

Primary focus

Primary school efficacy:

the best lever we have to improve the Nation's productivity

July 2022

About this presentation

The purpose of this presentation is to provide the evidence of why **Primary School Efficacy** is the best lever we have to improve the nation's productivity.

- Primary school literacy and numeracy outcomes predict educational attainment, employment and income
- Knowledge matters: cognitive capacity and the quality of education rather than the quantity of education (years of schooling) predict productivity performance
- Knowledge underpins 21st Century skills in communication, creativity, critical thinking and problem solving.

Who is Primary Focus?

Primary Focus is a charity and not-for-profit advocacy organisation whose ambition is to improve the quality and outcomes of Australia's primary schools because a quality primary school education is the single largest driver of a nation's economic and social prosperity.

Overview

1. The current scenario in Australia
2. Implications for Australia's productivity
3. Solution: Primary school efficacy
4. The economics of education
5. Declining educational outcomes
6. Predictors of educational outcomes and earnings
7. 21st Century skills and knowledge
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Current state in Australia – productivity and educational outcomes

Declining productivity growth well below long term averages

- Labour productivity in 2020-21 was 1.07% compared with the 5 year average of 0.91%
- Multifactor productivity in 2020-21 was 0.18% compared with the 5 year average of 0.35%

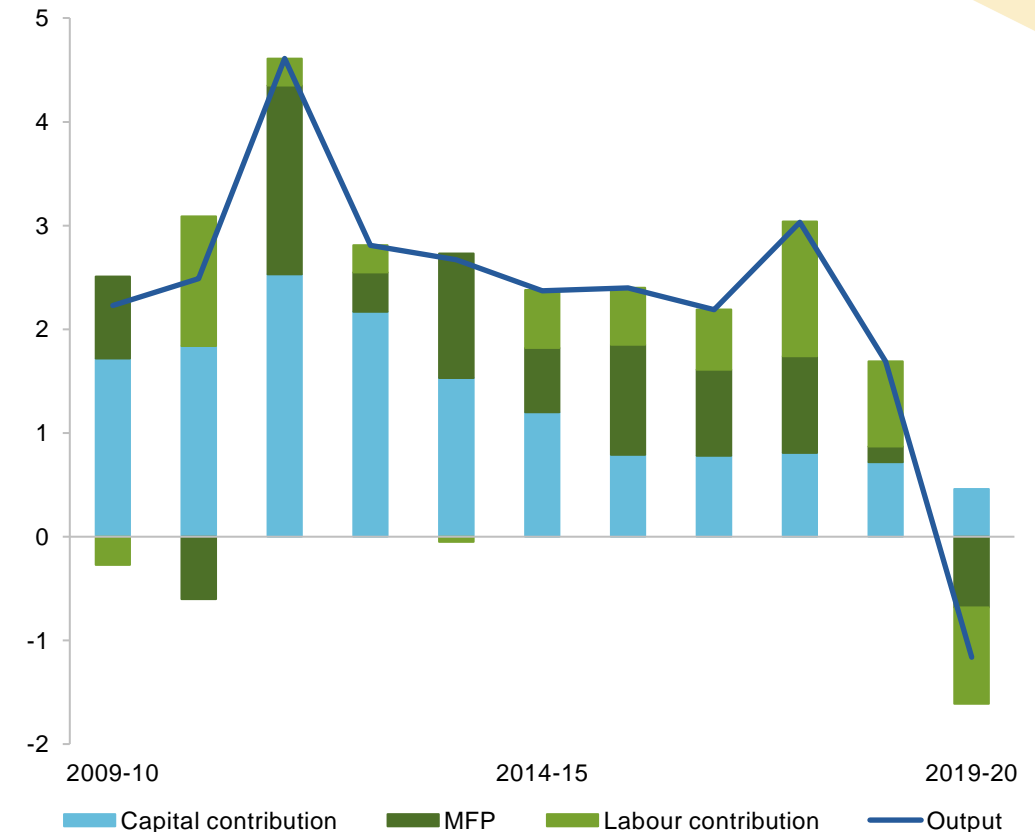
Declining educational outcomes

- 28.4% of grade 7 students do not have the core knowledge, literacy or numeracy skills required to access and engage in further educational opportunity¹.
- PISA results show persistent decline in reading, mathematics and science
- In 2021, the apparent retention rate for year 10 to 12 was 81.6%, for year 7/8 to 12 it was 83.1%²
- In 2020, 76% of students successfully completed year 12³

