



Results of the Programme for International Student Assessment (PISA) 2012

Background

The Organisation for Economic Cooperation and Development (OECD) created the Programme for International Student Assessment (PISA) as part of an ongoing program of reporting on educational outcomes across countries. PISA is a triennial program designed to monitor trends in the performance of 15-year-olds in mathematical, scientific and reading literacy over time.

In 2000, the PISA focused on the assessment of reading literacy. The focus changed to mathematical literacy in 2003, scientific literacy in 2006, then back to reading literacy in 2009. In 2012 the focus was on mathematical literacy.

The development of the PISA is guided by the following focus questions:

- How well are young adults prepared to meet the challenges of the future? What skills do they possess that will facilitate their capacity to adapt to rapid societal change?
- Are some ways of organising schools and school learning more effective than others?
- What influence does the quality of school resources have on student outcomes?
- What educational structures and practices maximize the opportunities of students from disadvantaged backgrounds? How equitable is education provision for students from all backgrounds?

Almost 510 000 students, representing 28 million 15-year-old students, from 65 countries and economies took part in PISA 2012. In Australia 775 schools (Western Australia – 90 schools) participated, providing a nationally representative sample of around 14 481 students representing all sectors. One thousand seven hundred and thirty eight Western Australian students participated.

Students answered a pen-and-paper assessment with questions from one or more of the mathematical, scientific and reading literacy domains, a computer-based assessment in mathematical and reading literacy, and problem solving and a questionnaire about their background, their motivations to learn mathematics and their attitudes to school. Principals answered a questionnaire about the level of resources in the school, the school environment and qualifications of staff.

Results are reported as average scores with the standard error, as distributions of scores, and as percentages of students who attain the international benchmarks (Advanced, High, Intermediate, Low, Below Low) for countries and specific groups of students within Australia. The Intermediate international benchmark is considered to be the minimum proficient standard.

Results of the Programme for International Student Assessment (PISA) 2012

Key test findings

- Australia's results were significantly higher than the OECD average in each of reading, scientific and mathematical literacy.
- Western Australia performed significantly above the OECD average, and above Australia, in each assessed area.
- In terms of means, WA was ranked first, ahead of ACT, in scientific literacy and second, after ACT, in both reading and mathematical literacy.
- Both WA and the ACT significantly outperformed all other jurisdictions except for New South Wales in mathematical and science literacy, and except for Victoria in reading literacy.

- Australia has a greater spread of scores from lowest to highest than the OECD average in each assessed area.
- Significant gaps in achievement remain for Australian students related to gender, Indigenous status, geolocation and socioeconomic status.

In Mathematics:

- In terms of means, WA ranked second behind ACT.
- Australia was ranked nineteenth with 16 countries scoring significantly higher in mathematical literacy in 2012.
- Since 2003 the Australian mean has declined significantly from 524 to 504 points.
- Between PISA 2003 and PISA 2012, the proportion of Australian low performers (those students who failed to reach Level 2) significantly increased (by 5%) and the proportion of Australian top performers (those students who reached Level 5 or above) significantly decreased (by 5%).
- Mathematical performance declined more for girls than boys, increasing the gender disparity.

In Science:

- In terms of means, WA ranked first.
- Australia was ranked sixteenth with seven countries scoring significantly higher in scientific literacy in 2012.
- Australia's mean score has declined (from 527 to 521), but not significantly, since PISA 2006 and the proportions of top and low performers have remained stable.
- WA's mean has declined from 543 in 2006 to 535 in 2012. This change is not significant.
- WA had one of the highest proportions of top performers and the lowest proportion of low performers.
- While males scored higher than females, the difference is not significant.

In Reading:

- In terms of means WA ranked second behind ACT.
- Australia was ranked fourteenth, with nine countries scoring significantly higher in reading literacy in 2012.
- Since 2000 the Australian mean has declined significantly from 524 to 518 points (2009 – 515 points).
- Australia was one of 10 countries in which the proportion of top performers (those at level 5 or 6) has significantly declined since 2000.
- There was a significant decline in reading literacy mean (from 535 to 519) between 2000 and 2012 in WA.
- The proportion of top performers in Western Australia decreased significantly as did the performance of females.

A more comprehensive summary of the report can be found at *Appendix 1*.

Appendix 1

2012 PISA summary

Participation

In 2012, 510 000 students from 65 countries or economies, including all 34 OECD countries and 31 non-OECD countries, participated in the PISA.

14 481 students from 775 schools across Australia took part. Of these, 1738 students were from Western Australia from 90 schools across both public and private sectors.

The PISA sample is age-based with most participating Australian students in Years 9, 10 or 11. Because of the half-cohort being in Year 10 in 2012, Western Australia had a higher percentage of Year 11 students in the sample, along with Queensland. For all other jurisdictions the majority of students were in Year 10.

