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# Dollars and Sense: Time for smart reform of Australian school funding

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**Glenn Fahey**

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# **Dollars and Sense: Time for smart reform of Australian school funding**

Glenn Fahey



**Research Report 40**

## **Related work**

Blaise Joseph, *Getting the most out of Gonski 2.0: the evidence base for school investments* (Research Report 31, October 2017)

Glenn Fahey, *What do parents want from schools?* (Policy Paper 26, November 2019)

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## Executive Summary

Australia is among the world's highest-spending countries on schooling. Yet, the educational return on this investment for parents, taxpayers, employers, and students, has deteriorated — despite the expectation of policymakers that increased funding would inevitably improve educational outcomes.

It's true that money matters when it comes to schooling, but how money is used is what really matters, not how much money is spent. All students and taxpayers would benefit from a more productive school system that delivers greater educational outcomes with the same or fewer resources. To achieve this, we need smarter approaches to funding — grounded in evidence and in market-based principles.

### Research findings

Analysis of school-level data shows that the expensive Gonski funding model, implemented since 2014 to improve student achievement and reduce educational inequity, has not resulted in higher student achievement.

If two schools with comparable cohorts of students, but different funding levels, are randomly selected, those schools' students would perform roughly the same on average. In other words, there is no clear relationship between school funding and student outcomes.

The only exception to this is the case of remote schools, where funding makes a small positive contribution to student achievement.

There is no evidence that recent efforts to expand 'needs-based' funding are properly targeted in a way that will achieve the objective of reducing educational disadvantage and lift education outcomes.

International comparisons show a lack of funding is not the culprit for Australia's educational decline over recent decades.

Rather than the amount of funding, the approach taken to school funding may contribute to poor educational outcomes and fail to align incentives toward higher performance.

Funding is:

- determined according to a flawed methodology;
- highly centralised;
- overly complex, opaque, and indirect;
- input-based rather than outcomes-based; and
- not designed to promote school choice and competition.

Building the capacity and performance of our teachers is the best investment that can be made in our education system.

However, expensive policy approaches — such as reductions to class sizes and increases to across-the-board teacher salaries — which have been tried for decades, haven't delivered demonstrable educational benefits.

Our teachers earn relatively high salaries, compared to similar countries, but pay is very flat and peaks early in their careers.

Moreover, confused approaches to teacher workforce development, and additional credentialisation have harmed, rather than helped, the status of the teaching profession.

Policymakers have let teachers and school leaders down by failing to provide the tools to conduct the performance management practices needed for building capacity and providing a supportive incentive structure.

### **Implications for policymakers**

A better policy approach should not just be about evaluating the amount of funding, but also improving efficiency and quality of education, so that money is better spent.

Policymakers should review the current Schooling Resource Standard's base funding methodology, the rate of indexation, and formally evaluate the efficacy of reforms to school funding against the objectives of increasing student achievement and reducing inequity.

Capacity-to-contribute approaches should be consistent across school sectors, rather than being unfairly applied only to non-government school funding adjustments.

The current review into funding of regional and remote schools should consider options to make better use of resourcing, rather than only assessing the methodology used to determine funding amounts within the existing formula.

More spending decisions should be made at the school level, rather than in centralised bureaucracies. School leaders and parents should have greater input into how schools are governed.

Financial incentives for schools and teachers should be incorporated into the funding model, so that it is more outcomes- and activity-based, rather than being purely input-based.

Teacher workforce planning should emphasise increasing supply of potential teachers, not restricting it. There should be fewer entry restrictions to teaching — both at initial level and for mid-career transitions. The focus to improve quality should be on developing teachers' capacity through deregulated performance management practices.

To support performance management efforts in schools, teachers' pay and conditions should be made more flexible — with financial incentives for high performance. International research shows that well-designed performance-based pay arrangements are an effective tool for lifting student outcomes.

School choice and competition could be better supported if school funding arrangements were more direct to households, rather than funded indirectly through schools. Providing means-tested vouchers to parents would allow for clearer price signals. If supported by more quality signals — particularly through enhanced school transparency — resources across the school system would be better allocated.





## Introduction

More than \$61 billion of public funding is spent on schooling each year in Australia.<sup>1</sup> This makes education spending among the largest budget items for state, territory, and federal governments. Periodically, school funding can be highly contested — with misleading claims and assertions routinely adopted in support of political positions.

Contributing to the complications and politicisation of school funding disputes is the shared role played between states and territories with the federal government. The vast majority of funding comes from states and territories, though the federal government has made increasingly large commitments over the past decade. States and territories are the majority funder of government schools, while the federal government is the majority funder of non-government schools. Different arrangements exist for funding that is intended for use in day-to-day running of schools and funding used for infrastructure spending.

Another complicating factor is that schools are funded both from taxpayers and parents. The fees and other contributions paid by parents vary greatly between schools within the non-government sectors. Fees are not compulsory in government schools, though many parents choose to make modest contributions. Because of the capacity to receive parental contributions, non-government schools tend to receive considerably lower levels of public funding, per student.

A result of the complicated financing arrangements of schools is that disparities in funding — rather than differences in educational quality — are seen to compound existing educational inequities. This has motivated governments to increasingly use school funding as the key policy lever in redressing educational and societal disadvantage.

Two major reviews into school funding in the past decade have been chaired by University of New South Wales Chancellor, David Gonski AC — which serve as motivation for what are commonly referred to as ‘Gonski reforms’.

The first review, chaired in 2011, was tasked to “develop a funding system which is *transparent, fair, financially sustainable and effective in promoting educational outcomes*.” Ultimately, it recommended a significant increase to public spending for government schools, and with additional resources to be provided to address, in particular, inequality of student outcomes. In essence, the resulting new ‘needs-based funding model’ developed by the then-government (and

implemented from 2014) concluded that:

- “providing *additional funding is essential*”;
- Funding reform would “ensure that children’s *educational outcomes are not determined by how much their parents earn*”; and
- Needs-based funding would “*improve each student’s achievements at school*.”

In effect, this produced three policy priorities: i) increase funding (particularly federal funding); ii) reduce the nexus between socioeconomic status and student achievement; and iii) to improve overall student achievement.

Following a second review chaired by Gonski, further adjustments were made in May 2017 to the school funding model. First, an adjustment was made to make funding more needs-based by reducing the public funding of non-government schools where parents have greater ability to pay fees. Second, ‘national consistency’ was reinforced, by removing different arrangements of the states and territories. In September 2018, the federal government further adjusted how the fee-paying ability of parents in non-government schools is assessed — with the intention to make funding amounts more accurately reflect parents’ ability to pay fees (based on ‘direct measures’ of parental incomes).

While there is a bipartisan commitment to sustained increases in investment of school funding at federal and state levels — formalised in National School Reform Agreements — the matter remains contentious. The independent National School Resourcing Board serves an important function in overseeing the efficacy of the current funding model and making periodic recommendations to government. To date, the changes to school funding introduced through Gonski and related reforms are yet to be formally evaluated against the stated aims of lifting student achievement and reducing educational inequity.

This research paper reviews the state of school funding in Australia, bringing together research from international comparisons based on OECD data sources, Australian school-level data, international research literature, and policy documents. It seeks to understand how and why the persistent increases in school funding in Australia have failed to improve educational outcomes. In doing so, potential solutions to the current policy settings are identified.



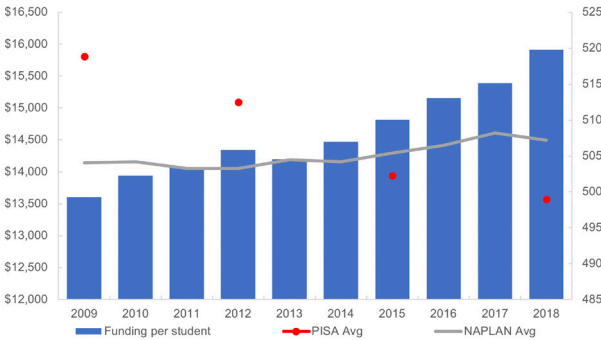
## Student achievement has declined despite funding increases

It's clear that despite record levels of funding in recent years, the educational return on investment — in terms of student achievement in domestic and international tests — has deteriorated. In 2018, the average public funding per student was just under \$16,000 — a 17 per cent real increase since 2009.

Australia's international performance in testing has been "steadily negative" according to the OECD.<sup>2</sup> Of the 66 regular PISA-participating countries, Australia's average decline over time (measured by the average rate of performance change per testing period) is second lowest (3.3% long term decline) — with only Finland falling further, albeit from a higher starting point (4.5% long term decline).

In domestic testing, overall achievement in NAPLAN has remained flat (an average score across the five domains tested, and four stages of testing, of 504 in 2009 to 507 in 2018, though this masks some variations within each learning domain of testing and at different year groups). It's true that Year 3 NAPLAN — the earliest cohort that is tested — has recorded steady improvements since 2008, but this has not translated into improvements in other grades (year 5, 7, and 9).

**Figure 1. Per student funding (\$A2018, LHS) and student achievement (PISA and NAPLAN, RHS), 2009 to 2018 (all school sectors).**



Source: Productivity Commission Report on Government Services (School Education) 2020 Table 4A.15. Financial figures are adjusted to 2017-18 dollars.



## School funding is high and has been increasing

By any measure, school funding in Australia is high, as conclusively shown by international comparisons, despite common claims to the contrary. It's also been increasing rapidly.

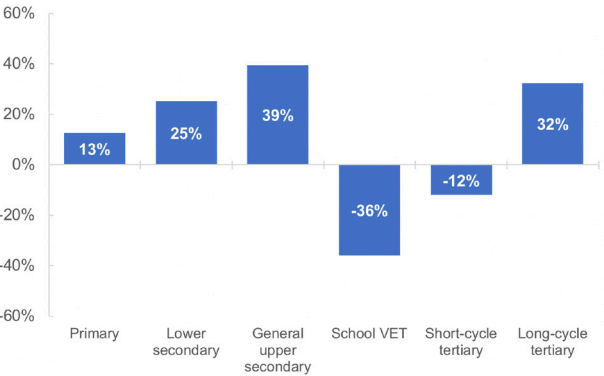
### Funding is higher than in comparable countries

It's often claimed that school funding should be increased in order to lift student achievement to reach international benchmarks. However, when combining primary and secondary school spending (excluding vocational education and training), Australia already spends around 26 per cent more than the OECD average — \$12,479 in \$US PPP\* terms (see Box 1), compared to \$9,890 — with many high-performing countries spending less.

This is no anomaly when it comes to assessing the level of expenditure on schooling. Over the course of the average Australian students' compulsory schooling (defined internationally as the cumulative amount spent between the ages of 6 and 15), Australia spends around 20 per cent per student (around \$150,000) more than the OECD average.<sup>3</sup>

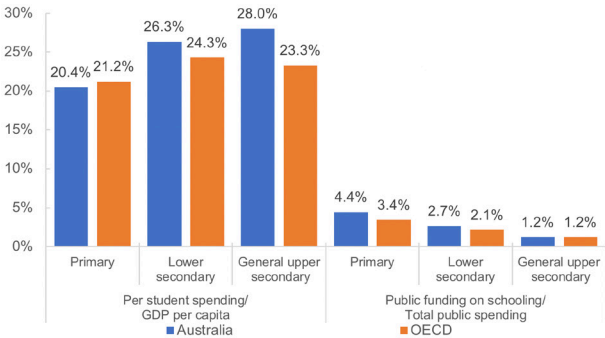
Alternative indicators are occasionally cherrypicked when making international comparisons, though they tend to be less reliable. Presumably these are selected by vested interests in order to claim that the school system is underfunded — though it is only primary school spending as a proportion of GDP per capita records spending that is marginally below the OECD average.

**Figure 2: Ratio of Australian spending per student (\$US PPP) compared to OECD average, by education sector.**



Source: OECD Education at a Glance 2020.

**Figure 3: Alternative international indicators of education spending Australia vs OECD average.**



Source: OECD Education at a Glance 2020.

\* In order to make effective comparisons across countries, these are converted to common Purchasing Power Parity (PPP) terms. Rather than simply based on exchange rate comparison, PPP adjusts according to the relative cost of goods between countries.



### Box 1: The complications in making international comparisons

Not all indicators are equally appropriate for making international comparisons. The most accurate way to compare spending on education internationally is the OECD’s purchasing power parity (PPP)-adjustment (as in Figure 2) because it is by far the most direct indicator (since it is a straight comparison of like-for-like). Two other indicators are sometimes used (Figure 3), but are not optimal — particularly since neither are adjusted to reflect what money is worth in respective countries.

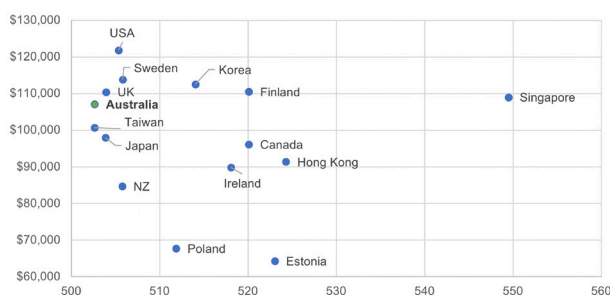
The first of these is school spending per capita as a proportion of GDP per capita — meant to indicate how spending compares after accounting for differences in national wealth. However, since the OECD has argued that national wealth is not a good proxy for expected educational quality, it makes little sense to then compare educational spending on this basis.<sup>4</sup> It’s also not an accurate measure for this purpose because there’s little reason for education spending to vary along with relative changes in GDP. Nor is it suitable to argue that this indicator better reflects population mixes, as the per capita component of the metric explicitly includes all members of a country’s population — because changes in population are correlated with changes in student populations (the per student component of the metric).

