

Not just for the kids:

Adult skills in the 21st century

- Juliette Mendelovits
- Dave Tout

Outline

- Adult Skills in the 21st century
- Assessments of adult skills
- Results: Assessments of adult skills
- The value of assessments of adult skills
- Q&A

Adult Skills in the 21st century

New Work Smarts: Skills that matter most



Smart Learning

- **learn** (be a lifelong learner)
- **solve problems**
- **think critically**
- **use science and mathematics skills**
- **use verbal communication and interpersonal skills**
- **have an entrepreneurial mindset**

Smart Thinking

Smart Doing

Adult Skills in the 21st century



Identifying and Supporting
Quantitative Skills
of 21st Century Workers

FINAL REPORT



- *Mathematics was considered extremely important in all of the companies involved.*
- *Changing work practices are generating new demands for mathematical skills, particularly in areas such as efficiency, innovation and Quality & Continuous Improvement.*

Adult Skills in the 21st century



Identifying and Supporting
Quantitative Skills
of 21st Century Workers

FINAL REPORT



“ *The application of mathematics in the workplace is not straightforward and goes well beyond a command of ‘core’ mathematical content. Workers perform sophisticated functions which require them to be confident to use mathematical skills in problem-solving situations and to see the consequences of the mathematics related procedures.* ”

Adult Skills in the 21st century



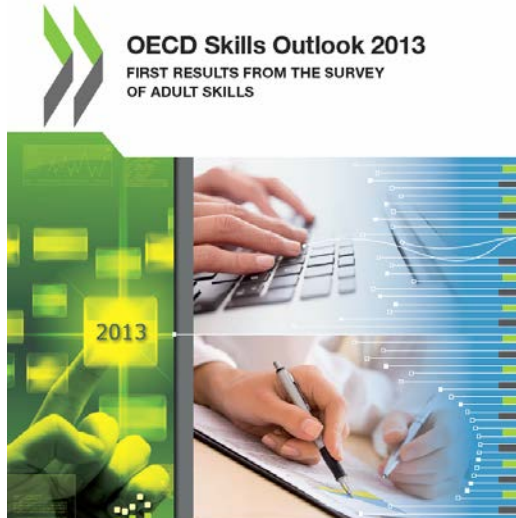
Identifying and Supporting
Quantitative Skills
of 21st Century Workers

FINAL REPORT



This is one of the most interesting aspects/concepts of this project. The relationship between workplace mathematical skills and school mathematics could be described as ‘distant’ at best – Teacher observation

Adult Skills in the 21st century



“ ... the demand for information-processing skills and other high-level cognitive and interpersonal skills is growing. **In addition to mastering occupation-specific skills, workers in the 21st century must also have a stock of information-processing skills, including literacy, numeracy and problem solving, and “generic” skills, such as interpersonal communication, self-management, and the ability to learn, to help them weather the uncertainties of a rapidly changing labour market.** ”

Adult Skills in the 21st century

Australian adult standards for LLN & Employability skills

Australian Core Skills Framework	&	Core Skills for Work Framework		
Reading		Navigate the world of work	Interact with others	Get the work done
Writing		A. Manage career and work life B. Work with roles, rights and protocols	A. Communicate for work B. Connect and work for others C. Recognise and utilise diverse perspectives	A. Plan and organise B. Make decisions C. Identify and solve problems D. Create and innovate E. Work in a digital world
Oral Communication				
Numeracy				

Learning underpins everything!

Literacy & Numeracy in the 21st century



- Not just the 3 R's of **basic** reading, 'riting and 'rithmetic
- Not just low level skills – a continuum from low level (beginning primary school) through to a very high level – up to Diploma/University levels.
- Work and life in the 21st Century demands higher level L&N skills.

Assessments of adult skills

Australia participates in a number of international assessments of school-aged children.

- The **Trends in International Mathematics and Science Study (TIMSS)** which occurs every four years in Years 4 and 8 and assesses both Mathematics and Science.
- **Progress in International Reading Literacy Study (PIRLS)** which occurs every five years in Years 4 and 8 and assesses Reading.
- **Programme for International Student Assessment (PISA)** which occurs every three years in Year 9 and assesses Reading Literacy, Mathematical Literacy and Scientific Literacy. Other domains are offered from time to time: for example, problem solving and financial literacy.

Assessments of adult skills

Australia also participates in international assessments of adult skills, and has done so since 1996. These surveys included:

- the **International Adult Literacy Survey (IALS)** conducted in 1996
- the **Adult Literacy and Life Skills Survey (ALLS)** in 2006
- the **Programme for International Assessment of Adult Competencies (PIAAC)**. Cycle 1 was conducted in Australia in 2011/12. Planning is currently underway for Cycle 2 of PIAAC, to be conducted in 2022. PIAAC, like PISA, is conducted under the auspices of the OECD.

Assessments of adult skills

Definitions and changes: Literacy/Reading

Survey and year	Literacy (reading)
IALS – 1996	<p><i>Document literacy:</i> the knowledge and skills required to locate and use information contained in various formats, including job applications, payroll forms, transportation schedules, maps, tables, and graphics.</p> <p><i>Prose literacy:</i> the knowledge and skills needed to understand and use information from texts including editorials, news stories, poems, and fiction.</p>
ALLS – 2006	<p><i>Literacy</i> is using printed and written information to function in society, to achieve one's goals, and to develop one's knowledge and potential.</p> <p><i>Document literacy:</i> the knowledge and skills required to locate and use information contained in various formats, including job applications, payroll forms, transportation schedules, maps, tables and graphics.</p> <p><i>Prose literacy:</i> the knowledge and skills needed to understand and use information from text, including editorials, news stories, poems and fiction.</p>
PIAAC cycle 1 – 2012	<p><i>Literacy</i> is the ability to understand, evaluate, use and engage with <i>written texts</i> to participate in society, to achieve one's goals, and to develop one's knowledge and potential.</p>
PIAAC cycle 2 – 2022	<p><i>Literacy</i> is accessing, understanding, evaluating and reflecting on written texts in order to achieve one's goals, to develop one's knowledge and potential and to participate in society.</p>