As in 2009, a report on the performance of students by educational sector is provided at the national level only. This indicates that while based on comparisons of raw data mean performance declines from Independent to Catholic to public school sectors, when background factors were accounted for through multi-level modeling, the differences at the school level are very small. It should be noted, however, that the peer effect on individual students is a very important factor influencing student performance.

The assessments

Students answered a pen-and-paper assessment in one or more of the mathematical, scientific and reading literacy domains, a computer-based assessment in mathematical and reading literacy, and problem solving and a questionnaire about their background, their motivations to learn mathematics and their attitudes to school. Principals answered a questionnaire about the level of resources in the school, the school environment and qualifications of staff.

Reporting scales

PISA, reports results as mean scores along with various statistics that reflect the distribution of performance. The PISA performance scale provides a more detailed picture of performance by providing a profile of what students have achieved in terms of skills and knowledge – what they can do and what they know. This performance scale is divided into levels of difficulty, or proficiency levels. In PISA 2012 there are six levels of mathematical and scientific proficiency and seven levels of reading literacy proficiency. Results are reported as average scores with the standard error, as distributions of scores, and as percentages of students who attain the international benchmarks (Advanced, High, Intermediate, Low, Below Low) for countries and specific groups of students within Australia. The Intermediate international benchmark (Level 2) is considered to be the minimum proficient standard.

Results 2012

Australia's results were significantly higher than the OECD average in each of reading, scientific and mathematical literacy.

Western Australia performed significantly above the OECD average, and above Australia, in each assessed area.

Shanghai – China achieved the highest scores in all three domains. The difference between their means and those of Australia indicates that their 15 year old students are performing at a level representing three years of schooling above that of Australian students in mathematical literacy, two years in scientific literacy and one-and-a-half years in reading literacy (one school year equals 37 score points).

In terms of means, WA was ranked first, ahead of Australian Capital Territory, in scientific literacy and second, after the ACT, in both reading and mathematical literacy. Both WA and the ACT significantly outperformed all other jurisdictions except for New South Wales.

Main study: Mathematical literacy

Australia

Sixteen countries (twelve in 2009): Shanghai – China, Singapore, Hong Kong – China, Chinese Taipei, Korea, Macao – China, Japan, Liechtenstein, Switzerland, Netherlands, Estonia, Finland, Canada, Poland, Belgium and Germany scored significantly higher than Australia in mathematical literacy in 2012. The difference between Shanghai – China's and Australia's mean scores, 613 compared to 503, represents just over three years of schooling.

Since 2003 the Australian mean has declined significantly (524–520–514–504). A difference of 35 score points is equal to one year of schooling, so mathematical performance has declined by half a year since 2003.

There has been a significant decline in the performance of top performers, average performers and low performers. Between PISA 2003 and PISA 2012, the proportion of Australian low performers (those students who failed to reach Level 2) significantly increased (by 5%) and the proportion of Australian top performers (those students who reached Level 5 or above) significantly decreased (by 5%).

Australia has a wider spread of scores from lowest to highest than the OECD average. There were differences in performance by gender in favour of males which were seen internationally as well as in Australia.

Across Australia the mean performances of all sub-groups declined significantly (males by 17 points, females 24; Indigenous students 23, non-Indigenous students 19) from 2003 to 2012.

Western Australia

In terms of means, WA (546) was ranked second, after ACT (547) for mathematical literacy. Both WA and the ACT significantly outperformed all other jurisdictions except for New South Wales.

All jurisdictions, except Victoria, showed a significant decline in their mathematical literacy performance between PISA 2003 and PISA 2012. WA declined by 32 points.

Males performed significantly higher than females and WA's gender difference, in favour of males, was the largest of all states. Females in all jurisdictions significant declined and WA was one of five in which males also showed a statistically significant decline.

WA was one of four jurisdictions to show a significant increase in the proportion of low performers (+8%) and a significant decrease in the proportion of top performers (-10%) between PISA 2003 and PISA 2012.

Scientific literacy

Australia

In 2012 Australia was outperformed in scientific literacy by seven countries (six in 2009): Shanghai – China, Hong Kong – China, Singapore, Japan, Finland, Estonia and Korea. Australia was ranked sixteenth and performed similarly to Vietnam, Poland, Canada, Liechtenstein, Germany, Chinese Taipei, the Netherlands, Ireland, Macao – China, Switzerland and the United Kingdom. All of these countries were significantly above the OECD average.

Fourteen per cent of Australian students were top performers (27% in Shanghai – China) and 13 % were low performers (2% in Shanghai – China).

Trends in **science literacy** can only be established from 2006 as this was the first major assessment of PISA science. Australia's mean score has declined (from 527 to 521), but not significantly since PISA 2006 and the proportions of top and low performers have remained stable.