The second of these is the proportion of total public expenditure that goes to schooling — that is, an indication of the relative priority of education within the public spending envelope. First, it counts only public spending, meaning it doesn’t account for differences in public-private split of schooling between countries. Second, the relative size of government between countries is not a good barometer for comparing education spending.

One claim often made is that even if previous spending increases haven’t improved students’ results yet, further increases in funding may bring the desired outcome. But this ignores that there are already many other countries that spend similar amounts — or indeed some that spend considerably less — and have recorded significantly better educational outcomes. Over the course of a student’s typical time in the school system, Australia spends around 24 per cent more per student than in countries that perform better (such as Estonia, Poland, New Zealand, Ireland, Hong Kong, Canada, Japan, and Taiwan) — see Figure 4.

Some countries that outperform Australia, such as Singapore, Finland, and Korea, spend around the same. For instance, Singapore, spends just \$260 per year more than Australia per student, while achieving 46 points higher in reading literacy (meaning Australian 15-year-old students are around 1.5 equivalent years of learning behind).

**Figure 4: PISA Reading Scores and School funding per student (US\$ PPP spending from age 6-15)**



Source: OECD (2019). Programme for International Student Assessment 2018; financial values are \$US PPP.

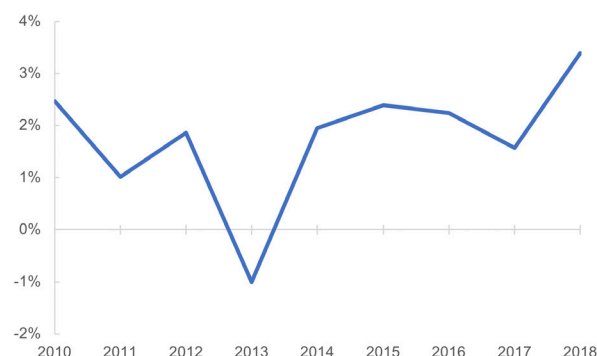
\*\* At the time that the reform was introduced, the bulk of the promised increase of funding was concentrated in the final two years of planned budgeting (2018 and 2019).

## Funding has been increasing, especially since Gonski reforms

From 2009 to 2018, \$498 billion (\$532 billion in A\$ 2018) of public funding was invested in schooling in Australia. The pace of increase in funding has also continued to grow. Not only is 2018 (the most recently reported year) the highest annual spend on record (\$61.5 billion) but it is also the highest yearly increase in public funding too — a 3.4% real increase per student from 2017. This is despite frequent claims of funding ‘cuts’ to schooling (see Box 2).

The surge in spending in 2018 is partly due to the controversial ‘last two years’ of Gonski funding\*\* coming into effect. This elevated level of spending is the new normal because it is based on transitioning funding into a new arrangement more quickly than in the initial years of the funding reform (2014 to 2017).

**Figure 5. Real recurrent public funding per student (year on year increase), 2009 to 2018 (all school sectors).**



Source: Productivity Commission Report on Government Services (School Education) 2020. Financial figures are adjusted to 2017-18 dollars.

### Box 2: Has school funding been cut?

In highly-politicised public debates, it’s routinely claimed school funding has been ‘cut’ in recent years — which is factually incorrect (see Figures 3 and 4). Rather than a quantitative reduction in actual funding, some have claimed there are promised future streams of increases that have not been delivered, which ignores the fact that none of the larger Gonski funding increases promised by the Labor federal government in 2014 were ever actually funded in the budget.

Another misconception is that school funding, while increasing, hasn’t ‘effectively’ increased. That’s because it’s claimed that much of the apparent increase in funding has been absorbed by increased pay to teachers. In turn, it’s argued, schools don’t end up with additional disposable funding. However, the main problem with this argument is that, in part, the justification of higher salaries for teachers was that this would result in higher quality education — indeed, the campaign for more school funding has explicitly demanded an increase in pay for teachers, not an increase in disposable funds of schools. The implication of the arguments is that school productivity should, in effect, continually decrease over time, as real teacher wages continue to rise without expecting corresponding improvements in student results.



## It's a mistake to focus policy on increasing quantity of funding, rather than quality of spending

It's a simplistic policy approach to assume that simply increasing funding amounts, while keeping everything else the same, would automatically improve policy outcomes. The overwhelming majority of international research has shown, for decades, that resourcing alone is not an effective lever in improving education outcomes.

### More funding hasn't increased student achievement in NAPLAN

Analysis of school-level data in Australia further shows that increasing funding overall, without any substantive changes in how funding is used, has not improved achievement in NAPLAN. This casts considerable doubt on the efficacy of Gonski-related funding reforms of recent years.

Statistical analysis of Australian school-level data shows that additional funding is a blunt instrument to improve students' results. After accounting for other factors, the amount of public funding to government schools has no statistically significant relationship with student achievement in Year 5. It's important to be clear about what that implies — if one is to randomly take two schools, made up of similar students, and differing only in terms of their level of funding, it's unlikely that these schools' students would perform differently on average. The only exception to this is for schools located in remote areas, as discussed below.

Consistent with other research, student achievement is primarily explained by other in-school and out-of-school factors. In particular, the best predictors of student achievement in year 5 are students' past achievement (year 3) and their socio-educational background (as indicated by the Index of Community

Socio-Educational Advantage (ICSEA): with a higher ICSEA representing a relatively advantaged school community). The attendance rate (the average proportion of days that students attend school) and the level of funding voluntarily paid by parents are also statistically significant, but relatively weak in terms of their effect size (see Figure 6b).

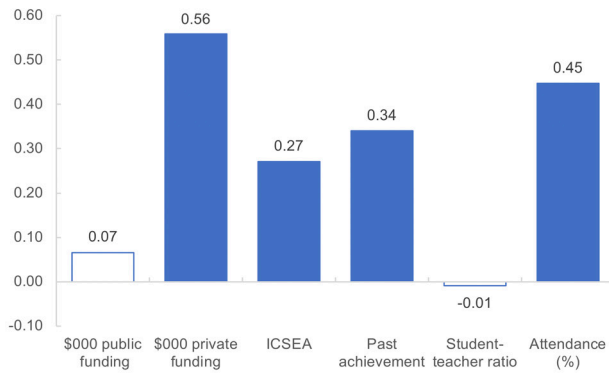
Specifically, every 1-point increase in the ICSEA is associated with a 0.27-point increase in average Year 5 NAPLAN score. The difference in ICSEA between a moderately advantaged and moderately disadvantaged school is around 200 points — meaning around an average 54 NAPLAN score can be explained specifically by differences between advantaged and disadvantaged schools. This corresponds to around 1.5 standard deviations\*\*\* in the Year 5 NAPLAN average. A 1 standard deviation change in ICSEA is associated with around a 0.7 standard deviation change in average Year 5 NAPLAN score.

Past student achievement is an important predictor of future educational achievement. In this analysis, a 1-point higher Year 3 average score is associated with a 0.34-point higher Year 5 average score. A 1 standard deviation change in past achievement is associated with around a 0.37 standard deviation in average Year 5 NAPLAN score.

There's a positive relationship between the average attendance rate and the average Year 5 NAPLAN score. A 10 percentage point increase in a school's average attendance rate is associated with a 4.5 point increase in NAPLAN average score (or 0.13 standard deviations in Year 5 NAPLAN averages). Equivalently, a 1 standard deviation change in the attendance rate is associated with around a 0.04 standard deviation change in Year 5 NAPLAN.

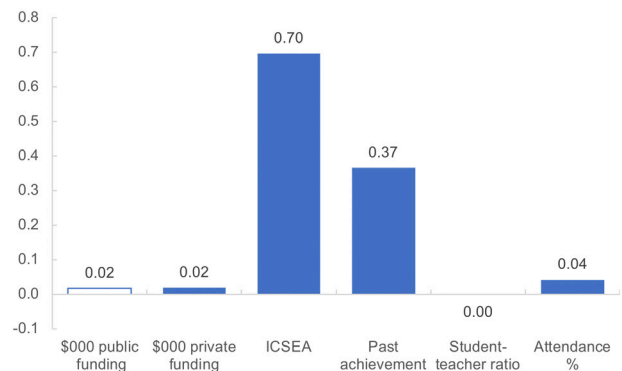
\*\*\* Standard deviation measures how widely data is recorded away from the average. Based on the distribution of most variables in this data, one standard deviation captures 68.27% of observations around the average. It is used here to indicate how the relationship between variables is likely to be affected across the range of the explanatory variable.

**Figure 6a. Statistical association between key variables and student achievement in Year 5 NAPLAN, government schools, 2010-2018.**



Source: Author's analysis of ACARA data (see Annex C and D)

**Figure 6b. Statistical association (standardised) between a 1 standard deviation in key variables in terms of a 1 standard deviation change in student achievement in Year 5 NAPLAN, government schools, 2010-2018.**



### Education outcomes in remote schools are more sensitive to various factors

Further analysis shows that the relative importance of factors differs by geography.

While there's no statistical relationship between public funding and achievement for metropolitan or regional schools, there is a moderate positive relationship for remote schools. Namely, an additional \$1,000 of public funding is associated with around a 0.63 higher average score in year 5 NAPLAN. Equivalently, a 1 standard deviation change in public funding is associated with around a 0.33 standard deviation change in Year 5 NAPLAN score in remote schools.

There is a statistically significant positive relationship between private funding and achievement for regional schools. Namely, a \$1,000 increase in private funding is associated with around a 0.73 point increase in school NAPLAN score. While statistically significant, however, a 1 standard deviation change in private funding is associated with only a 0.03 standard deviation change in school NAPLAN score.

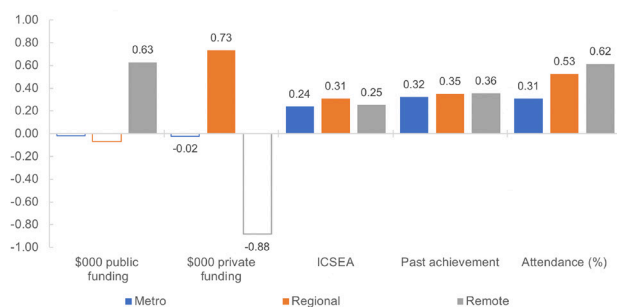
Socio-educational status (ICSEA) is more strongly related to achievement in regional schools, compared

to remote and metropolitan schools. However, once standardised, it's clear that ICSEA is an especially strong factor in explaining differences in NAPLAN scores in remote schools (this can be attributed partly to the wider dispersion of ICSEA for schools in remote areas). Namely, a 1 standard deviation change in ICSEA for remote schools is associated with around a 0.99 standard deviation change in Year 5 NAPLAN score.

Past achievement is a similarly strong predictor of student achievement in year 5. Again, once standardised, past achievement is especially important in explaining Year 5 NAPLAN scores in remote schools. A 1 standard deviation change in Year 3 NAPLAN is associated with around a 0.54 standard deviation change in Year 5 NAPLAN score.

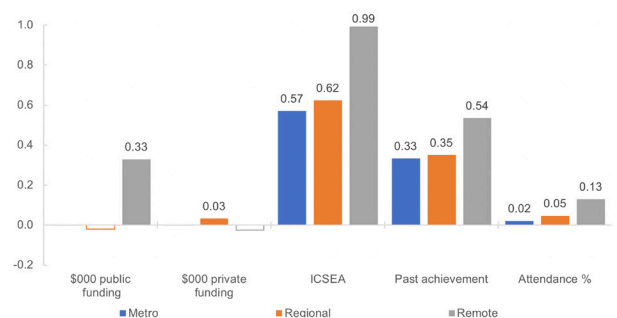
The relationship between attendance and student achievement is much stronger for regional and remote schools (especially after standardisation), compared to metropolitan schools. An increased average attendance rate of 10 percentage points is associated with an additional 6 Year 5 NAPLAN points — equivalent to around a 0.12 standard deviation change in achievement.