Assessments of adult skills

Definitions and changes: Literacy/Reading

Survey and year	Domain definition	Cognitive processes	Purpose
IALS – 1996	Document Literacy Prose Literacy	locate and use information understand and use information	[Not described]
ALLS – 2006	Literacy: • Document literacy • Prose literacy	<ul style="list-style-type: none"> locate and use information understand and use information 	to function in society, to achieve one's goals, and to develop one's knowledge and potential.
PIAAC cycle 1 – 2012	Literacy	is the ability to understand, evaluate, use and engage with written texts	to participate in society, to achieve one's goals, and to develop one's knowledge and potential.
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Assessments of adult skills

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Assessments of adult skills

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SAMPLE ITEMS FROM PIAAC LITERACY

Unit 1 - Question 2/4

Look at the job search results webpage. Click the box next to a company name to answer the question below.

Which company is looking for an employee to work at night?

Literacy item
Level = 1

In PIAAC cycle 1,
about 97% of
Australian adults
could succeed on
questions at this
level of difficulty



URL :



Refine results

Work Type

- Full Time only
- Part Time only
- Temporary only
- Casual/Vacation only

Salary

\$0 - \$200k+ per year | hour



Refine

6 jobs found

Office Administrative Assistant

[M.A.S.S. Media](#)

- Exciting media relations company
- Report directly to senior management
- Accounts experience required
- Salary negotiable

Join our dynamic and progressive team of professionals.

Administration & Office Support > Administrative Assistants

Client Liaison Officer

[Foss & Russ Engineering Ltd](#)

Use your excellent communication skills to keep customers informed about our latest products. You will learn to send out emails with images embedded and produce targeted marketing materials. Great company training program available to all in-coming employees. Full-time position available immediately.

Engineering > Customer Service



Look at the article about the gender gap. Highlight the sentence in the article that answers the question below.

According to the article, what has the impact of increased educational attainment been over the past 50 years?

Literacy Level =

Tackle Gender Gap to Boost Growth

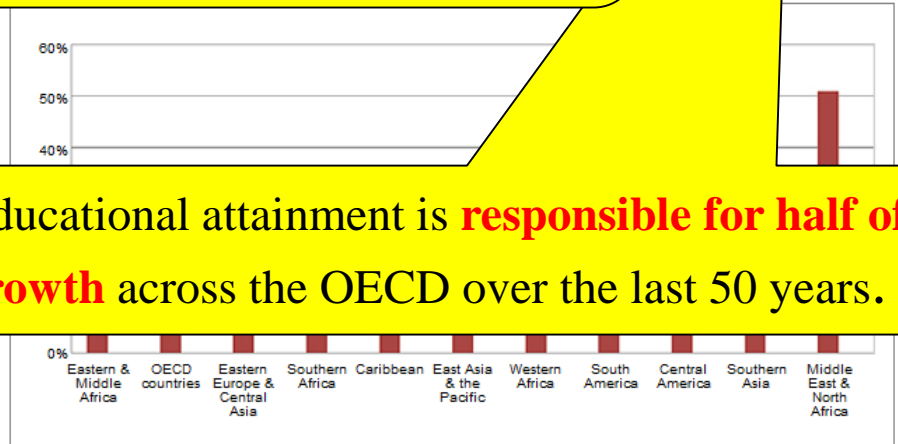
Breaking down barriers to gender equality in education, employment and entrepreneurship would create new sources of economic growth and help make better use of everyone's skills, according to a new report by the OECD, an organization of some 34 countries promoting policies to improve economic and social well being.

Overall, good progress has been made in education. Increased educational attainment is responsible for half of the GDP¹ growth across the OECD over the last 50 years. Every extra year of education of the population leads to an average increase of around 9% in GDP per capita, says the report. More

According to the article, what has the impact of increased educational attainment been over the past 50 years?

In PIAAC cycle 1, about 17% of Australian adults could succeed on questions at this level of difficulty

Increased educational attainment is responsible for half of the GDP growth across the OECD over the last 50 years.