Skill and labour shortages are a key issue for industry and employer groups

The National Skills Commission (NSC) projects that 9 in 10 new jobs to 2026 will require post-school education (3/5 will be skill level 1 and 2 jobs)

45% of 24 to 64 year olds currently not participating in the labour force have not completed year 12⁴



Source: Productivity Commission, productivity performance dashboard, <https://www.pc.gov.au/research/ongoing/productivity-performance#dashboard>

More than ever Australia needs a highly productive workforce. Is our education system able to deliver this?

The demand for higher levels of educational attainment to improve productivity is increasing, but:

- The current supply of labour is not meeting the needs of the workforce
 - *The Australian Industry Group reports that 99% of employers are affected by low levels of literacy and numeracy in their workforce with 39% highly affected*
 - *Low unemployment and underemployment rates*
 - *High labour force participation rate for 20 to 64 year olds (83%)⁵*
 - *Low levels of educational attainment for those not in the labour force prevents participation*
 - *Ageing population = ageing workforce*
- The future supply of labour is not achieving the equivalent level of educational outcomes as it did at the start of the Century⁶. This is a productivity priority for the nation.

There is a solution: improve primary school efficacy

Improving the cognitive capacity - knowledge and skills - of the population has a greater longer term impact on improving productivity than increasing years of schooling and/or regulatory reform.

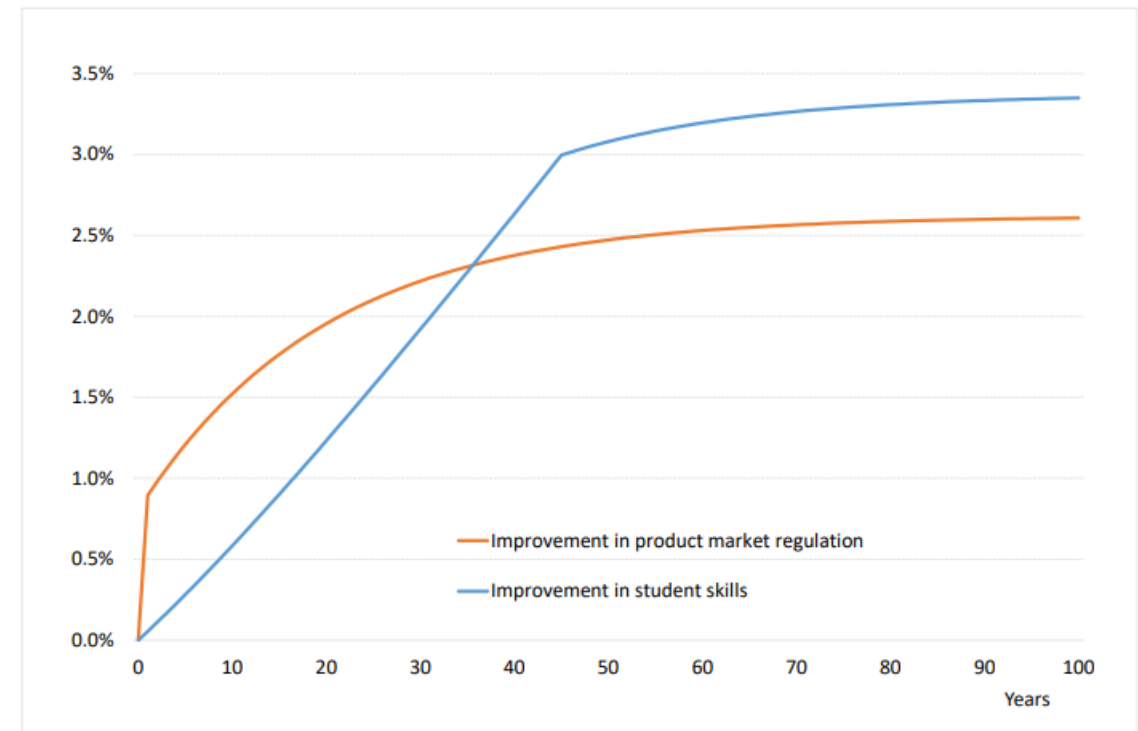
The foundational cognitive skills - literacy and numeracy - are learnt in primary school. If primary school is not done well, future schooling and education does little to remedy this.