**Figure 7a. Statistical association between selected key variables and school year 5 NAPLAN results, government school**



Source: Author's analysis of ACARA data

**Figure 7b. Statistical association (standardised) between selected key variables and a one standard deviation change in school year 5 NAPLAN results, government schools.**



Source: Author's analysis of ACARA data

## International research has long shown little to no relationship between resourcing and achievement

It's not only in Australia that more school funding hasn't appeared to improve educational outcomes. The OECD has also found that expenditure per student across the world has increased by more than 15 per cent, yet "most OECD countries saw virtually no improvement in the performance of their students since PISA was first conducted in 2000."<sup>5</sup>

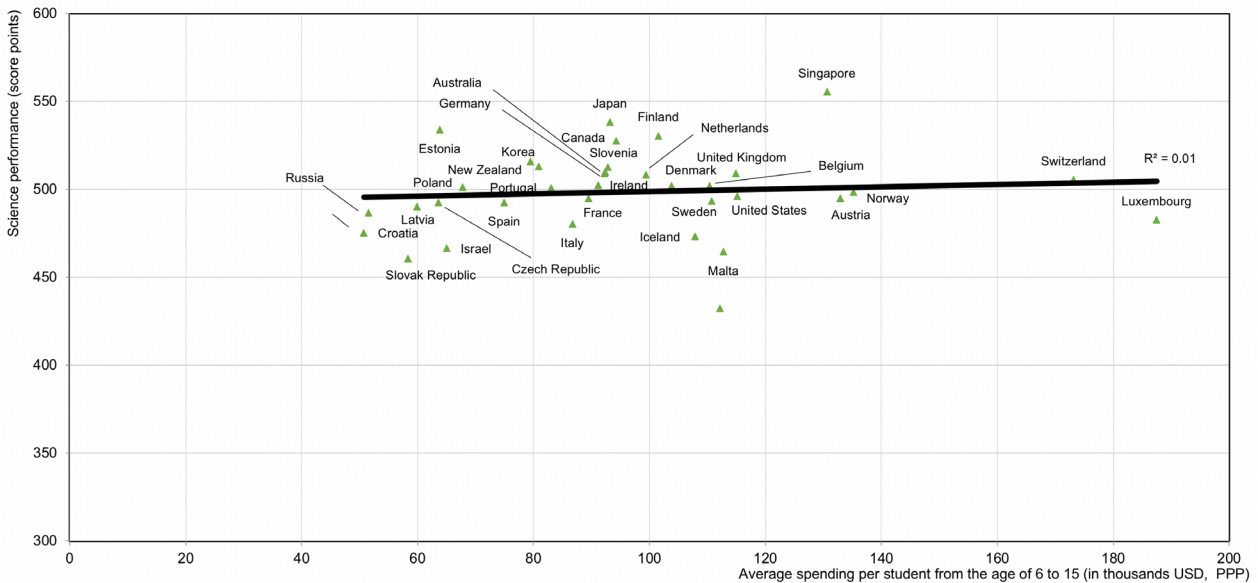
Figure 9 shows that the relationship between the level of resourcing and the achievement of students in PISA is very weak — just 1 per cent of the difference in PISA results can be explained by differences in the level of funding. This confirms the conclusion reached by the world's leading education economist, Eric Hanushek, that there is "no strong or systematic relationship between school expenditures and student achievement."<sup>6</sup> This result has been replicated now for decades in many contexts.

Among the explanations offered by researchers are that:<sup>7</sup>

- today's school expenditures have become inflated by waste and inefficiency without any educational payoff;
- there's been a deterioration in the quality of the teaching workforce that has reduced the amount of learning students gain; and
- that there may simply be diminishing educational returns from today's relatively high funding levels.

In sum, it's argued that it may be that money *once* improved educational outcomes, but continued increases haven't *further* improved outcomes — echoing the OECD's observation that beyond a modest amount of funding, differences in student achievement are almost fully explained by non-pecuniary factors.

**Figure 8. Cross-country correlation between student achievement and per student funding.**



Source: OECD (2016): PISA 2015.





## Australian education isn't underfunded, it's been directed to the wrong priorities

A number of factors have contributed to the sustained increases to school funding — including persistent reductions in class sizes, increases in across-the-board teacher salaries, and expanded efforts to address wider societal inequities through redistributive school funding. The problem is that each of these approaches, while well-intentioned, are not cost-effective and have not benefited from a supportive evidence base.

### Relatively high average teacher salaries are expensive and don't improve outcomes

Teachers' pay makes up by far the largest share of education expenditure — staffing accounting for 80 per cent, and teachers specifically accounting for 61 per cent. For this reason, the amount that schools are funded is necessarily closely related to the amount paid to teachers.

Teaching expenditure is a function of several factors: students' instruction time; teachers' working hours (including in-class and out-of-class time); teachers' wage rates; and the number of teachers needed to teach students (determined largely by class sizes). Figure 9 shows the effect that each of the four factors has on the level of expenditure on teaching, compared to the OECD average (that is, positive values indicate

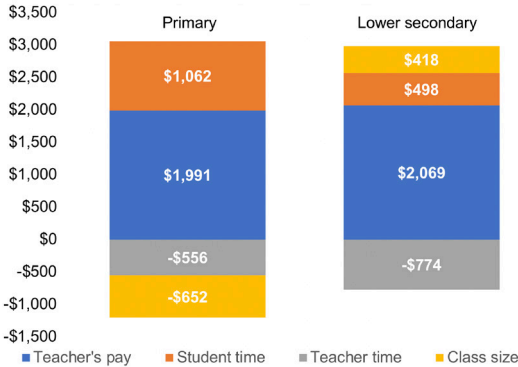
how much, per student, each factor is responsible for Australian teaching expenditure exceeding the OECD average).

The main reason that Australia's spending on teachers is higher than in the OECD is because teachers' salary rates are exceptionally high — responsible for additional per student spending (compared to what it would be if teachers were paid at the OECD average) of around \$1,991 in primary schooling and \$2,069 secondary schooling. In addition, OECD data shows that Australian students spend more time in class than in any other country (responsible for making teaching expenditure \$1,062 higher per primary school student than it would be if class time was equivalent to the OECD average), and secondary school classes are relatively small (meaning more teachers are employed than is necessary — responsible for making secondary schooling \$418 more costly per student than it would if class sizes were equivalent to the OECD average).

By international standards, Australian teachers enjoy among the highest pay rates in the world. At each level of schooling, Australian teachers are paid considerably higher than the OECD average — 35% at primary, 31% at lower secondary, and 22% at upper secondary.

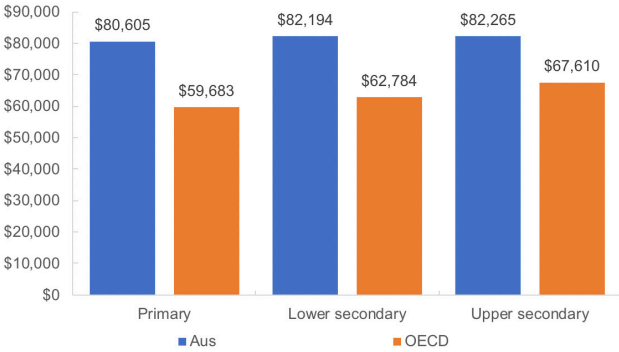
At most levels of schooling, Australian teachers also earn a relatively high salary compared to other tertiary-

**Figure 9. Contribution of factors to explain higher spending on teachers, per student, compared to OECD average.**



Source: OECD Education at a Glance 2020, 2019. NB: Lower secondary data only available from Education at a Glance 2019, excluded in 2020 edition. Values are converted from US\$PPP to A\$

**Figure 10. Average annual teachers' pay, PPP comparisons, converted to A\$**



Source: OECD Education at a Glance 2020.

educated workers — see Figure 11 — especially for women (where female teachers earn more than other tertiary-educated workers). It's sometimes mistakenly argued that, even if Australian teachers' salaries are relatively high compared to teachers in the rest of the world, that the problem is that teachers' salaries don't compare favourably to other educated workers here in Australia. In other words, prospective teachers don't compare their salaries to teachers overseas, but they do compare them to their peers in other fields here in Australia.

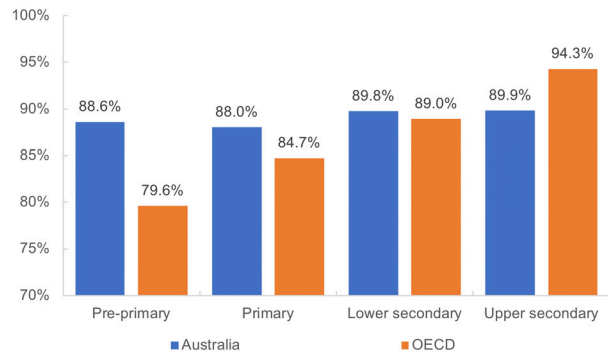
The argument is made that the teaching profession can't recruit the 'best and brightest' here because they are attracted to other occupations by greater potential earnings. While this may be true for graduates from some specialist disciplines — specifically, those with STEM backgrounds — it's not true for the broader teaching workforce.

Teachers' pay is not only higher than in the OECD, but also has been increasing more than twice as quickly as the OECD average (Figure 12).

While Australian teachers earn comparatively high salaries (particularly across-the-board starting salaries), they also peak relatively early in their careers — meaning there is little scope to earn salary increases — and most teachers earn virtually the same salary (due to centrally-determined pay arrangements). That means Australian teachers' pay is both relatively flat over time, and across the workforce.

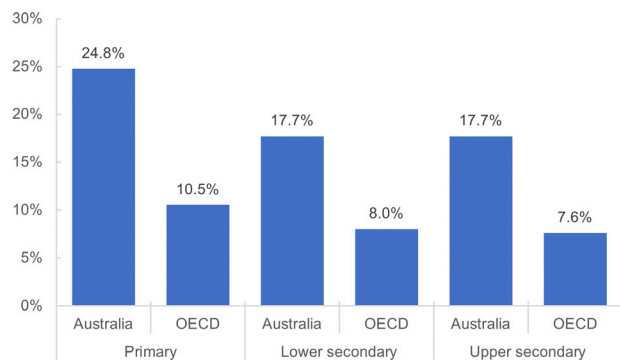
Figure 13 shows that in OECD countries, pay tends to peak at around 66 per cent above the starting salary, compared to around 48 per cent for Australian teachers. That means there is a relatively weaker incentive for teachers to stay in the field in order to reach their maximum earnings. For teachers who work beyond 15 years, there is only a 4 per cent increase in salary typically available to them for the duration of their careers. This has important implications for retention — as it's been observed that there is a sharp drop off of teachers leaving the workforce around the same time that salaries peak (around the 9-year mark for most teachers).<sup>8</sup>

**Figure 11. Ratio of teachers' salary compared to other tertiary-educated workers.**



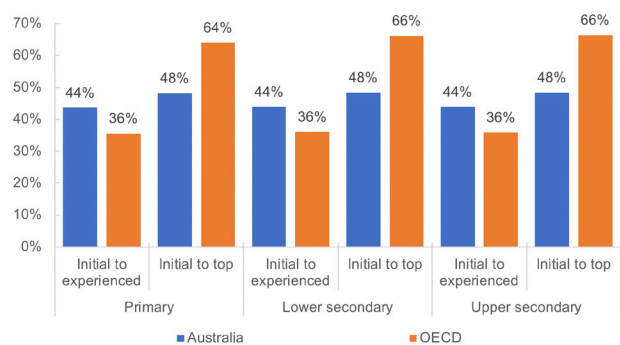
Source: OECD Education at a Glance 2020.

**Figure 12. Real increase in teachers' salaries, 2000 to 2019.**



Source: OECD Education at a Glance 2020.

**Figure 13. Ratio of average teachers' salaries based on experience and peak salary amounts, Australia vs OECD.**



Source: OECD Education at a Glance 2020.

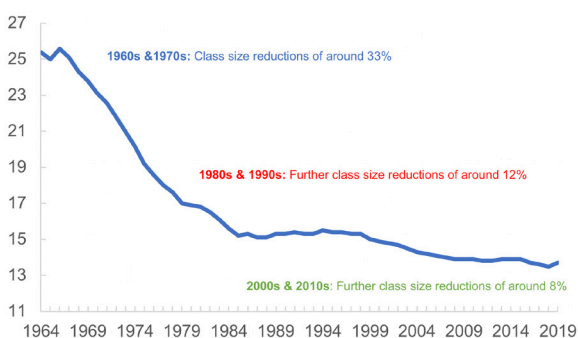
## Class size reductions are an expensive and ineffective education policy lever

Class sizes have steadily decreased for decades (see Figure 14). Since 1964, implied class sizes (based on the only available data: student-teacher ratios<sup>5</sup>) have effectively halved — from a student-teacher ratio of over 25 in the 1960s to an average of 13.6 in the past three years. Through the 1970s to 1990s, virtually all of the real increase in schooling expenditure can be attributed to class size reductions.<sup>9</sup>

Australian class sizes are comparable to similar countries (bearing in mind that other countries have followed a similar trajectory over recent decades in reducing class sizes also) — with slightly larger primary school classes than the OECD average (23.5 compared to 21.1), and smaller secondary school classes (22.2 compared to 23.3).<sup>10</sup>

The OECD argues there is no evidence that smaller classes lead to better learning of students — even finding that students in larger classes actually outperform those in smaller classes, on average.<sup>11</sup> This is supported by most of the broader academic research<sup>12</sup> — excluding some rare cases of classes made up of especially disadvantaged students and those requiring very specific, targeted pedagogical interventions.<sup>13</sup> That is, while some specific instruction can be more effective with smaller classes, student performance in most classes is unaffected by variations in class size of between 15 and 40 students.<sup>14</sup> In any case, the OECD notes that the most successful school systems are those that use school funding to prioritise the *quality* of teachers rather than reduce class size (ie the *quantity* of teachers).<sup>15</sup>

**Figure 14. Student-teacher ratio in Australian schools (all sectors and types), 1964 to 2019.**



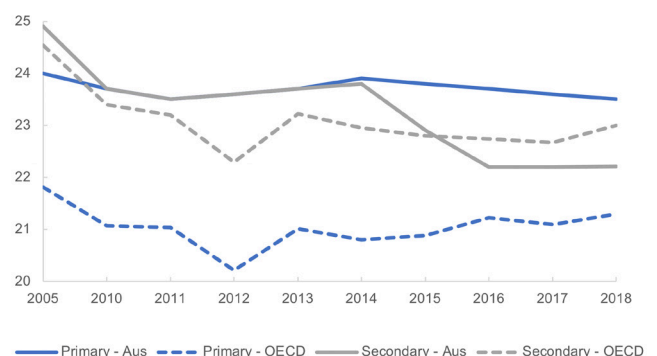
One reason the OECD has argued strongly against reducing class sizes is that it is very costly, meaning that there is less money available to potentially pay high-performing teachers more. They estimate that if class size reductions are to be pursued, it would require reductions to teachers' salaries of around \$4,900 to compensate for the additional cost of reducing classes by just one student (inversely, accommodating slightly larger classes could make the equivalent additional salaries payable to teachers).