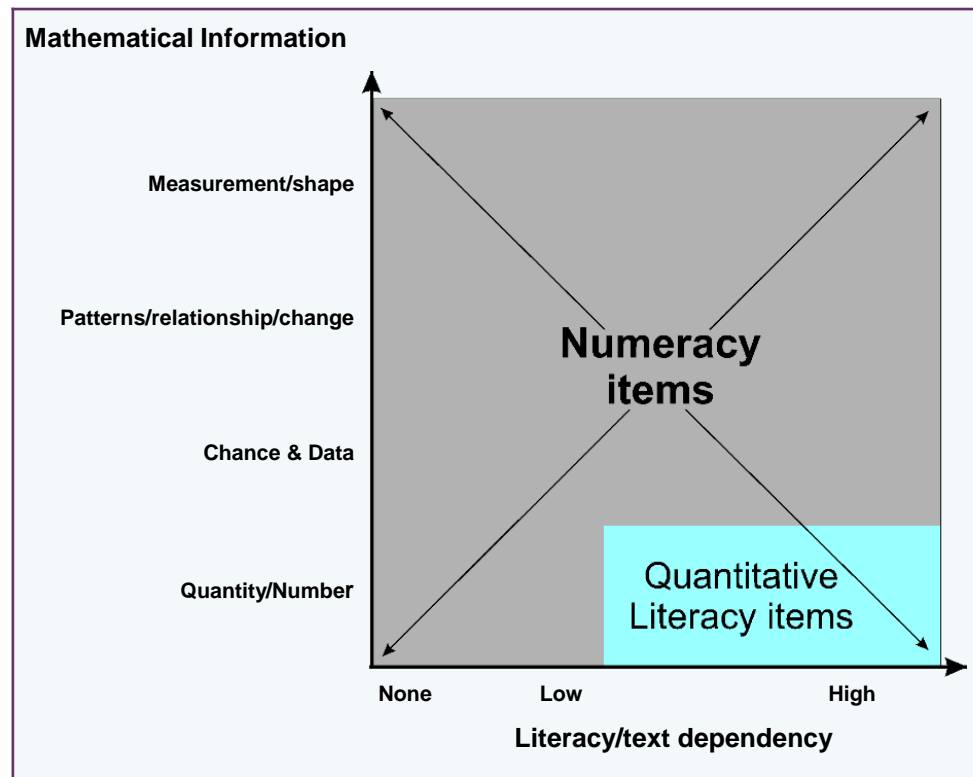


Assessments of adult skills

Definitions and changes: Quantitative Literacy to Numeracy



Survey and year	Numeracy
IALS – 1996	<p><i>Quantitative Literacy</i>: The knowledge and skills required to apply arithmetic operations, either alone or sequentially, to numbers embedded in printed materials such as balancing a check book, figuring out a tip, completing an order form, or determining the amount of interest on a loan.</p> <p>Note: <i>Quantitative Literacy</i> was assessed in IALS as one of three dimensions of literacy.</p>
ALLS – PIAAC (2006 onwards)	<p><i>Numeracy</i> is the knowledge and skills required to effectively manage and respond to the mathematical demands of diverse situations.</p>



Assessments of adult skills

Definitions and changes: Numeracy

Survey and year	Numeracy
ALLS – 2006	<i>Numeracy</i> is the knowledge and skills required to effectively manage and respond to the mathematical demands of diverse situations.
PIAAC cycle 1 – 2012	<i>Numeracy</i> is the ability to access, use, interpret, and communicate mathematical information and ideas, in order to engage in and manage the mathematical demands of a range of situations in adult life.
PIAAC cycle 2 – 2022	<i>Numeracy</i> is accessing, using and reasoning critically with mathematical content, information and ideas represented in multiple ways in order to engage in and manage the mathematical demands of a range of situations in adult life.

Assessments of adult skills

Definitions and changes: Numeracy

Survey and year	Numeracy
ALLS – 2006	<i>Numeracy</i> is the knowledge and skills required to effectively manage and respond to the mathematical demands of diverse situations.
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Assessments of adult skills



SAMPLE ITEMS: NUMERACY



Adults were asked to look at a photograph containing two cartons of coca cola bottles (changed to water bottles for PIAAC) and give the total number of bottles in the two full cases.

This was a **Below Level 1** numeracy item.

In PIAAC cycle 1, 6.5% of Australian adults aged 15-74 years of age were operating **at this level** - or, at least 93.3% of Australian adults could answer this correctly.

Unit 1 - Question 4/4

Look at the information about workplace injuries at Beauchamp Manufacturing. Click on the graph to answer the question below.

The factory manager checked this graph that had been prepared using the data in the table for 2011. He noticed that two bars were incorrect.

Click on the two incorrect bars on the graph.

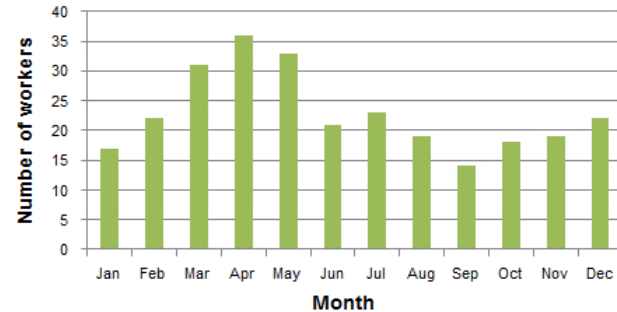
Numeracy item
Level = 2

In PIAAC cycle 1,
approx. 60% of
Australian adults could
succeed on questions at
this level of difficulty.

The factory manager checked this graph that had been prepared using the data in this table for 2011? He noticed that two bars were incorrect. Click on the two incorrect bars on the graph.

Month	2010	2011
Jan	20	17
Feb	21	22
Mar	34	31
Apr	30	36
May	35	33
Jun	28	23
Jul	24	21
Aug	25	19
Sep	19	14
Oct	23	18
Nov	22	19
Dec	19	22
TOTAL:	300	273

Number of workers injured
per month in 2011



The Beauchamp Manufacturing company records its workplace accidents each year. The table above shows the number of workers injured during each month for 2010 and 2011.



Results: Assessments of adult skills

PIAAC Cycle 1 (2011-12) was an international survey of adult skills across 34 countries:

- Assessed the cognitive skills of literacy (reading), numeracy and problem solving (in technology-rich environments)
- ABS conducts these surveys in Australia
- Random, representative (almost?) sample of 15 – 74 year olds
- Participants answer a significant number of background questions which, together with the survey data, provide the potential for rich analysis

Results: Assessments of adult skills

- It is important to note that the PIAAC assessment describes a range of capabilities (aspirationally full) in the adult population.
- This covers at one extreme, adults who have university level training and, at the other, adults who have very low levels of education (e.g. who left school at or before the age of 15).
- At the same time, it covers both young adults still in education and adults who completed their formal education 30-50 years prior to undertaking the assessment.

