Single-sex schooling and girls’ achievement in Australia

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Single-Sex Schooling and Girls’ Achievement in Australia

Dr Katherine Dix

FEARLESS GIRLS STRONG WOMEN
Alliance of Girls Schools Australasia Educators Conference 2018
7 May 2018

Australian Council for Educational Research
National monitoring: A focus on child development in Australia

infancy

Long Day Care

Birth & Kindy cohorts: LSAC

early childhood

Pre School

Age 5 LSAC AEDC

middle childhood

Primary School

Years 3, 5, 7 & 9 NAPLAN Population Census

adolescence

Secondary School

Age 15 LSAY PISA

school leaving

Sample assessments: PIRLS Yr4; TIMSS Yr4/8

Age 10-11: MCS
Data for policy monitoring

Australian Curriculum, Assessment and Reporting Authority (ACARA)

...as key performance measures at a population level for the Measurement Framework for Schooling in Australia

...to evaluate progress towards the Educational Goals for Young Australians and the National Education Agreement outcome that Australian students excel by international standards
Australian trends in reading – Year 4 students

Progress in International Reading Literacy Study (PIRLS) 2016

- Average reading score for females and males from 2011 to 2016.
- *Score significantly different to PIRLS 2011.
Australian trends in reading – 15-year-olds

Programme for International Student Assessment (PISA) 2015

**READING LITERACY**

<table>
<thead>
<tr>
<th>Year</th>
<th>Females</th>
<th>Males</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>546</td>
<td>513</td>
</tr>
<tr>
<td>2003</td>
<td>545</td>
<td>506</td>
</tr>
<tr>
<td>2006</td>
<td>532</td>
<td>495</td>
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<td>2009</td>
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<td>496</td>
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<tr>
<td>2012</td>
<td>530</td>
<td>495</td>
</tr>
<tr>
<td>2015</td>
<td>519</td>
<td>487</td>
</tr>
</tbody>
</table>
Australian trends in mathematics – Year 4

Trends in Mathematics and Science Study (TIMSS) 2015

[Graph showing mathematics achievement over TIMSS cycles from 1995 to 2015 for males and females.]
Australian trends in mathematics – 15-year-olds

MATHEMATICAL LITERACY

(PISA 2015)
International trends in mathematics performance

PISA 2012 mathematics assessment:

• Overall gender difference in favour of boys by an average of 10 score points

• Boys outscored girls in 29 countries
  Girls outscored boys in 3 countries

• In Australia, boys performed significantly higher than girls by 12 score points, representing about $\frac{1}{3}$ of a school year

• Significant gender differences in mathematics were also found in PISA 2006 and 2009, but not 2003

(ACER Snapshots: Boys, girls and mathematics, 2014)
NAPLAN: 2010-2012

<table>
<thead>
<tr>
<th>Year</th>
<th>Reading</th>
<th>Narrative Writing</th>
<th>Spelling</th>
<th>Grammar</th>
<th>Numeracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 3</td>
<td>450</td>
<td>472</td>
<td>454</td>
<td>475</td>
<td>408</td>
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<tr>
<td>Year 5</td>
<td>533</td>
<td>533</td>
<td>534</td>
<td>549</td>
<td>544</td>
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<tr>
<td>Year 7</td>
<td>579</td>
<td>607</td>
<td>574</td>
<td>583</td>
<td>593</td>
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<tr>
<td>Year 9</td>
<td>622</td>
<td>639</td>
<td>624</td>
<td>644</td>
<td>629</td>
</tr>
</tbody>
</table>

Interpreting this table:
- **Substantially above**: Green
- **Above**: Light green
- **Close to**: White
- **Below**: Pink
- **Substantially below**: Red
Our analysis

What is the relationship between school-type and student achievement?

- NAPLAN - Reading and Numeracy achievement
- 2010-2012 data
- Schools with Years 3, 5, 7 data present
- High-SES: ICSEA of 1000 or more

- 65 Girls schools
- 33 Boys schools
- 1431 Co-education
- 1529 schools
The effect of SES

**NUMERACY**

**READING**
The effect of Year level

**NUMERACY**

**READING**

![Box plots showing data distribution for Year 3 to Year 9 in Numeracy and Reading achievements.](image-url)
The impact of school type in Australia

Theoretical 2-level HLM model of factors influencing academic achievement

- School type
- ICSEA
- Grades 3, 5, 7
- Reading or Numeracy Achievement

Level 2: between-school
Level 1: within-school
The impact of school type in Australia

The graph represents the standardised achievement scores in reading for girls schools, boys schools, and co-educational schools across three grades: Year 3, Year 5, and Year 7. The scores are measured against a baseline of 400.

