Single-sex schooling and girls’ achievement in Australia

Katherine Dix
Australian Council for Educational Research (ACER), katherine.dix@acer.edu.au

Follow this and additional works at: https://research.acer.edu.au/boys_edu

Part of the Educational Assessment, Evaluation, and Research Commons

Recommended Citation
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
National monitoring:
A focus on child development in Australia

Infancy
- Long Day Care
- Birth & Kindy cohorts: LSAC
- Sample assessments: PIRLS Yr4; TIMSS Yr4/8

Early childhood
- Pre School
- Age 5
- AEDC

Middle childhood
- Primary School
- Years 3, 5, 7 & 9 NAPLAN
- Population Census
- Age 10-11: MCS

Adolescence
- Secondary School
- Age 15
- LSAY
- PISA

School leaving
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

![Graph showing progress in average reading scores for Year 4 students in Australia.]
Australian trends in reading – 15-year-olds

Programme for International Student Assessment (PISA) 2015

READING LITERACY

Average reading literacy performance

- Females
- Males

PISA cycle

Australian trends in mathematics – Year 4

Trends in Mathematics and Science Study (TIMSS) 2015

[Graph showing trends in mathematics achievement for males and females from 1995 to 2015, indicating a significant difference between males and females in 2015.]
Australian trends in mathematics – 15-year-olds

MATHEMATICAL LITERACY

Average mathematical literacy performance

Females  Males  PISA cycle

2003: 522  527  Females
2006: 513  527  Males
2009: 509  519  Females
2012: 498  510  Males
2015: 491  497  (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

St Peter's Collegiate Girls' School

<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>
</tr>
<tr>
<td>Year 5</td>
<td>533</td>
<td>533</td>
<td>534</td>
<td>549</td>
<td>544</td>
</tr>
<tr>
<td>Year 7</td>
<td>579</td>
<td>607</td>
<td>574</td>
<td>583</td>
<td>593</td>
</tr>
<tr>
<td>Year 9</td>
<td>622</td>
<td>639</td>
<td>624</td>
<td>644</td>
<td>629</td>
</tr>
</tbody>
</table>
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

School type
- COED (1431)
- GIRLS (65)
- BOYS (33)
The effect of Year level

**NUMERACY**

**READING**

![Box plots comparing numeracy and reading achievement across different years and school types.](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

READING

<table>
<thead>
<tr>
<th>Year 3</th>
<th>Year 5</th>
<th>Year 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Girls school</td>
<td>+7.2</td>
<td>+0.4</td>
</tr>
<tr>
<td>Boys school</td>
<td>+4.6</td>
<td>+29.1</td>
</tr>
<tr>
<td>Co-ed schools</td>
<td>-22.6</td>
<td>-22.6</td>
</tr>
</tbody>
</table>

ICSEA

Grades 3, 5, 7

Reading Achievement +437.0
The impact of school type in Australia

**NUMERACY**

<table>
<thead>
<tr>
<th>Year 3</th>
<th>Year 5</th>
<th>Year 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Girls school</td>
<td>+4.3</td>
<td>+0.9</td>
</tr>
<tr>
<td>Boys school</td>
<td>+4.3</td>
<td>+68.2</td>
</tr>
<tr>
<td>Co-educational</td>
<td>+3.1</td>
<td>-15.2</td>
</tr>
</tbody>
</table>

**ICSEA**

- Girls school: +11.6
- Boys school: -2.2 +21.9
- Co-educational: +0.3 +416.4

- Grades 3, 5, 7: +4.3
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!

Dr Katherine Dix
katherine.dix@acer.org
ACER Adelaide