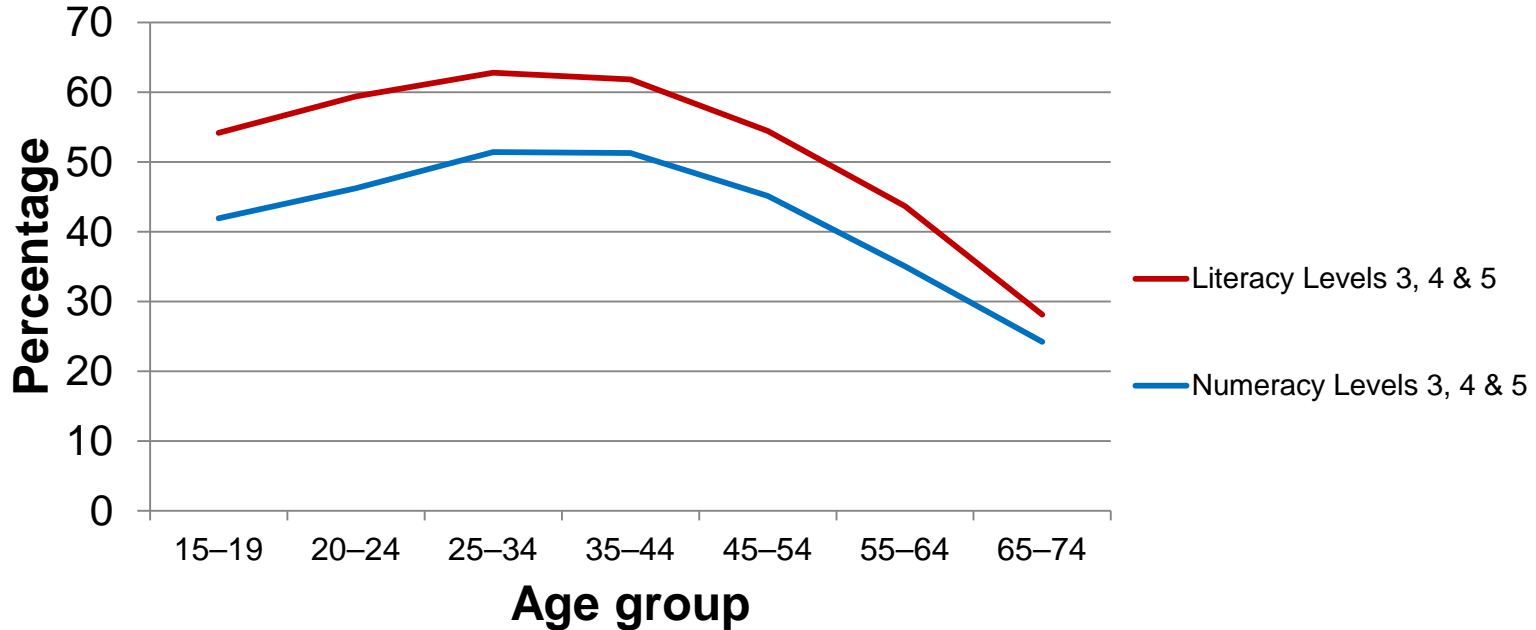
Results: Assessments of adult skills

PIAAC Cycle 1 (2011-12) was an international survey of adult skills across 34 countries:

- Household survey methodology - own homes or in some other agreed location under the supervision of trained interviewers. Conducted in Australia by the ABS.
- The assessment was undertaken either as a computer-based assessment (CBA) on a laptop computer or, in the case of adults with little or no familiarity with ICT (or who refused to undertake the test on computer), in a paper and pencil format.
- **After the filtering process, what percent of adult Australians (aged 15-74) undertook the assessment on the laptop?**

Research from assessments of adult skills

Percentage at Levels 3, 4 & 5 by age

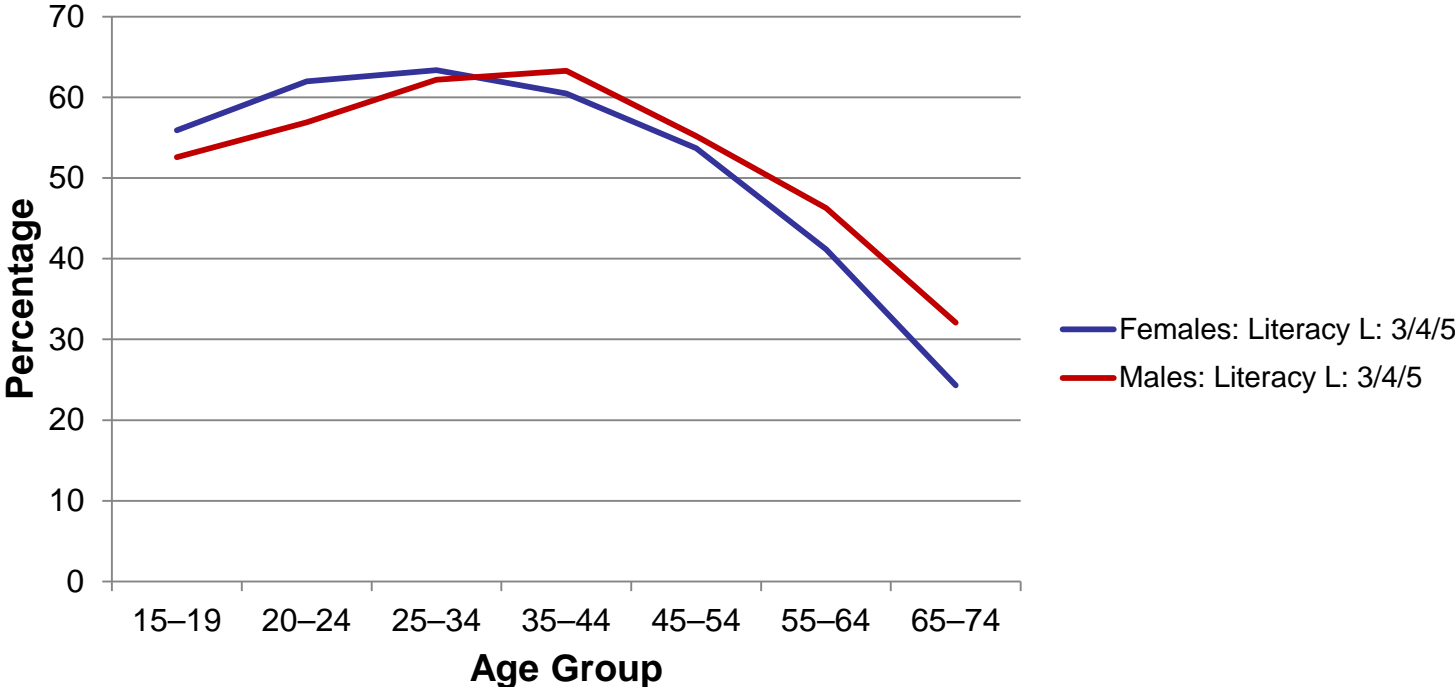


Proportions of persons in Literacy and Numeracy levels 3, 4 and 5 in PIAAC by age. Total Australian population aged 15-74 years.