## Addressing wider inequities through additional school funding is a costly and blunt instrument

The relationship between societal inequity and educational inequity is highly complex. Under Australia's various school funding formulas, the amount schools receive depends on the number of students and their demographics. This has seen large increases in 'loadings' calculated according to students' and schools' needs in the interest of redressing inequities.

While socioeconomic background clearly continues to impact upon students' educational achievement, it's not clear that the needs-based funding approach — providing additional funding to schools indirectly — is the most effective method in redressing disadvantage; particularly as there is little evidence that the approach ultimately results in targeted interventions for the students that attract the funding in the first place.<sup>16</sup> As a result, the equity-based focus of recent years can be a misplaced and costly effort.

**Figure 15. Average class size in primary and lower secondary school, Australia and OECD average (2005 to 2018).**



Source: OECD Education at a Glance 2020. NB: data series not available 2006 to 2009.

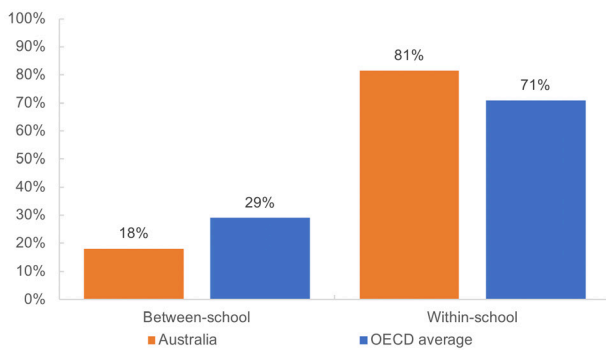
§ Class sizes and student-teacher ratios are related but are not calculated precisely the same way. The student-teacher ratio is calculated according to the number of FTE students divided by the number of FTE teachers. Class size is calculated as the number of students divided by the number of regular classes. Some factors can see the measures move in different directions, such as changes in the number of special education programs (which reduces the student-teacher ratio but not class sizes) and changes in the working hours of the teacher workforce (which affects student-teacher ratios but not class sizes).

In any case, it should be put into perspective that educational inequities in Australia are not as wide as in comparable countries, according to a number of indicators of equity used by the OECD.

Most of the difference in student performance in Australia is within- rather than between-schools (see Figure 16). What this reflects is that Australian classrooms are relatively likely to be made up of mixed ability students (high, low, and average performers) and that there is relatively small differences in performance between schools.

The first indicator is the spread in student achievement (essentially, the difference between the highest and lowest performing students). On this count, spread has been declining in recent years, mostly because there are relatively few high-performing students (rather than a reduction in low-performing students).

**Figure 16. Breakdown of variation in PISA performance.**

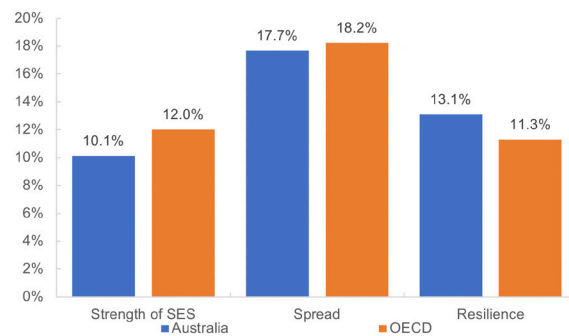


Source: OECD (2019) Programme for International Student Assessment 2018.

The second is the explanatory power of socioeconomic background for student achievement. Compared to most OECD countries, a student’s background isn’t a strong predictor of their achievement in Australian schools. One of the reasons for this is that migrants perform comparatively well and tend not to suffer the educational disadvantages experienced in many of our peer countries.

The third equity measure is ‘academic resilience’ — the likelihood that disadvantaged students are high achievers — in which Australia’s school system also outperforms most countries. Among the best predictors of academic resilience are parental support, a disciplinary climate at school, and students’ engagement and motivation for learning. To improve educational opportunity for disadvantaged Australian students, policy interventions that better target these factors would be more effective than simply increasing funding.

**Figure 17. PISA measures of inequity**



Source: PISA 2018 vol 2.





## The approach to school funding needs to change for money to be better spent

Australia's school funding approach and system is responsible for funding's failure as an effective policy lever. Simply spending more without changing the underlying incentive structures or the operating rules of schools clearly hasn't resulted in systematic improvements in student outcomes.<sup>17</sup>

Other education finance levers are available to policymakers. In particular, reforming institutional features can make an education system more productive by utilising market-based incentives for performance, addressing methodological problems in the existing funding model, and correcting the way that school funding is approached in the first place. In addition, approaches to education finance can, and should, work to reinforce accountability through market-based — rather than command and control — mechanisms.

### The funding approach is input-based rather than outcome-based

While needs-based funding carries rhetorical appeal,<sup>18</sup> it has unfortunately reinforced the misplaced focus on an input-based approach — which means that funding

to schools is determined mostly by the number of students and their demographic characteristics (as proxy for their needs), as well as the historical level of funding.

Input-based funding “misaligns incentives, rewards sub-par performance, and diminishes the imperative for significant and sustained educational outcomes.”<sup>19</sup> For this reason, it has been concluded that “by concentrating on inputs and ignoring the incentives within schools, the resources have yielded little in the way of general improvement in student achievement.”<sup>20</sup>

Ultimately, input-based funding is flawed as a means for maximising educational outcomes since it is based on who comes to a school rather than what happens at school. That's why it's been argued that funding “should be based upon academic growth and not just whether a student enrolls and sits at a desk.”<sup>21</sup>

For this reason, an outcomes-based approach reorients funding based on activity on the production side — that is, the quality of education that schools deliver, such as adopting funding arrangements that are directly tied to individual or institutional indicators for performance (performance-based funding).

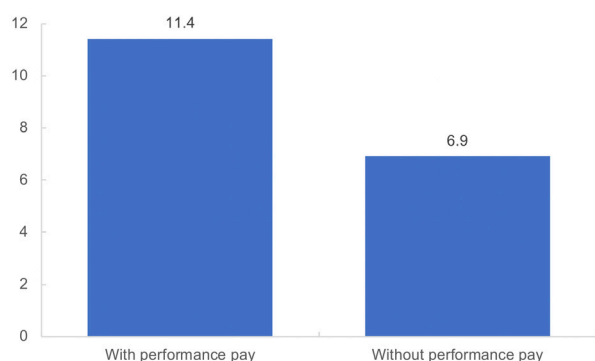
The OECD Principles of Budgetary Governance call on countries to “ensure that performance, evaluation and value for money are integral to the budget process.” The OECD’s School Resources Review recommends that countries direct their efforts to evaluating how funding is translated into educational processes and outcomes.<sup>22</sup> Funding systems based on outcomes intend to “reward schools for both achievement and improvement” to “promote classroom innovation, competition, and student performance.”<sup>23</sup>

There are obvious opportunities to reorient the funding approach in Australia and improve education outcomes. Teachers aren’t paid based on their performance, but on their degrees and years of experience — factors that have little correlation with their in-field performance — contributing to the disincentives for the high-ability teachers entering or remaining in the profession.<sup>24</sup>

The lack of financial incentives supporting performance is due, in part, to a mistaken perception that teachers’ performance cannot, or should not, be measured. However, it’s clear that it’s unfair for all teachers to be paid virtually the same, despite differences in effort and performance. There’s also evidence that performance-based pay effectively motivates teachers,<sup>25</sup> and that establishing a clearer connection between spending on schools and outcomes helps build public support.<sup>26</sup>

Moreover, countries that pay teachers based on their performance score higher on PISA tests in all domains<sup>27</sup> — around one quarter standard deviations higher.<sup>28</sup> And Figure 18 shows that school systems that have performance-based pay for teachers are much more productive than those without — consistent with research that shows performance incentives are an especially cost-effective approach for improving educational outcomes.<sup>29</sup> Research has also found that performance pay can lead to improvements in teaching methods and in teachers’ responsiveness to students’ learning needs.<sup>30</sup>

**Figure 18. Per \$US1000 spent on schooling (over ages 6-15), countries with performance pay earn a greater return in terms of PISA reading score.**



Source: PISA in Focus (2012).

A comprehensive meta-analysis shows that teacher pay incentives have a positive and statistically significant effect on student achievement — equivalent to around 0.043 standard deviations (though there is variability in effectiveness based on programme design, implementation, and context).<sup>31</sup> While some past studies have not shown any significant effects of using performance incentives, this is generally because the design of schemes was temporary and not embedded into ongoing system-wide practices.

The design of a performance-based pay system is critical to its likely success. A particularly successful approach was implemented in Washington, DC, using both rewards and sanctions, and multiple measures of performance. Under that model, teachers rated as highly effective earn a substantial bonus as well as an equally large permanent salary increase after two years. Teachers deemed to be ‘minimally’ effective are provided support of coaches and offered one year to demonstrate improvement. Teachers found to be ineffective are at risk of dismissal.

Researchers studying this model found that simply introducing the threat of possible dismissal increased the voluntary attrition of low-performing teachers by 50 per cent.<sup>32</sup> Another study in Chicago found that initially awarding a financial incentive, with the threat of withdrawal if results were not met, produced significant improvement in student test achievement.<sup>33</sup>

Program design features that appear to improve success of teachers’ performance incentives include: being supported by broader professional development practices (though including financial incentives is effective on its own, even without the benefit of further performance management); when multiple measures of performance are used; where the incentive payments are relatively high (at or above a 7.5 per cent bonus); where duration is longer (more than 3 years); for primary and upper secondary school levels (as opposed to middle school equivalent years); and especially beneficial when attached to achievement scores in mathematics.<sup>34</sup> While group-based incentives — intended to reward cooperation of teachers across a school or department — are attractive in theory, research shows that opportunities to ‘free ride’ can limit the effectiveness of programmes.<sup>35</sup>

### The funding formula methodology is fundamentally flawed

Formula-based approaches to school funding have become an increasingly popular method around the world over the past few decades — largely motivated by the intention to create a more consistent, robust, and transparent methodology. However, it’s not clear that these objectives have been met in Australia, as we are left with a highly complex set of arrangements, driven by a poorly understood and flawed model.

In order to establish an amount of funding considered to be sufficient to educate each student in Australian schools, a Schooling Resource Standard (SRS) has been determined and supported by states and territories in their respective models (though each calculate funding and distribute it differently in practice).

Moreover, the methodology behind the model assesses the appropriate amount of funding according to the historical amount received by relatively high-performing schools in the past (despite, as has been noted in this paper's research, differences in resourcing bearing little relation to differences in student achievement), rather determining the efficient (least-cost) figure for providing high-quality education. Specifically, a more appropriate methodology would effectively establish the production frontier for school education and use this to estimate base resourcing.

Writing around the time of the reform, the National Commission of Audit warned that "it is not clear ... that the projected step-up of growth in Commonwealth schools funding ... has been sufficiently justified." Moreover, its analysis found that "the per student

funding that drives the model is not based on a detailed analysis of the cost of delivering education and may not represent its efficient price" (see also Box 3).

### **Accountability of school funding must be improved by being more transparent and market-based**

Accountability makes all other elements of school systems work together.<sup>36</sup> That's because unaccountable school leaders who have been given autonomy could easily underperform, and competition between schools can only be effective if parents are able to make informed choices.<sup>37</sup>

It's important that there is accountability for schools' inputs (how much funding schools get), outputs (what schools do with their funding), and outcomes (what is achieved as a result of funding) in education. Key to this is transparency. Some of the approaches supported by the research include: supporting choice and competition; allowing greater decentralisation of decision-making and school-level autonomy; and linking accountability to performance.

### **Box 3: How much funding is enough?**

All governments are conscious of the need to provide schools enough funding to run effectively, but have struggled to calculate what an appropriate amount of funding is. The guiding principles are usually on the basis of ensuring an 'adequate' amount (meaning schools get a similar 'base' amount of funding each) or an 'equitable' amount (meaning that schools get enough to allow them to overcome any pre-existing inequities).

The Gonski funding model essentially incorporated both these principles, setting aside money for a base amount (75 per cent of total funding) and a component explicitly for addressing socioeconomic inequities (called 'loadings', in total worth 25 per cent of total funding). While the amount of equity loadings are set arbitrarily (based on little supporting evidence), the amount of base funding follows a methodology that benchmarks the level of past spending of relatively high-performing schools (called reference schools), after removing any equity-based funding.

The logic of this methodology is that schools can be split between two groups — high-performers and low-performers. It then assumes that the only difference between schools that are high- and low-performing is their level of funding. This then implies that since the benchmarked, high-performing schools have 'sufficient' funding, it would be expected that performance would not slip beneath the performance benchmark. However, analysis of this data shows that over one in four schools identified as initially high-performing had become a low-performing school four years later — meaning that despite receiving notionally 'sufficient' funding, they still experienced achievement decline. At the same time, many schools went from being low-performing to high-performing, while experiencing similar or lesser funding than the others.

In other words, the resourcing standard — the foundation on which the entire school funding model is based — is clearly a flawed approach which provides little basis for improving educational achievement.

#### **Box 4: Why is school funding in Australia so complex?**

Australia's school funding system is unnecessarily complex. That's because there are actually many school funding systems — differing according to states and school sectors. Moreover, while the funding formula is notionally nationally consistent (despite each state making their own separate commitments with the federal government), it's not 'sector-blind'.