A sustained improvement in PISA student test scores (cognitive skills) by 5.14% is estimated to increase MFP by between 3.4% and 4.1% in the long run (OECD).

Comparatively, an increase in mean years of schooling (of 9.3%) generates an increase in MFP of between 1.8% and 2.2% over the same period.

Another study showed that a twenty-year reform plan to improve educational outcomes would yield a 5% increase in GDP (compared with an economy with no increase in cognitive skills)⁷

Change in multi-factor productivity, per cent



Source: Egert, B., de la Maisonnette, C., and Turner, D. (2022), A new macroeconomic measure of human capital exploiting PISA and PIAAC: Linking education policies to productivity, OECD Economics Department Working Papers No. 1709, OECD.

Profound impact but it will take long term thinking

Improving primary school efficacy has a long-run macro-economic effect as productivity improvements will be realised once the student cohorts are engaged in the workforce.

To be reflected in the entire working age population, the OECD⁸ estimates it would take almost five decades before sustained improvements in student skills are fully realised in productivity improvements.

The model found that over the long run, improvements in student skills have a greater impact on improving productivity performance than improvement in product market regulation.

Without taking a long-term view, Australia is at risk of being stuck in a vicious cycle of oscillating productivity performance.



Primary school efficacy: the best lever we have to improve the Nation's productivity

Knowledge matters: cognitive capacity and the quality of education rather than the quantity of education (years of schooling) predict productivity performance

The economics of education

Quality not quantity - Human capital has become synonymous with educational attainment. This is not accurate economics and policy-makers need to update their views.

Economic growth, and associated productivity performance, determines the future economic and social well-being of a nation.

Human capital - the potential productive wealth embodied in labour, skills and knowledge - is a key factor in the production function to determine the output of an economy, alongside capital, labour and technology.

Human capital is acquired formally through schooling, education and training, and informally through family, social networks and workplaces as well as through the provision of health services.

To measure the contribution of human capital to the economy using the production function, education, such as years of schooling or highest level of educational attainment, is generally used as a proxy.

This is a quantity measure of education and does not account for the quality of the education.

In the past, investing in education and training has been a priority policy lever used by policy makers to improve the stock of human capital and productivity.

However, increases in the quantity of education, measured by levels of educational attainment or years of schooling, has not resulted in a corresponding increase in productivity growth, as was expected.

This has led some to conclude that the contribution of education to economic growth may be overestimated.

Others argue that the lack of correlation relates to the measurement of human capital, rather than education per se.

However, human capital is a constructed means of production and cannot be assumed to be homogenous.

For this reason we argue that ignoring differences in the quality of education significantly distorts the picture of how education and economic outcomes are related.

Quantity of education

- Measured by levels of educational attainment or years of schooling
- Incomplete and ineffective measures of the relevant knowledge and skills required in the economy
 - This may be because relevant data is readily observable, consistent, available and measurable.
- Assumes that a year of schooling is homogenous and that it delivers the same increase in knowledge and skills regardless of the school, sector or system.
- Does not differentiate between the type or quality of educational outputs.
- Assumes that formal schooling is the primary source of human capital and that variations in the quality of non-school factors affecting learning and improving human capital have a negligible effect on education outcomes.
- Neglects the qualitative differences in the knowledge and cognitive skills acquired through the schooling experience and other sources of learning.
- It distorts both the empirical analysis and resulting policy development.



What is quality education in primary school?

Quality education is a measure of knowledge and cognitive skills demonstrated through standardised tests in literacy, numeracy and science.