Research from assessments of adult skills



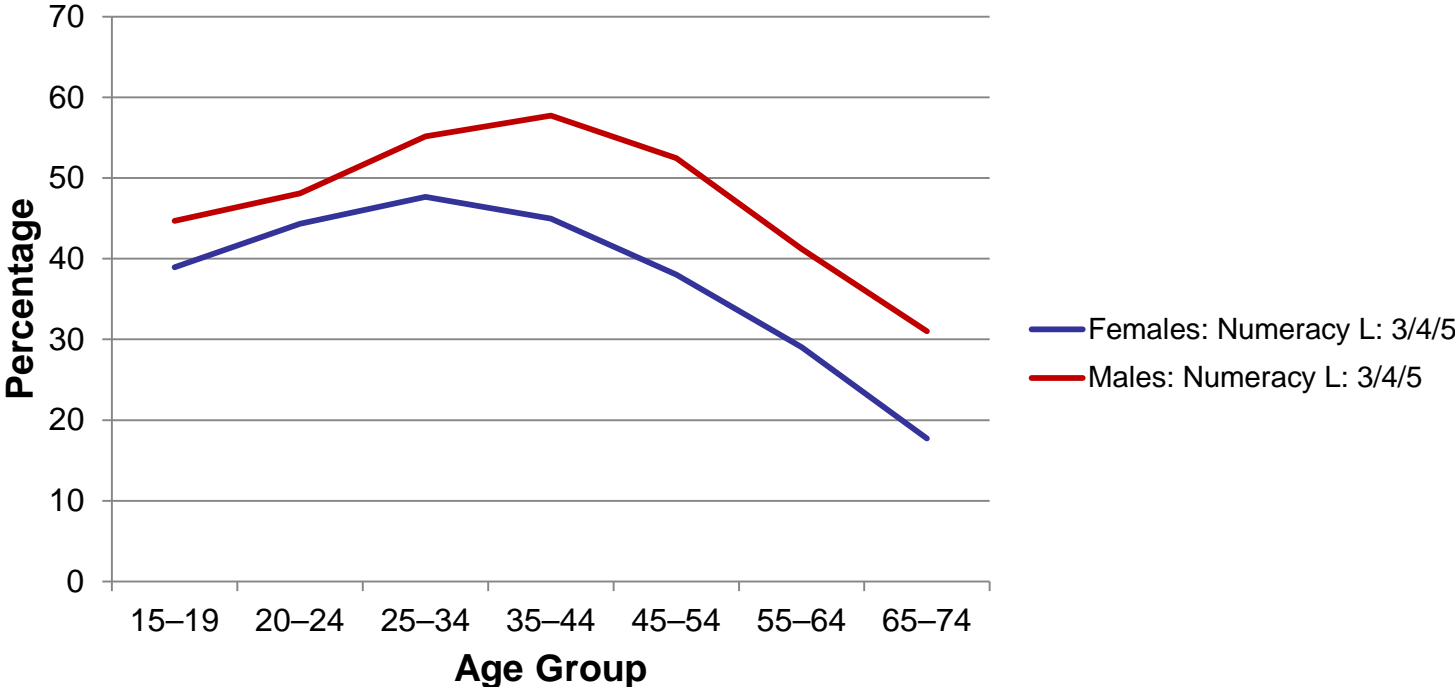
Performance at Upper Levels by Gender vs age



Research from assessments of adult skills



Performance at Upper Levels by Gender vs age



Research from assessments of adult skills



Based on three cycles of international assessments of adult literacy and numeracy skills (IALS, ALLS and PIAAC), the research indicates, amongst a number of other findings, that people with higher LLN skills are significantly **more** likely to:

- be employed
- participate in their community
- experience better health
- engage in further training
- earn more on average
- each extra year of education improves L&N skills.

Ongoing research on other countries has substantially expanded on this knowledge and understanding of the crucial role that literacy and numeracy play as underpinning skills required for successful lives.