In the current arrangement, the federal government's model is important because it sets the expected level of funding that each student is notionally entitled to for their schooling (the amount that a student 'attracts'). But the amount of that funding that ultimately ends up at the school-level — let alone to a student's classroom — is quite another matter.

For most schools, state governments and the leaders of non-government school systems receive the funding each student attracts and then recalculate according to their own respective models, and redistribute it further between their schools more or less as they see fit. Around one in five non-government schools receives a substantially different amount of funding (+/- 10%) to what is notionally attracted.<sup>38</sup>

And funding that is notionally attracted for equity purposes is often not actually used for that purpose. Some of it isn't reallocated for equity purposes at all (around 16 per cent)<sup>39</sup> while the remainder is reallocated across different equity categories. In particular, funding that is attracted in order to address socioeconomic disadvantage and students with disability is reallocated for alternative uses.

Another complicating factor is the shared funding responsibility between the federal government and states and territories; each contributing different resourcing levels based on individual agreements. It's well acknowledged across education stakeholders that federalism arrangements — from resourcing to inter-state decision-making coordination — have largely obscured, rather than improved, allocation of schooling responsibilities.<sup>40</sup> This has led to suggestions for radically simplifying the funding structures — such as leaving all government school funding to state and territory governments, along with placing all non-government school funding responsibility with the federal government.<sup>41</sup> It's argued that simplifying where responsibilities lie will improve accountability to relevant governments.

#### **School funding is indirect and not transparent to parents and taxpayers**

When it comes to accountability for school inputs, Australia's system is opaque and complex. The multiple overlapping school funding formulas applied, and the indirect way this funding eventually flows to schools, is far too complex and undermines accountability (see Box 4). The other reason school funding is opaque is that public funding is distributed within 'systems' (authorities that make spending allocations) so parents don't have a visible price signal for how much their child's education actually costs. That's because public funding goes to schools via systems (a supply-side subsidy) rather than to parents, such as through vouchers (a demand-side subsidy).

#### **Decision-making is highly centralised, limiting school-level autonomy and accountability**

There is virtually no accountability for outputs. While the total amount of funding schools receive is reported online, what that money was spent on is not publicly reported — meaning parents are unable to make fully informed decisions in choosing schools, and taxpayers cannot be fully confident that funds have been used well. It means there is little visibility over the spending priorities schools have or any specific pedagogical approaches they favour.

It's important that spending decisions should ultimately be made at the school level, but there should also

be visibility for parents on what those decisions are. Australian teachers and school leaders report very high and increasing administrative burden placed upon them due to overly burdensome centralised red tape.<sup>42</sup> It's also clear that some accountability measures currently adopted in Australia's school system — such as school performance self-assessments and annual reports — are not proving to be especially meaningful to stakeholders in their current form.<sup>43</sup>

For money to be well spent, decisions need to be made based on the best possible information. As the Gonski review argued, localised spending decisions allow money to meet educational needs of schools, since principals know best what schools' needs are. Across countries, more decentralised decision-making (autonomy) in schools is correlated with better educational outcomes and more centralised decision-making is correlated with poorer educational outcomes.<sup>44</sup> In particular, in countries where schools have greater autonomy in how they spend money, and there are accountability measures of outcomes in place, students perform better.<sup>45</sup>

According to the OECD,<sup>46</sup> Australian schools are slightly more autonomous than the OECD average — primary responsibility for tasks is more likely to be delegated to the principal, teachers or the school governing board. However, this overall result is a little misleading, as it's necessary to further break this down according to school sector — because Australia has a relatively large non-government sector, this inflates the overall autonomy index. That's because there are significant



differences in autonomy between government and non-government schools (with the former much more centralised, and the latter more flexible).

When comparing Australian government schools and non-government schools to their international equivalents, autonomy over spending is lower than the OECD average in each school sector. That means there is considerable scope for deregulating school spending decisions in Australia, which is likely to bring with it greater efficiency, and result in better outcomes for students.

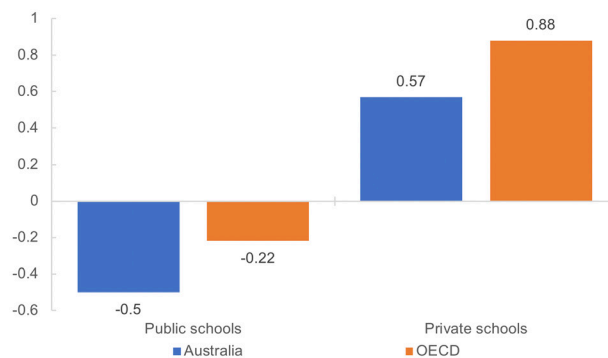
### Market-based accountability through choice and competition can more efficiently allocate resources

In most countries, school choice has generally been increasing over recent decades, and in Australia, competition between schools is among the highest in the OECD.<sup>47</sup> Yet, CIS research shows that most Australian parents still don't feel that they have as much choice as they would like — mostly due to constraints of cost and location limiting their choice.<sup>48</sup> Policymakers could further improve access of parents to school choice by alleviating existing location-based barriers (such as zoning regulations) and cost-based barriers (such as supporting parents who seek, but cannot independently afford, non-government school alternatives for their children).

Expanding school choice could help to improve educational outcomes.<sup>49</sup> The OECD argues that school choice should be "real, relevant, and meaningful" — that is, where there is genuine access to choice, when that choice differentiates on relevant matters, and when there is genuine differentiation between schools.<sup>50</sup>

On the supply side, more choice to parents means more competitive pressure on schools to perform better than they would otherwise — and evidence shows that competition increases teachers' performance in particular.<sup>51</sup> In Australia, because parents voluntarily pay proportionately more than in most countries, parents generally demand greater accountability

**Figure 19. OECD Index of Autonomy over resource use, by school sector.**



Source: OECD (2012). Public and Private Schools: How Management and Funding Relate to their Socio-economic Profile.

for the performance of chosen schools (since there is something of a visible price signal when fees are paid) — making schools more demand-sensitive than they would be otherwise. CIS research has found that parents with children in non-government schools (with higher voluntary payments) are more confident in how schools use their resources than those who chose government schools.<sup>52</sup>

On the demand side, more choice offers school differentiation, meaning parents can find schools that best meet their preferences and the interests, abilities, or needs of their children. There are also other 'allocation effects', meaning that more school choice increases the diversity of school populations (see Box 5). Since students who live in a given area are limited in choosing an out-of-area government school, this reinforces socioeconomic inequities (also known as 'stratification') because people in a given geographic area tend to share similar demographics. Yet, inequities in the current school funding arrangements mean that non-government schools receive markedly less public funding than similar government schools, even when there may be comparable ability for parents to pay toward their child's schooling.<sup>53</sup>

## Box 5: Does school choice increase inequality?

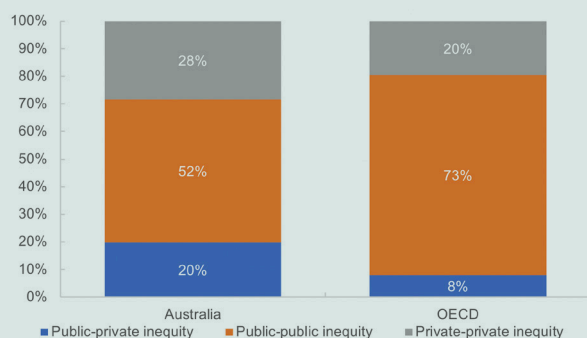
It's often argued that school choice should be 'balanced' with equity — implying there is some trade-off between more choice and more equity in a school system.<sup>54</sup> However, the research shows that school choice *reduces* rather than increases inequity, particularly through reducing socioeconomic stratification.<sup>55</sup> It's true that Australia's schooling is slightly more stratified overall than the OECD average — meaning that students are a little more likely to go to school with students of a similar socioeconomic background to themselves — but that is ultimately a reflection of a lack, rather than an excess, of school choice.

By far the greatest inequities that exist in Australian schooling can be mostly attributed to differences in postcodes, not school sectors. After accounting for differences in socioeconomic status, there is virtually no performance advantage for non-government schools in Australia. That means school choice (and having access to a non-government school specifically) does not *exacerbate* educational inequity. In part, this is because Australian non-government schools, on average, are much less exclusive than those in other countries. While there are financial barriers for some families to access some schools, other selection barriers (like making enrolment decisions based on student performance in placement tests or ancestral background) are less common in Australia.<sup>56</sup>

As a result, the actual socio-economic difference between Australian public and private schools is no wider than the OECD average.<sup>57</sup> Even once system-wide inequities are decomposed, the majority of inequities can be explained by differences between government schools.

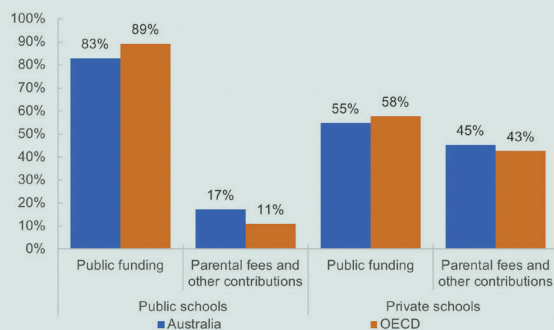
Opponents of school choice often argue that non-government schools shouldn't be eligible for public funding (an indirect subsidy) because most already receive — or have the capacity to receive — funding from parents. While it's true that Australian schools, overall, receive a relatively high proportion of funding from parents compared to other countries, once this is broken down by school sector, it provides evidence against the standard arguments made by school choice opponents. Parents voluntarily pay relatively high amounts to *government* schools (which are prohibited from imposing mandatory school fees) compared to government schools in other countries, and taxpayer subsidisation of non-government schools is less than the OECD average. Moreover, OECD research shows that government funding to support choice (by partly offsetting cost-barriers) of non-government schools significantly reduces the possible socio-economic inequities than would exist otherwise.<sup>58</sup>

**Figure 20. Decomposition of inequities within and between school systems, Australia and OECD average.**



Source: Adapted from OECD (2012). Public and Private Schools: How Management and Funding Relate to their Socio-economic Profile.

**Figure 21. Source of funding, by sector of school: Australia and the OECD.**



Source: OECD (2012). Public and Private Schools: How Management and Funding Relate to their Socio-economic Profile.

In order to support competition and parental choice, there needs to be transparency of school outcomes — this is mostly limited in Australia to the reporting of student achievement in NAPLAN testing. Ongoing debates and reviews continue regarding whether the standardised testing regime is unfair on teachers and students, whether it overly simplifies students' learning, and whether there is a need for an externally validated test to independently compare students and schools.

However, the international evidence shows that not only do school systems that publicly report student achievement in standardised tests — like the MySchool website — perform better, but those that attach more consequences (sometimes referred to as 'higher stakes' by education researchers) to the results, perform better than those that are low-stakes.<sup>59</sup> In Australia, NAPLAN testing is (at least formally) no-stakes because there are basically no consequences for underperforming schools or teachers — and the benefits are reduced by significant time lags between when testing takes place and the reporting of results.



## Australia hasn't made smart investments in our teachers

The most significant financial investment the education system makes is in its teachers. It's also the case that quality of teaching is by far the greatest controllable factor relating to students' educational outcomes — far surpassing other policy interventions. For this reason, the school funding approach should specifically support incentives for high performance of teachers in order for resourcing to improve student achievement. A more constructive approach toward performance management is essential for the education system to successfully build teachers' performance.

### **Building teachers' capacity is the best investment the education system can make**

The ability and performance of teachers accounts for around 30 per cent of the observed difference in achievement between students (considerably dwarfing the possible impact of simply increasing school funding).<sup>60</sup> Within a given school, differences in the quality of teaching are responsible for around 6 months to 18 months' worth of learning. Good teaching provides a considerable payoff not only in classroom learning, but for students' likely lifetime earnings — between \$144,000 (for teachers that are slightly better than average) to \$543,000 (for teachers in the top 16 per cent).<sup>61</sup> It's also been estimated that a low-performing teacher contributes only around half of the equivalent learning of a student in a given year.<sup>62</sup>

However, it's one thing to recognise the importance of quality teaching and quite another to identify how public policy can meaningfully improve the

effectiveness of the teaching workforce — policymakers can't police every classroom and every school to ensure only 'good' teaching is taking place. But policymakers do set the institutional rules that determine who becomes teachers and what's broadly expected of them.

When it comes to available policy levers, it's important to distinguish between pre-service (attraction, selection, and training of teaching candidates) and in-service (performance management, professional development, and retention) interventions to improve teachers' effectiveness. Another way to think of this is that pre-service interventions deal with teachers' aptitudes or capabilities (getting high ability potential teachers to apply and join the profession), while the in-service component deals with teachers' performance (developing and retaining the best teachers — basically, getting the best out of existing teachers). Analysis of top-performing school systems has identified that there is an integrated approach that targets both pre-service and in-service.<sup>63</sup>

Most of the time, however, policymakers have been overly focussed on the pre-service factors (like placing restrictions on eligibility of teachers or requiring additional training of teachers) and not enough on in-service factors.

