	●	▲	▲
QLD	507	4.4	▼	▼	●		●	●	●	▲
WA	506	9.3	▼	●	●	●		●	●	▲
SA	503	6.2	▼	▼	●	●	●		●	▲
TAS	491	10.9	▼	▼	▼	●	●	●		●
NT	464	13.3	▼	▼	▼	▼	▼	▼	●	

Read across the row to compare a state/territory's performance with the performance of each jurisdiction listed in the column heading.

▲ Mean performance significantly higher than in comparison jurisdiction.

● Not significantly different from comparison jurisdiction.

▼ Mean performance significantly lower than in comparison jurisdiction.

Figure 9.2 shows the proportions of students who were low performers, high performers and those who attained the National Proficient Standard in Year 8 mathematics, by state and territory. The percentages of students who attained the National Proficient Standard ranged from 45% in the Northern Territory to 72% in New South Wales and the Australian Capital Territory.

FIGURE 9.2 Proportions of students who were very low performers, very high performers and attained the National Proficient Standard in Year 8 mathematics, by jurisdiction

Year 4 science

Table 9.3 provides the Year 4 science performance results for the states and territories. The performance of students in the Australian Capital Territory was higher than that of students in all other jurisdictions. Students in the Northern Territory were outperformed by those in all other jurisdictions.

TABLE 9.3 Multiple comparisons of Year 4 science achievement, by jurisdiction

Jurisdiction	Mean score	SE	ACT	TAS	VIC	NSW	QLD	WA	SA	NT
ACT	559	6.1		▲	▲	▲	▲	▲	▲	▲
TAS	538	6.6	▼		●	●	●	●	●	▲
VIC	536	4.7	▼	●		●	●	●	●	▲
NSW	535	5.1	▼	●	●		●	●	●	▲
QLD	530	4.8	▼	●	●	●		●	●	▲
WA	527	5.3	▼	●	●	●	●		●	▲
SA	527	5.7	▼	●	●	●	●	●		▲
NT	484	10.4	▼	▼	▼	▼	▼	▼	▼	

Read across the row to compare a state/territory's performance with the performance of each jurisdiction listed in the column heading.

▲ Mean performance significantly higher than in comparison jurisdiction.

● Not significantly different from comparison jurisdiction.

▼ Mean performance significantly lower than in comparison jurisdiction.

Figure 9.3 shows the proportions of students who were low performers, high performers and those who attained the National Proficient Standard in Year 4 science, by state and territory. The percentages of students who attained the National Proficient Standard ranged from 55% in the Northern Territory to 88% in the Australian Capital Territory.

FIGURE 9.3 Proportions of students who were very low performers, very high performers and attained the National Proficient Standard in Year 4 science, by jurisdiction

Year 8 science

Table 9.4 provides the Year 8 science performance results for the states and territories. Students in the Northern Territory were outperformed by those in all other jurisdictions.

TABLE 9.4 Multiple comparisons of Year 8 science achievement, by jurisdiction

Jurisdiction	Mean score	SE	NSW	ACT	VIC	QLD	WA	SA	TAS	NT
NSW	540	7.9		●	●	●	●	▲	▲	▲
ACT	538	4.3	●		▲	▲	●	▲	▲	▲
VIC	524	4.5	●	▼		●	●	●	●	▲
QLD	524	4.4	●	▼	●		●	●	●	▲
WA	520	9.2	●	●	●	●		●	●	▲
SA	520	5.4	▼	▼	●	●	●		●	▲
TAS	513	10.2	▼	▼	●	●	●	●		▲
NT	483	11.3	▼	▼	▼	▼	▼	▼	▼	

Read across the row to compare a state/territory's performance with the performance of each jurisdiction listed in the column heading.

- ▲ Mean performance significantly higher than in comparison jurisdiction.
- Not significantly different from comparison jurisdiction.
- ▼ Mean performance significantly lower than in comparison jurisdiction.

Figure 9.4 shows the proportions of students who were low performers, high performers and those who attained the National Proficient Standard in Year 8 science, by state and territory. The percentages of students who attained the National Proficient Standard ranged from 53% in the Northern Territory to 79% in the Australian Capital Territory.

FIGURE 9.4 Proportions of students who were very low performers, very high performers and attained the National Proficient Standard in Year 8 science, by jurisdiction

Performance over time – TIMSS 2015 to 2019

Table 9.5 shows that, from 2015 to 2019:

- ▶ 6 jurisdictions did not change.
- ▶ New South Wales improved in Year 8 mathematics and Year 8 science, mostly because of an increase in higher performing students.
- ▶ Queensland improved in Year 8 science, mostly because of an increase in higher performing students.