Australian PISA & PIAAC results

PISA

PISA 2015: **mathematical literacy** just above the international mean

PISA 2015: **reading literacy** significantly above the international mean

Mathematical literacy in PISA has significantly declined since 2003

Reading literacy in PISA Australia has significantly declined since 2003

PIAAC

In PIAAC: **numeracy** just below the international mean

In PIAAC: **reading literacy** significantly above the international mean

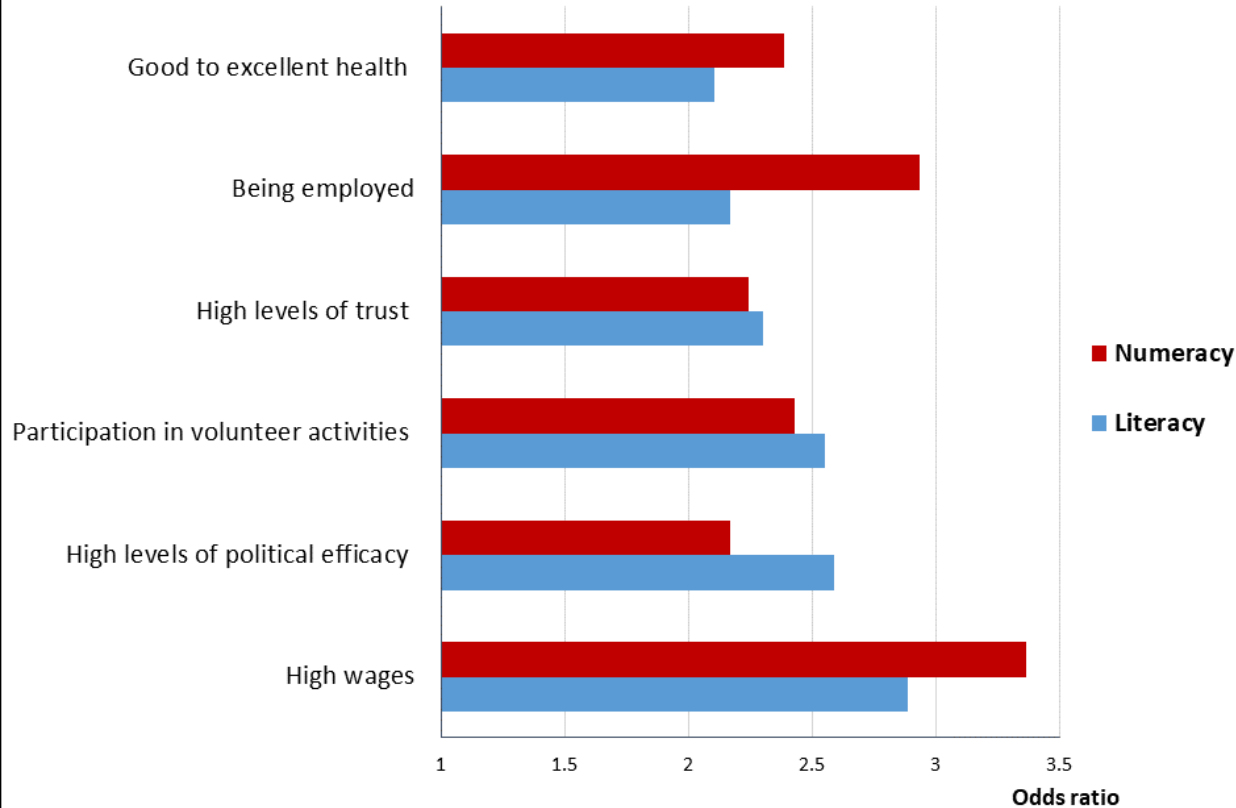
In PIAAC: performance in **numeracy** has declined slightly since 2006

In PIAAC: performance in **reading literacy** has improved slightly since 2006

Why the difference in relative performance between Reading and Numeracy?

Research from assessments of adult skills:

Likelihood of positive social and economic outcomes among highly literate or numerate adults



As an example of the analytic potential of PIAAC, this graph shows that adults with high proficiencies in literacy and in numeracy are much more likely, compared to those with lower skills, to report good health, to be employed, to have higher earnings, and to have positive social dispositions and take part in community life. And that **numeracy** appears to be a more potent predictor of social and economic outcomes such as **health, employment, and high salary**, compared with literacy.

The value of assessments of adult skills



- Look at the definitions and frameworks themselves, and what the related research tells us about teaching and learning.
- Build on the empirical and theoretical research emanating from such international assessments e.g., the roles of text and task complexity in reading; interaction between literacy and maths in numeracy.
- The theoretical frameworks, constructs and descriptions of the adult skills assessments develop from cycle to cycle and reflect the demands expected of adults as workers and citizens in the 21st century.
- Utilise and research the rich data set of information about adults' literacy and numeracy cognitive skills performance, especially in relation to the rich background data set.
- And one specific example: LANTITE

The value of assessing literacy and numeracy standards of adult skills: Validating literacy and numeracy standards in Australia

But how do we know what the top 30% can do?



*...s to initial teacher education will successfully
...ir capacity to engage effectively with a rigorous
...n program and to carry out the intellectual demands
of teaching ... To achieve this, it is expected that applicants'
levels of personal **literacy and numeracy** should be **broadly
equivalent to those of the top 30 per cent of the population.**"*

Standard set by the Ministerial Council for Education, Early
Childhood Development and Youth Affairs (MCEECDYA),
April 2011



PIAAC

to the rescue!!!

PIAAC!!!!

to the rescue

- The international adult skills studies are the only robust large-scale measures of the literacy and numeracy of Australian adult population
- The latest survey results - PIAAC cycle 1 - could be used to ascertain the level of literacy and numeracy of the top 30% of Australian adults aged 15 to 74
- How could this be implemented?