For one, identifying and selecting the best prospective teaching candidates is not an exact science.<sup>64</sup> Even though, on average, teachers with higher cognitive ability scores turn out to be better teachers (see also Box 6), performance can vary substantially between two teachers that record similar cognitive ability scores

on paper.<sup>65</sup> For this reason, research indicates that recruitment criteria shouldn't be exclusively based upon academic ability, but also on additional criteria of candidates' attributes (such as their expectations and beliefs on how their work can impact students' learning).<sup>66</sup> <sup>67</sup> Research also shows that teachers' subject area knowledge — not solely their academic ability — is a strong predictor of student achievement; particularly when mathematics teachers have highly specialised mathematical knowledge.<sup>68</sup> As a result, policymakers should take caution in setting restrictive and overly narrow eligibility requirements for teaching candidates based solely on cognitive ability.

Pre-service selection efforts can result in possible false positives (those who meet eligibility but turn out to be ineffective when in the classroom) and false negatives (those who may have been effective but did not meet eligibility). Second, efforts to improve the selection of teachers will take years to make a significant difference in schools (and does nothing to impact on the practice of the 95 per cent of teachers who are already in the field). And third, it's likely the quality of content in the training that teachers gain (or fail to gain) during their preparation courses at university plays a bigger role in how effective teachers ultimately become on-the-job. Indeed, general increases in additional training requirements and credentialing — like having more teachers complete postgraduate qualifications or longer undergraduate degrees — are costly (since it increases wage demands) and haven't been shown to effectively improve outcomes.<sup>69</sup>

In any case, perhaps the most commonly made claim is that salaries for teachers need to be high in order to attract the best candidates and retain the most highly capable teachers. But, because all teachers gain from the high rates of pay (not just the high-performers or those with in-demand skills), this is a costly and ineffective approach. Instead, a much more differentiated pay structure with performance incentives would be far more efficient and fairer to teachers (see Box 6).

## More flexible recruitment and pay is needed to attract more high ability candidates to teaching

Australia has suffered a persistent challenge in attracting (and retaining) teachers who score highly in academic proficiencies, for both demand and supply reasons.

On the demand side, reductions in class size (and, to a lesser extent, planning to address the ageing workforce) have unnecessarily increased the demand for teaching recruits, which has been met with reduced tertiary entry requirements into teacher preparation degrees. That's despite the OECD warning that lower standards of entry into the teaching profession can produce a downward spiral, resulting in a lower-quality teaching force.<sup>70</sup>

On the supply side, the aptitude of teachers has declined not so much because of relaxed entry standards (in any case, this is a relatively recent phenomenon and the decline has predated it) but because of a general decline in the literacy and numeracy aptitude within the general adult population (and other factors affecting supply of teachers' labour, see Box 6). More broadly within Australia's adult population, while literacy levels are relatively high, numeracy levels are lower — around one in five Australian adults can perform only basic mathematical processes, at a level equivalent to a 10-year-old child. This could reflect differences in post-schooling educational choices and reductions in the quality of instruction in tertiary education sectors.

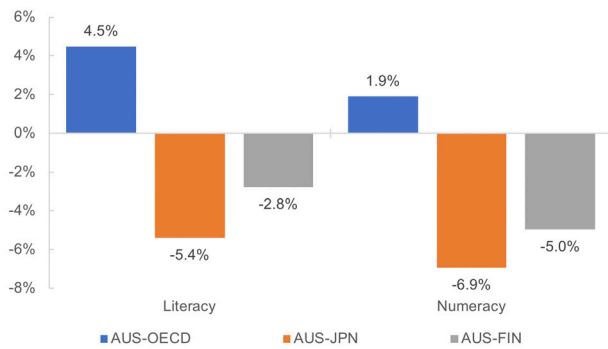
This means that within the Australian labour market, adults with high levels of numerical proficiency are already relatively scarce, which explains why OECD data shows that Australians with high numerical proficiency earn a particularly high wage premium in the wider labour market. This makes it relatively difficult to attract top mathematics teachers to classrooms, particularly given inflexible pay arrangements (see Box 6).

### Box 6: Why are fewer high achievers becoming teachers?

While most would agree there is a persistent difficulty attracting and retaining great teachers, there is disagreement as to the reasons. It's often reported that the problem is the decline in status of the teaching profession, citing international examples of countries that notionally 'respect' teachers more than here. The argument is not very convincing, given the evidence that Australian teachers are paid much higher than their international counterparts, and their pay compares favourably against other university-educated workers. It's much more likely that fewer high achievers are attracted to teaching because of the inflexible pay structure and that there are simply fewer high achievers in the broader population to choose from.

Research has tested two competing explanations of the declining academic aptitude of teachers:<sup>71</sup> the 'pull' hypothesis (pay in other professions has increased over the years, so highly capable candidates are no longer attracted to teaching), and the 'push' hypothesis (centralised and inflexible pay compression has 'pushed out' capable teaching candidates). It finds that virtually all the decline in observed changes in average teacher academic aptitude can be explained by the push hypothesis. Moreover, it finds that wage compression results in a large share of relatively low-aptitude workers being attracted to teaching at the same time that high-aptitude workers are disinclined to become teachers.

**Figure 22. Australian adults' literacy and numeracy proficiency, compared to OECD average, and high performing countries.**



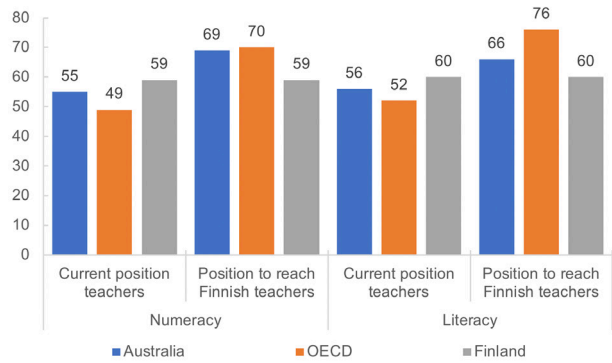
Source: OECD PIAAC.

Contrary to recent public commentary, Australian teachers are not especially low-achievers compared to most other countries (see Figure 22). Australian teachers record above-average levels of numeracy (from the top 45 per cent) and literacy (top 44 per cent) proficiency, compared to other university-educated Australians (similar to the pool of teachers in the Finnish labour market). But because the numerical and literacy skills of the broader adult population are lower in Australia than in Finland, for instance, it means that for Australia's teaching workforce to meet the same level of Finnish teachers it would be necessary to more selectively recruit from within the Australian adult population.

It is feasible that Australia could match the academic ability of Finnish teachers if it recruited from the top 31 per cent of our adult population in numeracy, and the top 33 per cent of our adult population in literacy (see Figure 23). There is a large estimated educational payoff — equivalent to around an 18 per cent increase in students' numeracy performance in PISA tests, and to around a 7 per cent increase in students' literacy performance.<sup>72</sup> However, it may be more readily possible to increase the general aptitude of teacher candidates by further developing competencies of the broader adult population in literacy and numeracy (such as through tertiary education), than by imposing restrictive recruitment policies.

Setting stringent cut-offs to entry to the teaching profession could result in unintended negative consequences. To start with, there's no reason to assume high-ability candidates will choose teaching ahead of other career options unless there is a change in the broader financial incentives (Box 6). Second, stricter entry requirements would result in a shortage of teaching recruits, potentially leading to a repeat of the cycle that contributed to the increase in low-aptitude teachers in the first place. And third, the evidence suggests that efforts to restrict entry to teaching elsewhere haven't improved teacher quality (such as through credentialism),<sup>73</sup> but have inflated wages (since explicit and implicit costs of prospective teachers are effectively passed on through wage bargaining).<sup>74</sup>

**Figure 23. Distribution of literacy and numeracy of in-field teachers, international comparison.**



Source: Hanushek, Piopiunik and Wiederhold (2014), *The Value of Smarter Teachers: International Evidence on Teacher Cognitive Skills and Student Performance*; OECD Programme for the International Assessment of Adult Competencies (PIAAC).

Instead, it would be more appropriate to implement more flexible, demand-based salaries that reflect the relative shortage of some subject area teachers (especially those in mathematics and with specific training in supporting students with special needs). This could be supported by more flexible, employment-based pathways to teaching — where mid-career candidates with previous, relevant experience in a subject area receive fast-tracked training in schools, rather than undertaking formal undergraduate and postgraduate education degrees.

All teachers, once in schools, could benefit from performance incentives — which could be a more effective approach to building education quality than setting broad and inefficient entry restrictions on teacher candidates. Research shows that use of performance incentives has a long-term benefit for teacher workforce planning — attracting higher ability teachers to the profession<sup>75</sup> and retaining high performing, early career teachers.<sup>76</sup>

More flexible entry pathways (such as the Teach for Australia programme) and salaries could also lead to a more efficient allocation of teacher supply. While some teachers do change schools for potential differences in salary (like when workers seek promotions in other professions), because of the centralisation of salaries (particularly in the government school system), the incentives are not sufficient to significantly improve allocation of teachers to where they're needed.<sup>77</sup> This has been particularly pronounced in the ongoing difficulty to attract and retain teachers in disadvantaged areas.<sup>78</sup>

But the other problem has been the oversupply of teachers with some academic backgrounds, and an undersupply in those with others — without the flexibility in pay to reflect high-demand and low-demand skillsets. The most obvious shortage is that of STEM teachers in Australia<sup>79</sup> — 80 per cent of students have a teacher without specialist background,<sup>80</sup> and just 19 per cent of teachers have university-level STEM qualifications.<sup>81</sup>



## Our teachers would benefit from better performance management practices

While high starting salaries can make teaching relatively attractive to candidates, the relatively flat structure and inflexibility make it harder to retain high-ability teachers (who also are able to potentially command higher salaries outside of teaching, see also Box 6). A lack of performance management in Australian schools also means there is little opportunity available to teachers to further develop their proficiency once in the field. This is exacerbated because there are virtually no financial incentives attached to performance — since pay levels don't reflect the differences in ability, motivation, and performance of teachers.<sup>82</sup> International research shows that teachers' overall effectiveness tends to decline over time when there isn't supportive performance management or incentives available.<sup>83</sup>

There are far greater dividends to be earned from improving performance management in schools as a way to improve teachers' capacity than can be achieved through various pre-service policy interventions. Relative underperforming teachers can be developed into average performers, and high-performers can be motivated to maintain their performance (and not leave the profession). Further, the costs to improve performance management are minimal, and financial

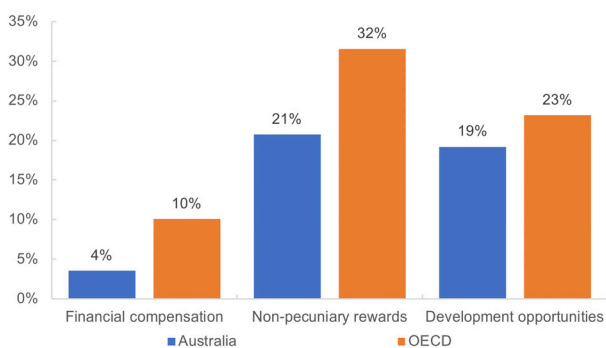
incentives could be compensated by other policy interventions (such as increasing class or school sizes slightly).

When it comes to performance management, Australian teachers' performance appraisals are more likely to be inconsequential or low-stakes than in other countries. It's extremely rare for performance appraisals to be linked with financial compensation — either a change in base salary or additional reward payment.<sup>84</sup> Moreover, this is not because principals aren't able to identify high- and under-performing teachers, but they are unable to effectively act upon observed performance because the system is highly regulated.<sup>85</sup>

The unfortunate reality is that while most schools notionally have a performance appraisal system, there is a general failure in the effectiveness of them.<sup>86</sup> Teachers report that underperformance is tolerated in schools without any action taken (see Figure 26). In addition, around 70 per cent of teachers say that a colleague would not be dismissed in their school for sustained poor performance.<sup>87</sup>

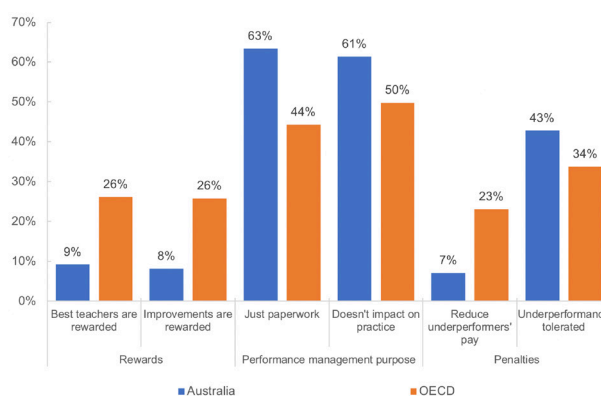
At the same time, good performance isn't rewarded — about 90 per cent of teachers don't think they would receive any recognition for improving performance.<sup>88</sup> It's little surprise, then, that performance management is a key reason given for leaving teaching — around

**Figure 24. Outcomes of teachers' performance appraisals**



Source: Adapted from OECD (2009). *Creating Effective Teaching and Learning Environments: First Results from TALIS*, OECD Publishing, Paris.\*

**Figure 25. Teachers' perspectives on school performance management systems**



Source: Adapted from OECD (2009). *Creating Effective Teaching and Learning Environments: First Results from TALIS*, OECD Publishing, Paris.\*\*

± The OECD notes that sampling issues in Australian participation in more recent waves of TALIS (2013 and 2018) limit the usage of this item. Where comparisons are possible across TALIS waves, they are consistent with the findings shown in this Figure. For instance, 5% of teachers in TALIS 2013 and 7.5% in TALIS 2018 say sanctions, like reductions to annual pay increases, may be applied for poor performers (compared to the OECD average of 22% and 15% respectively). In addition, 14% of teachers in TALIS 2013 and 12% in TALIS 2018 say they can earn a salary bonus (compared to the OECD average of 14% and 41% respectively).