Key points observed in the graph:

- **Girls schools**:
  - Year 3: +7.2
  - Year 5: +4.6
  - Year 7: +1.9

- **Boys schools**:
  - Year 3: +4.6
  - Year 5: +2.6
  - Year 7: -2.1

- **Co-educational schools**:
  - Year 3: -22.6
  - Year 5: +29.1
  - Year 7: +10.1

Incomparably,

- The achievement in girls schools is higher than in boys schools by 5.7 points in Year 3.
- The achievement in boys schools is higher than in co-educational schools by 11.1 points in Year 7.

The graph highlights the trend that co-educational schools have significantly lower reading achievement scores compared to girls and boys schools, indicating a potential impact of school type on student performance in reading.
The impact of school type in Australia

NUMERACY

- Girls school
- Boys school
- Co-Educational

Standardised Achievement Scores

Year 3: +4.3
Year 5: +2.8
Year 7: +0.9

Girls school: +4.3
Boys school: +2.8
Co-educational: +0.9

Girls school compared to coed schools:
Reduction by 2.3 terms

Boys school compared to coed schools:
Reduction by 1.5 terms

ICSEA

Grades 3, 5, 7

+11.6 +21.9 -15.2 -5.4 +4.3 +68.2 +0.3

Numeracy Achievement
+416.4
Are some kinds of teaching and schools more effective than others?

• Girls schools are doing very well in Reading
  ➔ How can we better support Numeracy?

• General trend is a declining proportion of high achievers
  ➔ How can we extend the highest achievers?
Value-added Primary Years

NUMERACY: learning gain between Years 3-5 and 5-7
NAPLAN 2010-2012

Percentile of Australian schools (n=1529: ICSEA of 1000 or more)
Value-added Primary Years

Girls schools in the top quartile for learning gain in numeracy 2010–12*

- Lauriston Girls' School, Armadale, Vic
- Methodist Ladies' College, Kew, Vic
- Presbyterian Ladies' College, Burwood, Vic
- Ruyton Girls' School, Kew, Vic
- Seymour College, Glen Osmond, SA
- Shelford Girls' Grammar, Caulfield, Vic
- St Catherine's School, Toorak, Vic
- St Dominic's Priory College, North Adelaide, SA
- St Mary's College, Hobart, Tas
- St Peter's Collegiate Girls' School, Stonyfell, SA
- Tangara School for Girls, Cherrybrook, NSW
- Walford Anglican School for Girls, Hyde Park, SA
- Wilderness School, Medindie, SA

*Only girl’s schools with Years 3, 5 and 7 NAPLAN data in 2010-12 were included in the analysis
Teaching strategies that support mathematical thinking

Challenge

• Don’t over explain the challenge
• Give minimal instruction
• Allow participants to ask clarifying questions
• Encourage active listening
• Do not give clues with body language and tone
• Be less helpful
Teaching strategies that support mathematical thinking

Deep Learning

• Allow productive struggle
• Plan for dialogue, discussion, collaborative learning and movement
• Talk less
• Be aware of conceptual steps
• Plan how to ‘draw up’ learners to the next conceptual level from every entry point
Teaching strategies that support mathematical thinking

**Multiple entry points**

- Allow for conceptual development and intellectual stretch
- Low floor and no ceiling tasks
- Consider how to “draw” every student up to the next level
- Allow participants to estimate or guestimate first
Teaching strategies that support mathematical thinking

Always question

• Question both the wrong answer and the correct
• Be aware of a range of questioning types and purposes
  – fluency, understanding, reasoning, problem solving
  – enabling, challenging, producing cognitive conflict
to uncover misconception

What might the answer be?
Tell me what you’re thinking.
What would you like to do next?
If you did know, what would it be?
Did anyone have a different way?
Does that make sense to you?
Teaching strategies that support mathematical thinking

Having the wrong answer is a start…

• relieve the fear of being wrong
• identify misconceptions
• experience what it is, and also what it isn’t

Always review and reflect on the learning
Teaching strategies that support mathematical thinking

Culture
• The teacher is not the expert
• Reward early – the right thinking
• Value ‘many ways’, rather than the ‘right answer’
• Growth mind-set
• Truly believe that everyone can learn
• Believe that everyone can be good at maths
• Connect to prior learning and the real-world
• Estimate, guess, have a go, change your mind
• Focus on sense making rather than rote-learning and recall
No matter how your child is performing in school, the aim of education is for every student to improve.

Thank you!

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