Ignoring differences in the quality of education significantly distorts the picture of how education and economic outcomes are related.

When the cognitive skills of the population are included in the production function, a statistically and economically significant positive effect of the quality of education on economic growth is apparent.⁹

This effect is far larger than the association between the quantity of education and economic growth.

The acquisition of quality education begins in primary school.

Empirical evidence:

Models that include direct measures of cognitive skills can account for about three times the variation in economic growth than models that include only years of schooling.¹⁰

When cognitive capacity is included in the model, the association between years of schooling and economic growth turns insignificant and is reduced to close to zero.¹¹

From a diffusion of technology perspective, several studies conclude that lower quantity of education is more important for imitation and that higher quality education is more important for innovation and productivity.¹²

An OECD working paper found that a sustained improvement in PISA student test scores (cognitive skills) by 5.14% is estimated to increase multi-factor productivity (MFP) by between 3.4% and 4.1% in the long run.¹³

Economics of education: translating quality into policy

Ignoring differences in the **quality** of education significantly distorts the picture of how education and economic outcomes are related and misses the true relationship between education, economic growth and thus productivity. We need to ensure that policy-makers know that knowledge capacity and cognitive skills are a product of both the quantity and quality of schooling, especially primary schooling.

Rather than just quantitative measures alone, including achievement outcomes such as cognitive skill measures in literacy and numeracy when estimating the effect of education on economic growth would be more prudent and provide a truer reflection of the value of education to the economy.

Using measures of educational achievement captures variations in the knowledge and skills that the education system aims to produce and is also acquired through other sources such as in the family, through social networks as well as inherent ability.

Policy implications:

- Policies that extend years of schooling may be very different from the best policies to improve cognitive skills and the quality of educational achievement.
- Allowing for differences in educational achievement and quantity of schooling in calculating the economic effects of education, the opportunity to develop different policies designed to affect the quality aspects of education systems is enabled.
- Productivity improving policy reform must focus on education policy settings to ensure that foundational literacy and numeracy knowledge and skills are learned proficiently in primary school and are supported as students progress through their schooling.

Primary school efficacy: the best lever we have to improve the Nation's productivity

Primary school literacy and numeracy outcomes predict educational attainment, employment and income

Declining educational outcomes

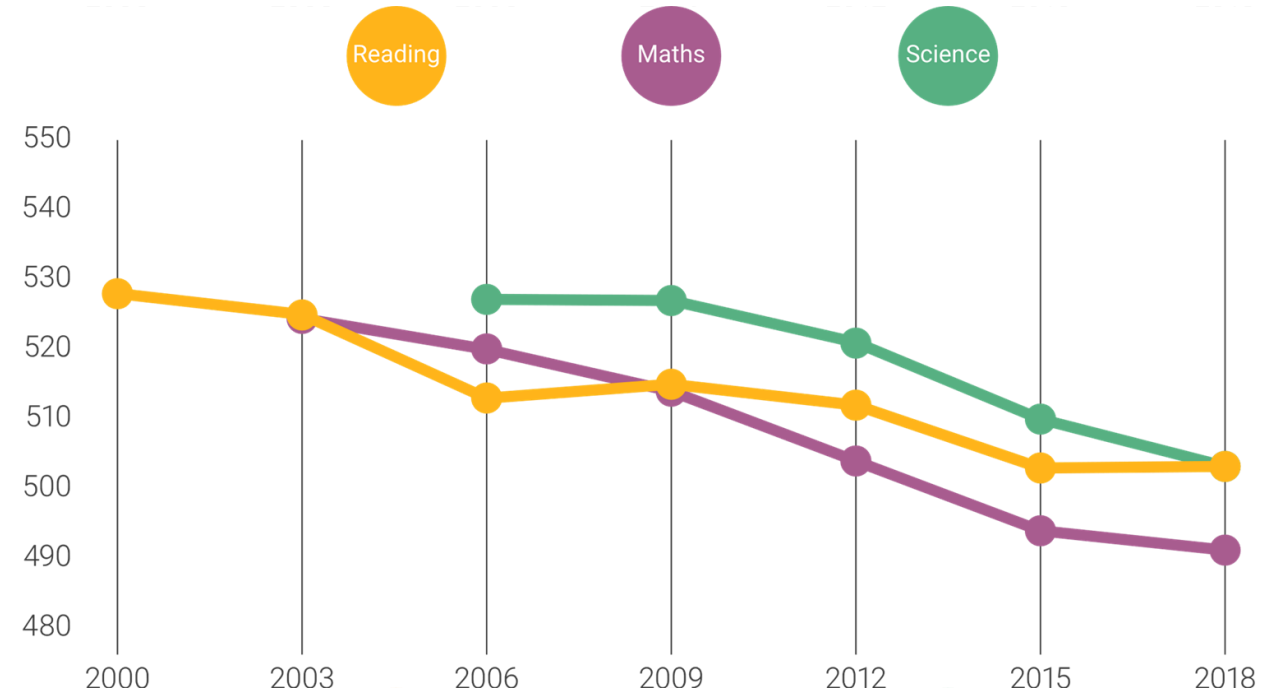
By the time they start year 7, around 28.4% of Australian students have not acquired the core knowledge, literacy or numeracy skills required to access and engage in further educational opportunity.¹⁴