±± The impact of performance appraisals was not included in TALIS 2018 volumes I or II. TALIS 2013 included a similar item but with fewer responses available. Where it is possible to compare this items across these waves, there are broadly similar observations to those displayed in this Figure. For instance, 62% of Australian teachers in TALIS 2013 say that performance appraisal and feedback in schools is largely for administrative purposes (compared to the OECD average of 51%).

Two responses showed some variation in the TALIS 2013 wave. For instance, a lower proportion of teachers in TALIS 2013 said that performance appraisal has little impact on performance (43%; consistent with the OECD average). And a higher proportion (31%) of Australian teachers in TALIS 2013 say best performing teachers are rewarded (compared to the OECD average of 38%).

An additional option for respondents was included in TALIS 2013, which asks teachers if appraisal is based on thorough assessment of their teaching, to which 29% of Australian teachers agreed, compared to the OECD average of 47%.

50 per cent of secondary teachers leave teaching due to insufficient recognition and reward, and 15 per cent due to dissatisfaction with performance appraisal processes.<sup>89</sup>

This dissatisfaction is reflected by teachers' reporting that they see that performance management is undertaken just as an administrative formality, with no impact on their actual work. Nearly one in three Australian teachers report they have not had an appraisal or feedback from their principal in a year and only around one in three teachers who do receive feedback on their performance are satisfied with the feedback.<sup>90</sup>

The Productivity Commission has criticised the over-bureaucratisation of performance management in government schools, observing that:<sup>91</sup>

- Schools typically don't have the authority to dismiss a teacher or take other disciplinary action, though a majority of government secondary school principals would like more authority in dismissing teachers and many would like to financially reward teachers.<sup>92</sup>
- Schools are basically limited to providing a formal warning and period of case management in which a teacher has to remedy their underperformance.
- If the teacher fails to lift their performance to the required standard after being given

reasonable time and support to do so, the school usually has to initiate a further process with the education department, in which a written report is submitted to a senior departmental official to decide what action to take.

There are a number of possible ways that performance can be rewarded financially (see Table 1), but not all are equally effective. In Australia, the introduction of the Highly Accomplished and Lead Teacher programme has been unsuccessful — just 573 teachers across the country have been recognised in the top two of four performance bands (around 0.2 per cent of the teaching workforce).

Among the observed failures of this kind of approach has been that the onus has been on teachers to demonstrate their proficiency (which can be quite time-consuming), even though more objective measures like student achievement scores could more readily identify top teachers. In addition, because pay increases are permanent rather than a periodic responsive reward, there is no guarantee that performance will be sustained. But most significantly, the programme has led to high-performing teachers being taken out of classrooms and into administrative roles (around three in four teachers who achieved HALT status have shifted into leadership roles), meaning students may be worse off.

**Table 1. Common performance-based remuneration approaches**

Approach	Description	Comment
<b>Performance-based increments</b>	Teachers automatically progress between points on a pay scale, based on meeting a set of performance expectations and tenure.	While pay increments are notionally based on meeting satisfactory performance, they are rarely withheld in practice — meaning it ends up ultimately not reflecting performance in effect.
<b>Advanced-skill teacher positions</b>	Senior positions (like instructional leaders) are made available to teachers with a single higher-paid classification. Selection is based on experience, gaining extra qualifications and/or demonstration of quality teaching practice, but rarely on evidence of student outcomes	Relatively few senior positions are made available, and, rather than pay-for-performance tends to result in pay-for-extra-work.
<b>Performance-based career structures</b>	Teachers' performance is classified across a range of different proficiencies (as in Australia's accreditation system), based on demonstrating a range of proficiencies.	Should be designed so reward payments are only provided to high-performing teachers, and it does not entrench an expectation that higher certification automatically entitles teachers to higher pay.
<b>Performance bonuses</b>	Lump-sum bonuses paid on the basis of recent performance. Bonuses are most effective when they are 'limited linear' — that is, there is a minimum performance threshold set and then progressive incentives applied for achievement beyond the threshold up to an expected (and an exceptional) standard.	Provided bonuses are timely, this reinforces effective practice. Because bonuses are temporary, this encourages teachers to maintain performance. If well designed, virtually all teachers can be engaged (not just those that are more experienced).

Source: Adapted from Productivity Commission (2012). Research Report: Schools Workforce, Canberra; OECD (2009). Evaluating and rewarding the quality of teachers: international practices, OECD Publishing.



## Implications for policymakers

### **Policymakers mustn't assume additional funding will automatically improve student achievement**

Taxpayer funding for schools is expected to continue increasing at record levels for the foreseeable future, thanks to long term agreements in place between states and the federal government. It's unlikely that policymakers' ambitions to see educational improvements will be realised with these funding commitments.

The analysis presented in this paper shows there is no relationship between additional funding and improved student achievement. This does not mean that smart use of taxpayer funding *cannot* help schools, but that the current approach is unlikely to yield the desired educational return. This should serve as a warning to policymakers to reconsider the planned increases (through aggressive yearly indexation) in school funding. In the more immediate term, it should also give cause for policymakers to resist urges for additional 'catch-up funding' due to covid-related learning losses of students.

An exception to this may be remote schools, since those receiving additional public funding also show higher average achievement. The current independent review into funding of rural and remote schools should carefully consider the appropriateness of the current approach to this specific loading (including how it relates to the broader school funding formula, since it confounds student- and school-level resourcing components). While modelling suggests additional funding may help to address the achievement gap, there are also alternatives that could reduce the burden on taxpayers — such as consolidation of some remote schools — as efficiencies from larger schools would reduce additional funding requirements.

### **The methodology behind the school funding model is flawed and should be reviewed**

There are technical flaws in the school funding formula, which have impacted on resourcing decisions. In particular, the methodology used to estimate base funding amounts — which are responsible for the majority of funding — should be reconsidered. A formal, independent evaluation of both the evidence supporting the Gonski review and the effectiveness of subsequent funding increases (grounded, at least partly, in Gonski's recommendations) should be delegated to the National School Resourcing Board.

As it stands, the current approach assumes that the historical funding received by relatively high-achieving schools represents the efficient cost of delivering quality education — but the methodology used in support of these decisions doesn't actually do this. Alternative empirical approaches would need to be applied in order to actually estimate the efficient cost of education. Base resourcing should be allocated according to the benchmark of the most efficient schools, rather than historical spending of relatively high-achieving schools (which make no assumptions about schools' efficiency).

In order for further analysis to be definitive about the effectiveness of specific components of the school funding formula — rather than simply the aggregate amounts — available data needs to be properly disaggregated. Moreover, the evidence base supporting school funding decisions needs to be enhanced through the use of high-quality, experimental evaluations of different financing approaches. To date, the only relevant accounting of school funding arrangements are in the form of audits that check compliance with legislation, not whether funding is contributing to educational improvement.



## **Funding should be more outcomes-based and less inputs-based — including performance-based funding approaches for schools and teachers**

The school funding model is effectively based on inputs — the number and demographics of students — not what is actually delivered by schools. This results in few incentives to improve the quality of education. Instead of being purely based on inputs, there should be components in the funding model that are explicitly tied to performance.

An obvious way to go to do this is for funding to be allocated as financial incentive for performance of teachers and schools. This would mean that resources are allocated according to the quality of education delivered. Care should be taken in the design of such a system, so that it is fair and accurate. To make a change of this kind will require agreement between the education ministers of the states, territories, and the Australian government — formalised in National School Reform Agreements.

One option for policymakers could be trialling a performance pay scheme on a relatively small scale while monitoring its effectiveness. Policymakers should note that several design features are common to effective schemes, such as: linking broader performance management and professional development to the financial incentives; having multiple measures of performance (including, but not limited to, student value-added achievement); providing sufficiently large rewards (at least equivalent to a 7.5 per cent bonus for high performance); and applying for a sufficient time period (at least 3 years).

Several findings from the research suggest that if policymakers were to trial a performance pay programme, it could be initially limited to mathematics teachers. There is reason to believe that additional salary flexibility would be most beneficial in this subject area, because there is a need to attract and retain teachers with high mathematics knowledge and ability to the teaching profession to address the current shortage, and because Australian students' performance is most severely declined in this subject area.

## **More autonomous, but accountable, schools would make better resourcing and workforce decisions**

Government schools have little discretion over how they use funds, and they are largely accountable to bureaucrats, rather than to parents. However, the research shows that autonomy, when combined with accountability, is key to promoting higher student achievement. Autonomy and accountability can be better shared among school leaders and parents, with a far more limited role for government departments.

Most school systems in Australia would benefit from providing more flexibility to school leaders in how resources are used — including decisions about

teacher pay and performance. Schools would benefit from having more flexible pay structures for teachers (rather than subjected to centralised wage decisions) and not being confined to limited, archaic performance management practices. There should be no institutional barriers preventing school leaders from providing financial rewards to high-performing teachers, and there should not be barriers to the dismissal of under-performing teachers.

Providing parents with more transparency over funding and other school-level decisions would increase parents' confidence in schools' use of resources. Policymakers should support additional governance models for government schools; particularly in order to allow parent bodies a closer line of sight in how their schools are run and resources are allocated and spent. Accountability from parental governing bodies — working in support of school leadership — would be more effective than the bureaucratic and centralised models faced by government schools in most Australian states and territories.

## **Funding could be more efficient if provided directly to households, rather than to schools**

An inhibitor to school funding transparency is that money for education goes to schools (generally via system authorities), not to households. This means parents have little idea how much they are actually contributing to their child's education. Clearer price signals would allow them to make better school choices and encourage greater accountability.

If funding for schooling was provided directly to households (such as through a voucher programme), this would enable greater choice and less reliance on government-run schools. One option would be to provide bursaries for students in low income households to use at non-government schools,<sup>93</sup> which would reduce the burden of additional fees on parents who would otherwise not be able to make payments. Though taxpayer subsidies for non-government schools already partly reduce their school fees, governments provide substantially more financial assistance to government schools — which means moving students from the government sector into the non-government sector saves taxpayer money.

While there has been improvement in making taxpayer support to non-government schools more closely reflective of parental incomes in recent years, this could be improved. Means-testing of direct payments to households would improve allocation by assessing each household's capacity to pay fees, rather than the assessed average for each school. There is also an institutional bias in assessing parental incomes, in that taxpayer funding is only adjusted for non-government schools. It would be fairer if similar assessments of parents' capacity to pay fees are made of parents choosing government schools.

## Teacher workforce planning should emphasise increasing supply of potential teachers, not restricting it

Policymakers have focussed their efforts in addressing teacher workforce challenges by restricting the supply of teachers. That includes tightening the eligibility to become a teacher (such as ATAR cut-offs and aptitude tests); increasing the hurdles needed to jump for accreditation (through compliance with additional professional standards); and requiring additional years of study and professional development to qualify for positions. This has been ineffective and only further entrenches current workforce problems — including chronic shortages in key subject areas, upward pressure on wages, and remuneration inextricably tied to tenure and qualifications (rather than ability and performance).

Instead, policymakers should be expanding the pool of potential teachers (both early career and mid-career transitions). Allowing a wider pool of teaching applicants means that schools — and the universities admitting prospective teachers — can be more selective in who they accept, and can make better selection and recruitment choices.

In order to better reflect the diversity of applicant abilities entering teaching, there should be more flexible, demand-based salaries of teachers. This could include higher starting salaries for candidates demonstrating high academic ability, those with subject area backgrounds facing shortage (such as special needs support or mathematics specialists), and those seeking work in hard-to-service locations.

Rather than imposing unnecessary restrictions on capable individuals transitioning to teaching, these barriers should be lifted. This could include accelerated, on-the-job training for individuals with suitable backgrounds, who wish to become teachers.

## Conclusion

There are strong justifications for public investment in education systems. A great education system leads to higher future productivity and economic growth — with educational differences accounting for over one-third of the gap in economic performance.<sup>94</sup> This makes closing the achievement gap between Australian students and the best in the world an economic no-brainer.

Given the huge investment, all Australians have a stake in seeing that funding effectively supports educational improvement and redressing the low level of satisfaction Australians have with the education system.<sup>95</sup> Money is an important lever for achieving education policy outcomes, but a more market-based approach is needed if we're to arrest the decline of recent decades. A constructive approach to performance — and ingraining incentives that support it — is a prerequisite for any education system that aspires to excellence.

Much political capital was expended to place school funding reform as a policy priority at various points over the past decade. Given the evidence that this approach may have been misguided, a comprehensive reassessment of policy direction can right the ship.

Policymakers should not be complacent about the need to restore confidence that the education system — and the investment made in it — are delivering to the highest standard of quality possible.

Money does talk when it comes to education, but must better meet the expectations and needs of parents, taxpayers, and educators.

CIS research has previously shown parents don't see a lack of resourcing as a key issue for schooling. Instead, they disagree with system-wide spending priorities, would prefer more flexible spending of schools, and would like more school choice.<sup>96</sup> School funding that incentivises higher performance will provide a greater educational bang for taxpayers' bucks. And teachers and school leaders would be the greatest beneficiaries of a school funding system which better supports and rewards high performance.

A country's education system is a predictor of its future economic prosperity, since human capital is key to national productivity. Australia's path toward a more productive future starts with ensuring greater efficiency and smarter investment in our education system.

