Achievement and equity: Where is Australia at?

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Curriculum and assessment: Closing the gap

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OECD’s Programme for International Student Assessment (PISA)
OECD surveys of student performance

- Programme for International Student Assessment

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<td>ICT literacy</td>
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- Country participation

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<td>43</td>
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- Google on PISA - We are number 1.
Key features of PISA 2003 assessment

- **Information collected**
  - Volume of questions
    - 3½ hours of mathematics assessment
    - 1 hour for each of reading, science and problem solving
  - From each student
    - 2 hours on paper-and-pencil tasks (subset of all questions)
    - ½ hour for questionnaire on background, learning habits, learning environment, engagement and motivation
  - From school principals
    - questionnaire (school demography, learning environment quality)

- **Geographic coverage**
  - 275,000 15-year-old students randomly sampled

- **Curriculum relevance of assessments**
  - NOT curriculum content
  - BUT capacity to use knowledge and competencies
PISA’s messages about quality.
Mathematical literacy
Unable to use mathematical skills in ways required by easiest PISA tasks.

Answer questions in familiar contexts where all relevant information present. Carry out routine procedures.

Extract and use relevant information from single source. Employ basic algorithms, formulae, procedures.

Conceptualise, generalise and use information based on investigations and modelling of complex problems. Link and move between different information sources and representations.

OECD (2004), *Learning for tomorrow’s world*, Table 2.5a, p.354.
OECD (2004), *Learning for tomorrow’s world*, Table 2.5a, p.354.
OECD (2004), Learning for tomorrow’s world, Table 2.5a, p.354.
OECD (2004), Learning for tomorrow’s world, Table 2.5c, p.356.
Some rankings on mathematical literacy scales

<table>
<thead>
<tr>
<th>Overall scale</th>
<th>Space &amp; shape</th>
<th>Change &amp; relationships</th>
<th>Quantity</th>
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<td>USA</td>
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OECD (2004), *Learning for tomorrow’s world*, Tables 2.5c, p.356; 2.1c, p.342; 2.2c, p.346; 2.3c, p.350; 2.4c, p.352.
Problem solving
OECD (2004), *Problem solving for tomorrow’s world*, Table 2.1, p.144.
% at problem solving proficiency levels (All)

OECD (2004), *Problem solving for tomorrow’s world*, Table 2.1, p.144.
Mean problem solving scores (OECD)

Source: OECD (2001) *Knowledge and skills for life: First results from PISA 2000*, Fig. 2.4, p.53
PISA’s messages about quality for Australia.

Australian education, at least to age 15, is of high quality by international standards, in

- mathematics
- problem solving
  - AND
- reading
- science
PISA's messages about equity.
Link between social background & achievement: Reading literacy - PISA 2000
Social background & reading literacy (2000)

Social Advantage

PISA Index of social background

Reading literacy

High

Low

Social background has a strong relationship with student performance (Parental occupation, wealth, cultural resources, parental education, family structure, immigrant status)

But disadvantaged background is not necessarily associated with poor performance.

Each dot in this diagram represents 20,000 students in the OECD area.

Source: OECD (2001) Knowledge and skills for life, Appendix B1, Table 8.1, p.308
This gap is in the order of 3 years of schooling.

Steeper slope = less equitable results

Source: OECD (2001) *Knowledge and skills for life*, Appendix B1, Table 8.1, p.308
Social equity & reading literacy (2000)

Source: OECD (2001) Knowledge and skills for life, Table 2.3a, p.253.
PISA’s messages about equity for Australia: reading literacy 2000

Australian education is relatively low equity, including in comparison with some other high quality countries like Canada, Ireland, Sweden, Finland, Japan, Korea.
Link between social background & achievement:
Mathematics literacy - PISA 2003
Social equity & mathematics literacy (2003) - 1

Source: OECD (2004) Learning for tomorrow's world, Table 4.3a, p.397.
Two indices of equity

- **Slope of the line:**
  How much increase in achievement is associated with a given increment in social background.
  - Steep slope = low equity

- **Extent of spread about the line:**
  How well the line summarises the relationship OR how much of variance in reading literacy is captured by the line.
  - Small spread (large variance accounted for) = low equity

Source: OECD (2001) *Knowledge and skills for life*, Appendix B1, Table 8.1, p.308
Relationship of two measures of equity

Australia in maths literacy:
slope of line: average equity
spread about line: above average equity

Source: OECD (2004) Learning for tomorrow’s world, Table 4.3a, p.397.
Social equity & mathematics literacy (2003) - 2

Source: OECD (2004) Learning for tomorrow’s world, Table 4.3a, p.397.
PISA’s messages about equity for Australia: mathematics literacy 2003

Australian education is of moderate equity in having, compared with other OECD countries:

- Average increases in mathematics literacy associated with increases in advantage of social background.
- Relatively low proportion of variation in mathematics literacy explained by differences in social background.
Link between social background & achievement and school organisation:
Mathematical literacy - PISA 2003
Variation in mathematics performance

Variation in mathematics performance

OECD (2004), Learning for tomorrow’s world, Table 4.1a, p.383.

In some countries (including high quality ones), schools are similar.

In some, most of the variation lies between schools.
In countries with highly stratified schools, much of the intended variation between schools can be explained by socio-economic inequalities among schools and students.

Variation explained by socio-economic level of students and schools.

Apparent consequences of grouping students in schools: Mathematical literacy - PISA 2003
Performance vs socio-economic background

Germany

OECD (2004), *Learning for tomorrow’s world*, Figure 4.13, pp.199-203.
Performance vs socio-economic background
Japan

Student performance and SES - overall
School performance and SES
Student performance and SES - within schools
School: point proportional to size

OECD (2004), Learning for tomorrow’s world, Figure 4.13, pp.199-203.
Performance vs socio-economic background
Canada

Student performance and SES - overall
School performance and SES
Student performance and SES - within schools
School: point proportional to size

OECD (2004), *Learning for tomorrow’s world*, Figure 4.13, pp.199-203.
PISA’s messages about equity and school organisation for Australia: mathematics literacy 2003.

Grouping of Australian students into schools is:

- Less related to social background than in Japan or Germany.
- More related to social background than in Canada.
- Moderately equitable.
Do the differences between government and non-government schools create inequities?
What is the benefit of private schooling?

Private schools perform better
Public schools perform better
PISA’s messages about government and non-government schooling for Australia.

None, because the identifiers of school type are suppressed in the PISA data by Australia.
Further information

- Websites
  - OECD work on education: www.oecd.org/edu
  - OECD/PISA: www.pisa.oecd.org
    - All national and international publications
    - Complete micro-level database

- Staff contacts at OECD
  - barry.mcgaw@oecd.org
  - andreas.schleicher@oecd.org
  - pisa@oecd.org