Average performance in Australia has been steadily declining in literacy and numeracy in NAPLAN and reading, mathematics and science in PISA.

Performance in PISA has declined in Australia over the long-term by the equivalent of more than a full school year in maths and almost a full school year in reading and science.

The proportion of students not meeting the expected standard for their age increases steadily as they progress from the early years to primary school to secondary school.¹⁵

The spread of student achievement more than doubles as students move through school with the majority of the learning gap developing between years 3 and 9.¹⁶



Source: Thomson, S., De Bortoli, L., Underwood, C., and Schmid, M. (2019), PISA 2018: Reporting Australia's Results. Student Performance, Australian Council for Education Research

Predictors of educational outcomes

Countering long held assumptions:

Successful completion of year 12 is associated with prior achievement in literacy and numeracy throughout the schooling experience, more so than parental education or socio-economic background.

Several studies¹⁷ using multivariate analysis to predict academic performance conclude that prior achievement in primary school has the most influence on young people's overall educational outcomes, followed by parental education and/or occupation.

Empirical evidence:

Year 9 academic results predict year 11 and 12 performance.¹⁸

Writing skills are correlated with year 11 and 12 performance.¹⁹

Year 9 NAPLAN writing results were the strongest predictor of year 11 and year 12 performance, more so than reading, spelling, grammar or numeracy.²⁰

Writing ability is predicted jointly by spelling, grammar and punctuation, with spelling being the strongest predictor.²¹

Proficiency in English is a strong predictor of mathematical achievement.²²

At primary school, many children fail to achieve sufficient standards of writing to support their personal and academic needs at secondary school and beyond.²³

Writing performance in Australia

Sound writing skills are regarded as a critical prerequisite for employment and higher education in adult life by graduates, employers and higher education institutions.

Underpinning proficient writing skills is the ability to use and manipulate multiple language conventions efficiently; spelling, grammar and punctuation, all taught and learnt in primary school.

Students who experience difficulty with writing may be less likely to use writing to support and extend their learning to the wider curriculum. This impacts eventual school completion and the flow on effects to the economy and productivity.

Empirical evidence:

In 2021, 37.8% of year 9 students were at or below the expected level of writing, compared with 34.3% in 2011.²⁴

Year 9 Australian students' writing performance on the NAPLAN writing test has been declining since 2011 for both male and female students.

Several studies reveal a picture of accelerating negative change.²⁵

The average student in 2018 performed nearly 1.5 years behind the average student in 2011.²⁶

Not only does under-achievement in writing in year 9 impact successful school completion, it filters through to the Australian workforce, economy and broader society.

Predictors of earnings

Cognitive skills, measured by international tests of mathematics, science and reading, are powerfully related to individual earnings, to the distribution of income and the economic growth of a nation.