Items and test-takers are placed on the same scale

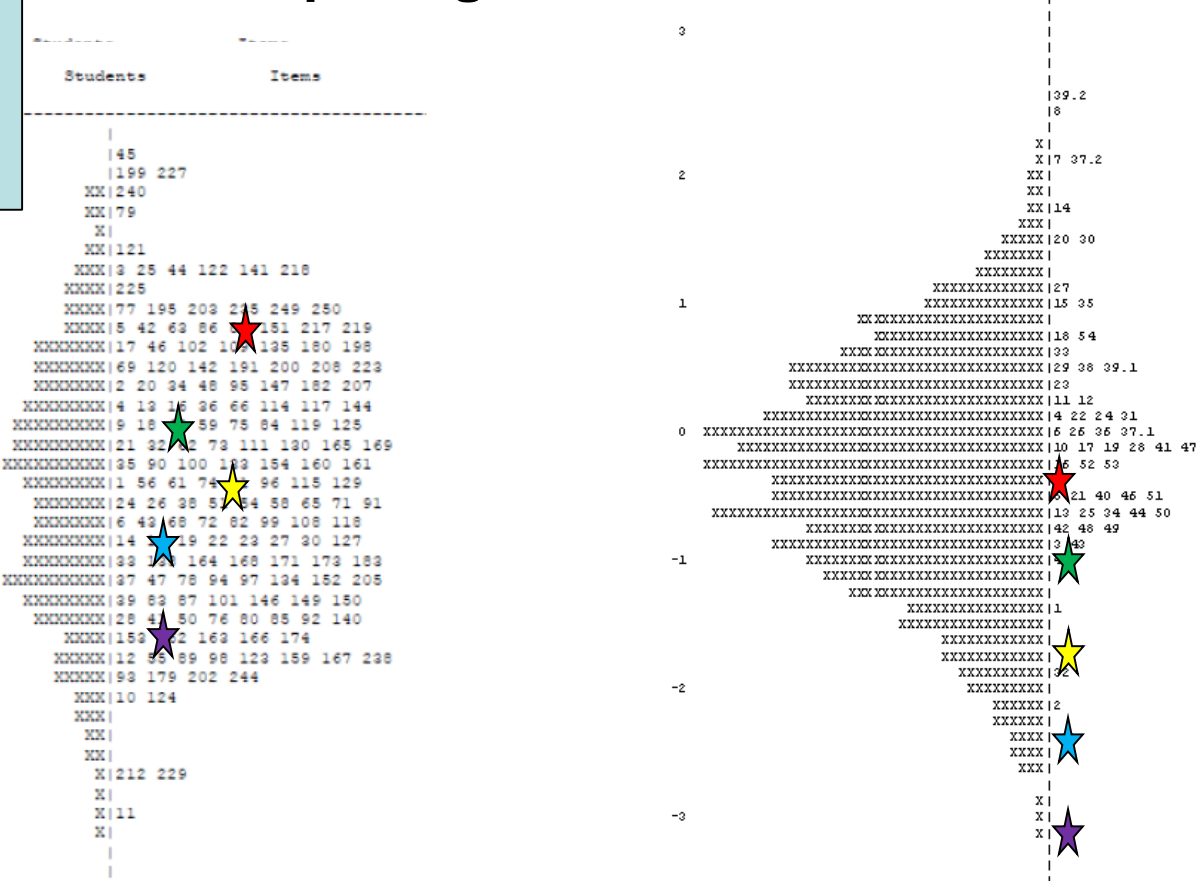




Equating between two assessments

Test A
(eg
PIAAC
cycle 1)

Test B
(eg LANTITE)



PIAAC!!!!

- The PIAAC test design – what each student sees

Literacy test	Numeracy test
60 scored items	60 scored items
5 unscored trial test items	5 unscored trial test items

- Total of 220 literacy and 220 numeracy items
5 PIAAC literacy/numeracy items (in clusters of 5 items)

- For equating with PIAAC: substituted three 5-item clusters of PIAAC items for three of the unscored trial test clusters



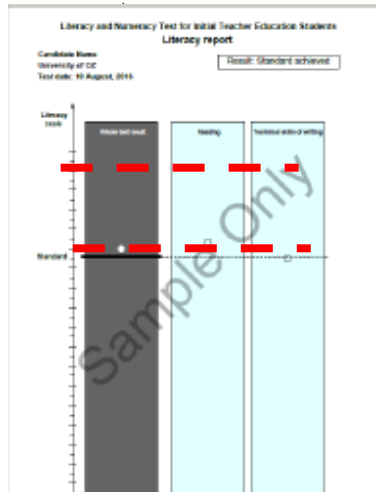
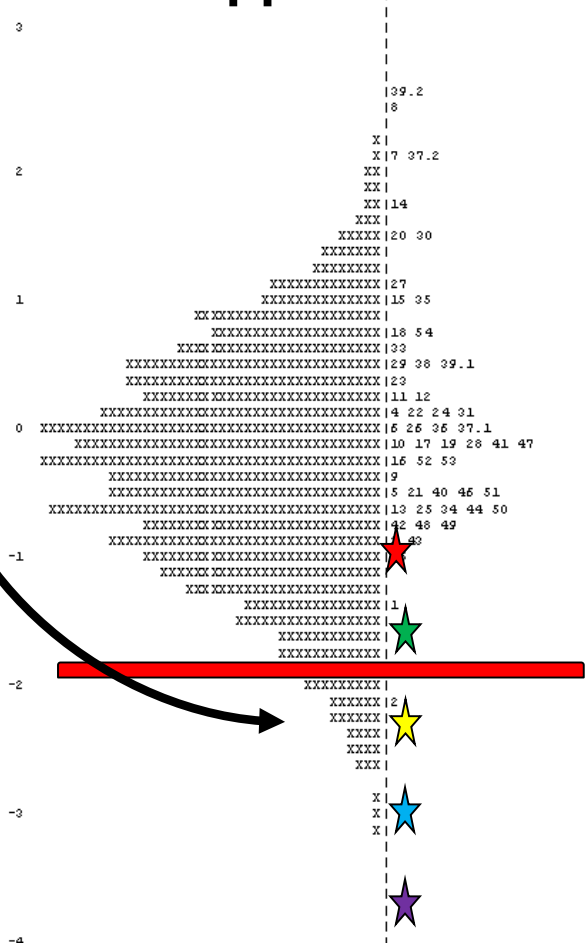
What could have happened

PIAAC
Cycle 1

Students	Items
45	
199 227	
XX 240	
XX 79	
X	
XX 121	
XXXX 3 25 44 22 141 218	
XXXXX 225	
XXXXX 77 195 203 235 249 250	
XXXXX 5 42 43 86 88 151 217 219	
XXXXXXXX 17 4 202 109 135 180 198	
XXXXXXXXX 69 170 142 191 200 208 223	
XXXXXXXXXX 4 13 16 36 66 114 117 144	
XXXXXXXXXX 9 18 49 59 75 84 119 125	
XXXXXXXXXX 21 32 62 73 11 190 165 169	
XXXXXXXXXX 35 90 100 130 154 160 161	
XXXXXXXXXX 1 56 61 74 81 96 115 129	
XXXXXXXXXX 24 1 38 51 54 58 65 71 91	
XXXXXXXXXX 6 4 158 72 82 99 108 118	
XXXXXXXXXX 14 15 19 22 23 27 30 127	
XXXXXXXXXX 33 138 154 168 171 173 183	
XXXXXXXXXX 37 47 75 79 97 134 152 205	
XXXXXXXXXX 39 83 87 101 146 149 150	
XXXXXXXXXX 28 41 50 76 80 85 92 140	
XXXXX 153 162 163 166 174	
XXXXXX 12 55 89 98 123 159 167 238	
XXXXXX 93 179 202 244	
XXXX 10 124	
XXXX	
XX	
XX	
X 212 229	
X	
X 11	
X	