## Annex A: Econometric methodology

All Australian school students (other than those with special exemptions or parental permissions) are required to participate in the National Assessment Program for Literacy and Numeracy (NAPLAN). NAPLAN assesses students at specific year levels (Year 3, Year 5, Year 7, and Year 9) in the domains of: grammar and punctuation; reading; spelling; writing; and numeracy (and all but the writing assessment are marked dichotomously). Test scores range from 0 to 1000 and are designed to support comparisons both across individual schools and over time. Scores are constructed so that any given score represents the same level of achievement over time, by scaling scores within a given domain so that it is consistent across schooling levels in that particular year.

For the purpose of this analysis, test scores are averaged at relevant Year 3 and Year 5 level across the domains of reading, writing, and numeracy. By excluding the additional language conventions — spelling and grammar and punctuation — it means the test score used for analysis isn't excessively weighted toward literacy at the expense of numeracy (student achievement in the language conventions tests is also relatively closely correlated with achievement in writing and reading, in any case). These domains were also selected because the available datasets match the scores of students in previous NAPLAN tests in the domains of reading, writing, and numeracy, but not for spelling or grammar and punctuation.

All Australian primary government schools are included in the analysis. Special schools are excluded because of relatively high NAPLAN exemption rates and due to differences in student intakes and staffing makeup, compared to mainstream schools. Combined schools are also omitted because current datasets provide only school-level aggregation of variables — including funding levels — which vary based on whether students are enrolled in primary or secondary schooling years.

Primary schools are also chosen for this study because it reduces, as much as is feasible, the confounding factors which may influence student achievement. For similar reasons, government schools are the focus of the analysis, rather than non-government schools. There are also differences in the staffing makeup in combined schools which would mean that their inclusion wouldn't support this analysis.

In the main, the key dependent variable of interest is the Year 5 NAPLAN score. This is because Year 3 achievement is relatively related to unobservable factors, like cognitive ability and home environment. Because analysis of Year 5 achievement allows employing past Year 3 achievement as a control, it strongly improves the accuracy of estimation in modelling — which can be observed in the high explanatory power of the respective models — and reduces the extent of possible confounding factors.

The Australian Curriculum, Assessment and Reporting Authority (ACARA) collects data on school characteristics (such as number of student enrolments, number of teachers and administrative staff, socio-educational advantage, and demographic characteristics of the student population), school finances in each year, and the average NAPLAN results for students in each domain in each year.

Econometric estimates are produced using a fixed effects regression model for the period 2010 to 2018 (the most recent data for financial information available at the present time) — a method that is occasionally employed in studying Australian education data.<sup>97</sup> The fixed effects specification is appropriate because it best accounts for within-school relationships among the relevant variables over time — meaning that it produces estimates according to the statistical association between time-demeaned predictors and predicted variable. The fixed effect approach also controls for unobserved effects and between-school heterogeneity — overcoming a common error in education research that limits efficacy of empirical estimates.

Alternative methodologies — such as regression discontinuity, propensity score matching, differences-in-differences, and the like — derived from experimental and quasi-experimental manipulation were not available for this study, because all schools and students are effectively 'treated' similarly (that is, there are no non-treatment, control groups for comparison).

Because of the presence of time fixed effects — given rejection of the null hypothesis that coefficient values corresponding to respective years are jointly equal to zero —, time (year) dummy variables are employed to account for observed differences in cohort-wide performance in NAPLAN tests for the year level specified.<sup>98</sup>

The fixed effect model specification can be expressed as:

$$\mathbf{N}_{i,t} = \alpha_i + \beta_1 \mathbf{F}_{i,t} + \beta_2 \mathbf{P}_{i,t-2} + \beta_3 \mathbf{X}_{i,t} + \mu_{i,t}; t=1, \dots, 9$$

Where  $\mathbf{N}$  is the mean NAPLAN score (reading, writing, and numeracy) in each school ( $i$ ) for each year ( $t$ ),  $\mathbf{F}$  is a vector of funding variables (i.e. public funding per student and private funds per student),  $\mathbf{P}$  is a vector of the lagged mean NAPLAN score (reading, writing, and numeracy) in each school ( $i$ ) for each year ( $t-2$ ),  $\mathbf{X}$  is a vector of control variables (i.e. student-teacher ratio, student-support staff ratio, size of school cohort, socio-educational advantage index, proportion of female students, proportion of students of Aboriginal or Torres Strait Islander background, proportion of students from a non-English speaking background, and year of test) and  $\mu$  is an idiosyncratic error. The subscript  $it$  refers to the  $i^{\text{th}}$  school and the  $t^{\text{th}}$  year.

The basic descriptives are provided for the primary government schools included in the analysis.

Variable	Definition		
		$\mu$	$\sigma$
<b>Year 3 NAPLAN</b>	Average annual consolidated score in the Year 3 NAPLAN tests for each school, averaged across the reading, writing, and numeracy domains.	403	37
<b>Year 5 NAPLAN</b>	Average annual consolidated score in Year 5 NAPLAN tests for each school, averaged across the reading, writing, and numeracy domains..	479	34
<b>Per student Public funding (\$000)</b>	Funding provided by the Australian Government for recurrent purposes, calculated per student.	13.7	8.7
<b>Per student Private funding (\$000)</b>	Private funds are made up of fees and other private contributions, calculated per student.	0.62	1.12
<b>FTE Students</b>	The number of students enrolled at the school expressed in terms of full-time students.	293.5	238.6
<b>FTE Students per FTE Teacher</b>	Average number of full-time equivalent students per full-time equivalent teaching members.	15.1	3.8
<b>FTE Students per FTE Non-Teacher</b>	Average number of full-time equivalent students per full-time equivalent non-teaching staff member. This includes: support staff, teacher's aides and assistants, administrative and clerical staff, building operations, general maintenance and other service staff.	52.7	37.8
<b>ICSEA</b>	Index of Community Socio-Educational Advantage (ICSEA), created by the Australian Curriculum, Assessment and Reporting Authority (ACARA) to facilitate comparisons of student outcomes results. ICSEA provides a scale representing the relative magnitude of student and school level factors of advantage and disadvantage.	992	87
<b>Attendance Rate (%)</b>	The average proportion of days that students attend school	92.2	3.2
<b>Female (%)</b>	The proportion of the student population that are female	48.2	6.3
<b>ATSI (%)</b>	Proportion of the student population of Aboriginal and/or Torres Strait Islander descent or who identify themselves as an Aboriginal and/or Torres Strait Islander.	8.4	13.7
<b>LBOTE (%)</b>	Proportion of students who speak a language other than English at home.	18.5	23.5

Statistical results are reported in terms of the raw statistical association as estimated through the analysis, as well as standardised in common terms — namely, by translating model outputs in terms of how a standard deviation in reported variables is associated with predicted student achievement, in standard deviations.

## Annex B: Detailed statistical tables

	Model A	Model B	Model C	Model D	Model E	Model F
Dep var:	Y5 NAPLAN	Y5 NAPLAN	Y5 NAPLAN	Y5 NAPLAN	Y5 NAPLAN	Y5 NAPLAN
T:	2010-2018	2010-2013	2014-2018	2010-2018	2010-2018	2010-2018
Location:	All	All	All	Metro	Regional	Remote
Y3 NAPLAN <sub>(t-2)</sub>	0.34 (0.00)	0.32 (0.01)	0.32 (0.01)	0.33 (0.01)	0.35 (0.01)	0.36 (0.03)
ICSEA	0.27 (0.01)	0.14 (0.01)	0.59 (0.01)	0.24 (0.01)	0.31 (0.01)	0.25 (0.03)
Public funding per student \$000	0.09 (0.07)	0.11 (0.13)	-0.01 (0.1)	0.3 (0.06)	0.49 (0.05)	0.23 (0.19)
Private funding per student \$000	0.00 (0.00)	0.48 (0.44)	0.00 (0.00)	0.01 (0.1)	-0.04 (0.11)	0.64 (0.32)
FTE Enrolments	-0.03 (0.00)	-0.06 (0.01)	-0.05 (0.01)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
FTE Enrolments <sup>2</sup>	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	-0.01 (0.00)	-0.04 (0.01)	-0.14 (0.07)
Student-teacher ratio	-0.01 (0.07)	0.07 (0.13)	0.05 (0.1)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Student-support staff ratio	0.01 (0.01)	0.01 (0.01)	0.00 (0.01)	-0.09 (0.09)	-0.02 (0.11)	0.61 (0.55)
Female % of students	0.07 (0.03)	0.09 (0.06)	0.05 (0.04)	0.01 (0.01)	0.00 (0.01)	0.09 (0.1)
ATSI % of students	0.38 (0.04)	0.2 (0.08)	1.14 (0.05)	0.09 (0.04)	0.06 (0.04)	0.14 (0.18)
LBOTE % of students	0.00 (0.01)	0.05 (0.04)	-0.03 (0.02)	0.04 (0.01)	-0.07 (0.03)	-0.07 (0.07)
Attendance Rate	0.48 (0.05)	0.33 (0.13)	0.15 (0.06)	0.33 (0.07)	0.56 (0.09)	0.6 (0.28)
i.2011	-2.56 (0.3)	-2.48 (0.32)	-	-1.88 (0.35)	-3.87 (0.54)	4.19 (2.6)
i.2012	-4.65 (0.31)	-4.31 (0.34)	-	-4.00 (0.36)	-5.69 (0.55)	-0.34 (2.73)
i.2013	-2.31 (0.32)	-1.69 (0.37)	-	-2.32 (0.37)	-2.3 (0.56)	2.86 (2.89)
i.2014	-5.79 (0.32)	-	-	-5.98 (0.38)	-5.43 (0.58)	-2.51 (2.91)
i.2015	-1.7 (0.34)	-	3.84 (0.28)	-1.55 (0.4)	-1.85 (0.61)	-1.89 (2.96)
i.2016	0.45 (0.37)	-	5.83 (0.31)	0.03 (0.44)	1.13 (0.65)	-0.41 (3.1)
i.2017	-0.8 (0.41)	-	4.37 (0.37)	-1.2 (0.49)	-0.11 (0.71)	-0.75 (3.18)
i.2018	-3.55 (0.59)	-	1.16 (0.55)	-5.14 (0.77)	-1.65 (0.95)	-5.35 (4.91)
Constant	28.57 (7.59)	189.12 (17.56)	-253.43 (11.34)	75.29 (9.92)	-12.52 (12.43)	16.63 (43.79)
N	35,013	15,376	19,637	19,970	14,176	867
i	4,435	4,230	4,303	2,295	1,972	168
R <sup>2</sup>	0.78	0.71	0.77	0.81	0.66	0.80

## Annex C: Design principles for teachers' performance incentive systems

It's often argued that teachers' performance is simply too complex, or context-dependent to be accurately or objectively measured. But a carefully designed performance pay system is possible, though there are some important things to consider in designing any scheme.

Individual or group rewards	The focus should be on rewarding individual teachers on their classroom excellence, but not to completely disregard group-based rewards in schools too. Incorporating some group-based rewards could increase collaboration, engagement in joint tasks, and sharing of good practice — however the design of the incentive must be sure to alleviate any risk of underperformers free-riding.
Evaluation based on test scores	The traditional evaluations of performance should always play a part in performance management, however it's important that student achievement in standardised tests is the key metric that is evaluated.  In order for between-teacher comparisons in their students' achievement to be accurate, appropriate "value-added" measures should be used to indicate how much any individual teacher has added to a student's achievement. <sup>99</sup> In addition to test scores, observation of classroom practice, surveys of students and parents, tests of teacher knowledge, professional development, self-evaluation, portfolios of professional activity, and collegiality of teachers can be considered. <sup>100</sup> Principals should be responsible for making these assessments of teachers, not bureaucrats — research shows that principals are generally quite effective at identifying which teachers will produce high-achieving students from their observations. <sup>101</sup>
Coverage of performance management	It's important that all teachers are eligible for performance pay. That can be difficult because not all subject areas are routinely tested. In particular, beyond maths, science, and literacy tests, there is relatively less agreement on how to objectively test students.
School leaders as well as teachers	The performance of individual teachers is partly a function of the school environment that they work within. If school leaders are partly beneficiaries of high performance this can help incentivise whole-of-school efforts, and also motivate them to effectively manage the performance of their teachers.
Carrot and stick	To be effective, performance pay arrangements need to not only reward high performance, but also penalise persistent underperformance.
Short term pay but long term continuous improvement	A performance pay system can't simply be about providing cash to teachers, but comprehensively helping to reinforce practice and coaching through an effective performance management system.
Performance funding is on top of core funding	Not all teachers' salary should be performance-based, as some essential base amount is necessary. To reduce possible volatility between pay periods, it may be best that each bonus pay schedule is based on more than one period.
Ensure it's not gameable or result in perverse outcomes	Possible perverse outcomes need to be prevented, particularly those that could apply to students with special learning needs or those coming from especially disadvantaged backgrounds.

Source: Adapted from Productivity Commission (2012). Research Report: Schools Workforce, Canberra; Hanushek (2007), The single salary schedule and other issues of teacher pay, *Peabody Journal of Education*, 82(4), pp. 574-58; and Hanushek, E. A. and Lindseth, A. A. (2009). *Schoolhouses, Courthouses, and Statehouses: Solving the Funding-Achievement Puzzle in America's Public Schools*, Princeton University Press.



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# About the Author



## Glenn Fahey

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Glenn Fahey is a Research Fellow in Education Policy, with a particular focus on education finance and accountability. He is formerly a consultant at the OECD's Centre for Educational Research and Innovation. He has published academic articles at *Public Administration Quarterly*, *Policy and Politics*, and *Public Finance and Management*, as well as the *OECD Education Working Paper Series*.

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