The Australian labour market operates in such a way that, within education levels, more skilled individuals in literacy receive higher remuneration.²⁷

Empirical evidence:²⁸

Up to 40% of the association between education and employment is attributable to literacy and numeracy skills. An increase in literacy and numeracy by one skill level is associated with an increased likelihood of employment of 2.4 and 4.3 percentage points for men and women, respectively.

Regardless of highest level of educational attainment, an increase in literacy and numeracy by one skill level is associated with about a 10% increase in wages for both men and women.

Educational qualifications and literacy skill levels are positively associated with income and income increases with literacy skill level, regardless of level of educational attainment.

The inclusion of literacy skills lowers the estimated income effects of qualifications, reducing the effect by around two thirds for men and 80 per cent for women.

Primary school efficacy: the best lever we have to improve the Nation's productivity

Knowledge underpins 21st Century skills in communication, creativity, critical thinking and problem solving.

21st Century skills V knowledge

Demand for productivity enhancing skills - referred to as '21st Century skills' - such as critical thinking, creativity, collaboration, problem solving, communication and 'soft skills' in the workplace has influenced education policy and pedagogy with requirements that these higher-order skills be taught and learnt in the schooling system.

This is evident in the Australian Professional Standards for Teachers which requires teachers at all levels to demonstrate the use of teaching strategies to develop students' "knowledge, skills, problem solving and critical and creative thinking".

Yet, there is no evidence-base that these higher order skills can be taught in isolation.

Over a number of decades cognitive scientists and educational psychologists have developed an architecture of how people learn, think and solve problems: **human cognitive architecture**.

Purpose of education:

To acquire knowledge and skills to use effectively in society and the economy.

Knowledge - the storage of information in the long-term memory - is acquired in two ways.²⁹

1) through the process of evolution and exposure to a wide range of experiences and does not need to be explicitly taught, referred to as **biologically primary knowledge**

2) domain-specific, biologically secondary knowledge, which is not acquired naturally and unconsciously, and needs to be explicitly taught.

The purpose of the education system is to teach this domain-specific, biologically secondary knowledge.

If this knowledge is not being added to long-term memory efficiently then education practices are not effective.

Discussion: 21st Century skills and knowledge

While students are able to acquire knowledge slowly and with considerable effort via inquiry learning, students can also acquire it far more rapidly and easily via explicit instruction from other people, such as teachers.³⁰

What requires teaching is the knowledge base from which students are able to apply their '21st century skills' to.

Starting in primary school, children apply their cognitive abilities to learn (acquire knowledge) first and then, as they get older, apply existing knowledge to enhance their knowledge and learning through innate critical thinking and problem solving skills as well as utilising emerging metacognition skills to reflect on their learning process.

Empirical evidence:³¹

Creativity and critical thinking cannot be taught as our cognitive architecture has evolved to do this innately without instruction

Knowledge held in long-term memory is the first prerequisite of critical and creative thinking

Differences in students' creativity and critical thinking is not due to differences in thinking strategies, but rather on differences in students' knowledge³¹.

Summary of our argument

There is no substitute to improving Australia's long-term productivity performance than improving educational outcomes, rather than outputs.

A key driver of national productivity is cognitive capacity of the entire population.

A strong foundation in reading, writing, spelling, grammar, mathematics and general knowledge are the fundamentals of a productive workforce.

K-12 education is the primary vehicle for a nation to lift its cognitive capacity.

Primary school efficacy is necessary for successful high school outcomes at the population level.

These are long term investments. However, if these investments are not made, there are no other activities or investments that can make up for them. Investing in post-school training can never recover the lost opportunity of high levels of vocabulary, reading fluency, mathematical ability and broad knowledge.

Productivity enhancing attainment at TAFE and University are bounded by the limits of achievement at earlier levels of schooling. Poor readers make poor students at any stage of education.

To achieve a better functioning education and training system geared to long-run productivity improvement and manageable transitions in the nature of work, governments need to improve the education outcomes of school students, particularly in primary school, through ensuring that the best possible teaching methods are being used in the school system, supported by an educational evidence base and the employment of high-quality, well-trained teachers in the fields where they are needed.

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