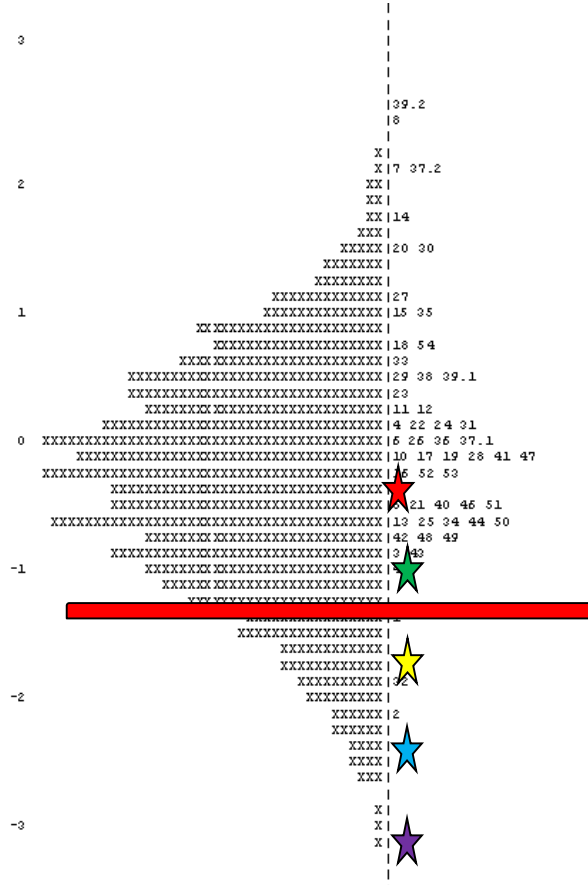
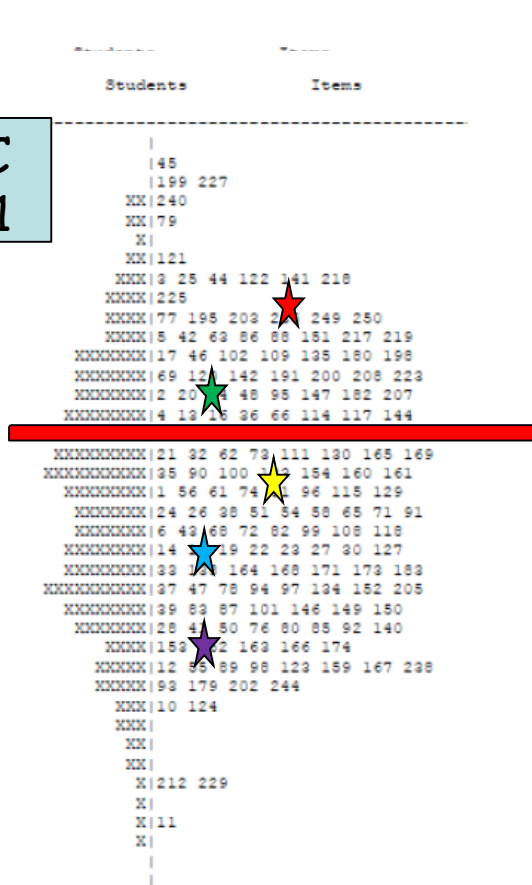
Top
30% of
Aus
adults

LANTITE
2016

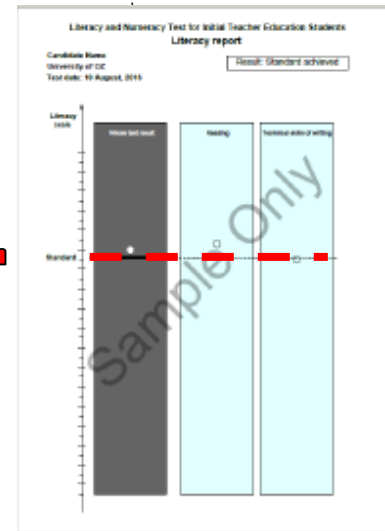


What **actually** happened

PIAAC
Cycle 1



LANTITE
2016



PIAAC!!!!

to the rescue

- The results from PIAAC cycle 1 were used to find the equivalence on the teacher test of the top 30% of the Australian adult population.
- This validated the standards set by the expert judgement of the LANTITE literacy and numeracy panels.
- Australia's participation in the adult skills surveys made this possible.

Research from assessments of adult skills



September 2017 report from the OECD on adult skills challenges in Australia. See:

<http://www.oecd.org/australia/building-skills-for-all-in-australia-9789264281110-en.htm>



A closer examination of Australia's performance reveals the following:

- Numeracy represents a particular challenge in Australia.
- Signs of poor numeracy performance can be traced back to initial schooling.
- Women have weaker numeracy skills than men.
- There is a relatively large gap between the most proficient and least proficient adults in literacy and in numeracy.
- Many well-educated adults have low literacy and/or numeracy skills.
- Young women in Australia are much more likely to be not in employment, education or training (NEET) than young men.



Are we prepared for the 21st century?

- Australia's ALLS and PIAAC results, no matter how you read them, demonstrate unequivocally that a significant number of people aged from 15 to 74 years old in Australia do not have access to sufficient foundation skills in reading and numeracy to be able to cope equitably with life and work in the 21st century.
- Reflect on PIAAC Cycle 2 results from both a policy level in relation to adult education, but also in relation to how school education is preparing young people for the world as adults.
- Australia needs more research and reports like those from the Productivity Commission (*Literacy and Numeracy Skills and Labour Market Outcomes in Australia*), and the former Industry Skills Councils (*No More Excuses*).
- Maybe time to address numeracy? See what the UK has done:
<https://www.nationalnumeracy.org.uk/>

Q&A