TABLE 9.5 Changes in performance over time for the Australian jurisdictions, TIMSS 2015–2019

Changes in...	Jurisdiction	Year 4 Mathematics	Year 8 Mathematics	Year 4 Science	Year 8 Science
Average performance	ACT	*	*	*	*
	NSW	*	▲ 32 points	*	▲ 29 points
	VIC	*	*	*	*
	QLD	*	*	*	▲ 17 points
	SA	*	*	*	*
	WA	*	*	*	*
	TAS	*	*	*	*
	NT	*	*	*	*
Proportion of very low performers	ACT	*	*	*	*
	NSW	*	*	*	*
	VIC	*	*	*	*
	QLD	*	*	*	*
	SA	*	*	*	*
	WA	*	*	*	*
	TAS	*	*	*	*
	NT	*	*	*	*
Proportion of very high performers	ACT	*	*	*	*
	NSW	*	▲ 11pp	*	▲ 9pp
	VIC	*	*	*	*
	QLD	*	*	*	▲ 4pp
	SA	*	*	*	*
	WA	*	*	*	*
	TAS	*	*	*	*
	NT	*	*	*	*
Proportion of students who attained the National Proficient Standard	ACT	*	*	*	*
	NSW	*	▲ 10pp	*	▲ 9pp
	VIC	*	*	*	*
	QLD	*	*	*	*
	SA	*	*	*	*
	WA	*	*	*	*
	TAS	*	*	*	*
	NT	*	*	*	*

pp= percentage points; * There were no significant differences between 2015 and 2019.

Performance over time – 1995 to 2019

Table 9.6 shows that, from 1995 to 2019:

- ▶ Year 4 mathematics had the greatest amount of change in performance for the most jurisdictions, and the cycles between 2003 and 2011 showed the biggest improvement.
- ▶ Queensland had improvement in the most subjects – Year 4 mathematics, Year 4 science and Year 8 science all had improvements in mean performance and the percentage of students attaining the National Proficient Standard.

TABLE 9.6 Changes in performance over time for the Australian jurisdictions, TIMSS 1995–2019

Changes in...	Jurisdiction	Year 4 Mathematics	Year 8 Mathematics	Year 4 Science	Year 8 Science
Average performance	ACT	*	*	*	*
	NSW	▲ 26 points	*	*	*
	VIC	*	*	*	▲ 24 points
	QLD	▲ 24 points	*	▲ 26 points	▲ 17 points
	SA	*	*	*	*
	WA	▲ 27 points	*	*	*
	TAS	▲ 28 points	*	*	*
	NT	▼ 30 points	*	*	*
Proportion of very low performers	ACT	*	*	*	*
	NSW	*	*	*	*
	VIC	*	*	*	▼ 5pp
	QLD	*	*	▼ 7pp	*
	SA	*	*	*	*
	WA	*	▲ 9pp	*	*
	TAS	▼ 8pp	*	*	*
	NT	*	*	*	*
Proportion of very high performers	ACT	*	*	*	*
	NSW	▲ 6pp	▲ 9pp	*	*
	VIC	*	▲ 6pp	*	▲ 4pp
	QLD	▲ 3pp	*	*	*
	SA	*	*	*	*
	WA	*	*	*	*
	TAS	▲ 5pp	*	*	*
	NT	*	*	*	*
Proportion of students who attained the National Proficient Standard	ACT	*	*	*	*
	NSW	▲ 11pp	*	▲ 7pp	*
	VIC	*	*	*	▲ 9pp
	QLD	▲ 9pp	*	▲ 12pp	▲ 9pp
	SA	*	▼ 9pp	*	*
	WA	▲ 13pp	▼ 13pp	*	*
	TAS	*	*	*	*
	NT	*	*	▼ 14pp	*

pp= percentage points; There were no significant differences between 1995 and 2019.

10 Results for Australian female and male students

Figure 10.1 provides the performance results for male and female students.

- ▶ In Year 4 mathematics, male students performed at a higher level than female students with a 10 point difference in mean score. This was mainly because there was a higher proportion of high performing male students compared to female students. There were no differences in the proportions of very low performers or students who attained the National Proficient Standard.
- ▶ There was no significant difference between the average performance of female and male students in Year 8 mathematics, Year 4 science and Year 8 science.