Australia has a greater spread of scores from lowest to highest than the OECD average. No significant differences in performance by gender were found in any jurisdiction.

Western Australia

In terms of means, WA (535) was ranked first, ahead of the ACT (534), in scientific literacy. Both WA and the ACT significantly outperformed all other jurisdictions except for New South Wales. Though WA's mean has declined from 543 (2006) to 539 (2009) and 535 (2012), the change is not significant.

Reading literacy

Australia

Australia was outperformed by nine countries in reading literacy: Shanghai – China, Hong Kong – China, Singapore, Japan, Korea, Finland, Ireland, Chinese Taipei and Canada. Australia's performance was not significantly different from 11 countries: Poland, Estonia, Liechtenstein, New Zealand, the Netherlands, Belgium, Switzerland, Macao – China, Vietnam, Germany and France.

In 2012 Australia's relative performance in reading literacy continued the decline evident between PISA 2003 to PISA 2009. Some of the causal factors included a decline in Australia's score and improvement or stability in the scores of several other countries and the entry of new, high performing economies into the assessment arena.

Australia has a wider spread of scores from lowest to highest than the OECD average.

Australia's mean reading literacy performance declined significantly from PISA 2000 to PISA 2012 (by 16 score points on average). There was a significant decline in the performance of students at the 75th and 90th percentiles.

Fourteen per cent of Australian students were low performers in reading literacy (failing to reach Level 2, the baseline proficiency level) compared to 17% of students across the OECD.

In Australia, females scored 35 score points on average higher than males, representing one year of schooling. Australia was one of four countries in which the performance of both males and females has significantly declined since 2000. While fewer Australian females were below Level 2 in 2012, there were more males.

Western Australia

In terms of means, WA (519) was ranked second, after the ACT (525), in reading literacy. Both WA and the ACT significantly outperformed all other jurisdictions except for Victoria.

WA was one of five jurisdictions in which there has been a significant decline in the reading literacy mean (from 535 to 519) between PISA 2000 and PISA 2012. Over that period the proportion of top performers in Western Australia decreased significantly as did the performance of females. The smallest difference by gender (of 26 score points) was found in WA.

Indigenous students

Across all three domains Indigenous students performed significantly lower than non-Indigenous students with the differences equating to about two and a half years of schooling.

There were significant declines for Indigenous and non-Indigenous students in both mathematical (2003–2012) and reading (2000–2012) literacy. There were no significant changes in the mean scientific literacy score of Indigenous students between 2006 and 2012.

Two per cent of Indigenous students were top performers in mathematical literacy compared to 15% of non-Indigenous students, while half of the Indigenous students were low performers compared to 18% of non-Indigenous students. The trend is similar for scientific and reading literacy.

School sector

When considering the unadjusted means scores, on average, students from Independent schools perform significantly better than those in Catholic and government schools and students from Catholic schools perform significantly better than government schools. However, no significant differences were found between school sectors (i.e., government, Catholic and independent) in either mathematical, scientific or reading literacies, once a student's individual socioeconomic background and the socioeconomic background of peers at school were taken into account.

Geolocation

The performance of students attending schools in metropolitan areas was significantly higher than students attending schools in provincial areas (the difference representing around half a school year) and students attending schools in remote areas (the difference representing more than one and a half school years). Students attending schools in provincial areas performed at a significantly higher level than students in remote schools (the difference representing about one school year).

The proportion of students who were top performers in the metropolitan area was about three times that of top performers from remote areas. There were about twice the proportion of low performers in remote areas compared to metropolitan areas.

Socioeconomic background

Students in the highest socioeconomic quartile performed 87 score points in mathematics on average higher than students in the lowest socioeconomic quartile, 88 lower in science and 86 lower in reading. This difference equates to around two-and-a-half years of schooling. Students from the highest socioeconomic quartile were overrepresented in the top performers and underrepresented in the low performers in all three domains. The reverse was true for students from the lowest socioeconomic quartile. The impact of schooling is greatest for students from disadvantaged backgrounds or attending schools with a low average socio-economic background.

Immigrant background

Students reported their country of birth as well as that of their parents. Foreign-born students and first-generation students achieved at significantly higher levels than Australian-born students in mathematical literacy. Australian-born students' performance was significantly lower than that of first-generation students and was not significantly different from that of foreign-born students in both reading and scientific literacy.

Language background

Students were asked what language was spoken at home most of the time. Language at home was not found to be a significant factor in achievement of mathematical literacy, with the scores of students who spoke English at home not significantly different to those of students who spoke a language other than English at home. However, students who spoke English at home performed statistically higher in both scientific and reading literacies than those who spoke a language other than English at home.