FIGURE 10.1 Student performance, by sex

11 Results for Aboriginal and/or Torres Strait Islander background

Information about the Aboriginal and/or Torres Strait Islander background of Australian students was collected in the Student Questionnaire.⁵ Nine per cent of the TIMSS 2019 Year 4 sample and six per cent of the Year 8 sample identified as being an Aboriginal and/or Torres Strait Islander person or First Nations Australian. Figure 11.1 provides the student performance results by Aboriginal and/or Torres Strait Islander background.

- ▶ The performance of Aboriginal and Torres Strait Islander students was lower than for other Australian students for both mathematics and science at both Year 4 and Year 8.
- ▶ Both Aboriginal and Torres Strait Islander students and other Australian students improved in average performance since 1995 in Year 4 mathematics, Year 4 science and Year 8 science. However, the improvement in average performance was greater for Aboriginal and Torres Strait Islander students in Year 4 and Year 8 science when compared to other Australian students.

Note: In cases in which the proportion of students in a benchmark band is 1% or less, the numeric label is not shown.

FIGURE 11.1 Student performance, by Aboriginal and/or Torres Strait Islander background

⁵ For more information about Aboriginal and/or Torres Strait Islander background, refer to the Reader's Guide in *TIMSS 2019 Australia. Volume I: Student performance*.

12 Results for language background

Information about the language background of Australian students was collected in the Student Questionnaire.⁶ Figure 12.1 provides the student performance results by language spoken at home.

- ▶ In Year 4 mathematics, there was no difference between the average performance of students who spoke English at home and those who spoke a language other than English at home. However, students who spoke English at home were less likely (by 5 percentage points) to be very low performers than those who spoke a language other than English at home.
- ▶ In Year 8 mathematics, students who spoke a language other than English at home performed at a higher level than students who spoke English at home, with a higher mean score (by 27 points) and a higher percentage of very high performing students (by 16 percentage points).
- ▶ In Year 4 science, on average, students who spoke English at home performed at a higher level than students who spoke a language other than English at home. However, this was due to better performance at the lower end of the scale – there were fewer very low performers and a greater percentage of students who attained the National Proficient Standard.
- ▶ In Year 8 science, there was no difference between the average performance of students who spoke English at home and those who spoke a language other than English at home. However, students who spoke English at home were less likely (by 8 percentage points) to be very low performers and more likely (by 9 percentage points) to have attained the National Proficient Standard than students who spoke a language other than English at home.

FIGURE 12.1 Student performance, by language spoken at home

⁶ For more information about the Language spoken at home indicator, refer to the Reader's Guide in *TIMSS 2019 Australia. Volume I: Student performance*.

13 Results for books in the home

Figure 13.1 provides the student performance results for the number of books in the home, used as an indicator of socio-economic status.⁷

- ▶ At both year levels and across both mathematics and science, students with *many books* in the home performed at a higher level than students with an *average number of books* in the home, who also performed higher than students with only *a few books* in the home.
- ▶ The difference in the mean scores between students with *many books* in the home and those with *a few books* ranged from 78 points in Year 4 science and 100 points for Year 8 science.

FIGURE 13.1 Student performance, by number of books in the home

⁷ For more information about the Books in the home indicator, refer to the Reader's Guide in *TIMSS 2019 Australia. Volume I: Student performance*.

14 Results for geographic location of schools

Figure 14.1 provides the student performance results for the geographic location of schools using the broad categories of metropolitan, regional and remote defined in the Australian Statistical Geography Standard (ASGS).⁸

- ▶ At both year levels and across both mathematics and science, students from metropolitan schools performed at a higher level than students in regional and remote schools (although this is not always significant due to large confidence intervals around the mean for students in remote schools).
- ▶ For Year 4 mathematics, the proportions of very high performers and students who attained the National Proficient Standard were greater in metropolitan schools than in regional (and remote) schools, while the proportion of low performing students was lower.
- ▶ For Year 4 science, there was no statistically significant difference in the proportion of very low performers, very high performers, or those who attained the National Proficient Standard across the geographic location of schools.
- ▶ At Year 8, across both mathematics and science, the proportions of very high performers and students who attained the National Proficient Standard were greater in metropolitan schools than in regional or remote schools. In addition, the proportion of very low performers was smaller in metropolitan schools than in regional or remote schools.

Note: In cases in which the proportion of students in a benchmark band is 1% or less, the numeric label is not shown.

FIGURE 14.1 Student performance, by geographic location

⁸ For more information about the ASGS, refer to the Reader's Guide *TIMSS 2019 Australia. Volume I: Student performance*. In TIMSS 2019 analysis and reporting, when the term 'metropolitan' is used in reference to ASGS findings, it refers to the category of Major cities.

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