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Targeted teaching:
How better use of data can improve student learning

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Overview

The best schools in Australia are not necessarily those with the best ATAR or NAPLAN scores. They are those that enable their students to make the greatest progress in learning. Wherever a student starts from on the first day of the year, he or she deserves to have made at least a year's worth of progress by the end of it. Any less, and our students will fail to reach their full potential. Sadly, that is too often the case.

Despite heroic efforts by many teachers, our most advanced students are not adequately stretched while our least advanced are not properly supported. Many fall further behind over time. But supporting every student is hard. Australian research shows that achievement can be spread over five to eight year levels within a single class: a Year 7 class may have students working at a Year 1 level, while others have mastered concepts from Year 8.

Schools and teachers have long understood this challenge, yet many struggle to respond effectively. Streaming students or holding back low performers is not the answer. Instead, teaching must be targeted to each student's needs. This requires accurate information about what students know and are ready to learn next.

While NAPLAN tests provide essential data for system monitoring and can point to areas of strength and weakness in a classroom, on their own they are too imprecise, and held too infrequently, to identify each student's specific learning needs. Instead, schools should use NAPLAN as part of a balanced system of assessment.

There is a better way. Teachers and schools can lift all students' performance if they are equipped to collect and use evidence of individual student achievement and progress. Working together, teachers should assess what each student knows now, target their teaching to what they are ready to learn next, and track each student's progress over time. Teachers should then analyse their own impact, keep what works and change what does not.

In the world's largest analysis of the factors that improve student learning, Professor John Hattie shows that the teaching strategies with the greatest impact are those that use evidence of learning to inform and improve teaching. Investing in student progress requires giving every teacher the time, tools and training to collect and use evidence to target their teaching in this way. Done well, this investment could boost learning enough to land Australia among the world's top five performing countries on PISA tests.

The challenge is to embed targeted teaching in every classroom. Schools and governments must both step up.

Many schools say they already target teaching. Certainly, they are not short of data. But this does not mean they are collecting the right information at the right time and using it effectively. Most have a long way to go. And they can't make all the changes needed on their own. Governments and school systems must provide more guidance and support so all teachers have the capacity to target their teaching to every individual student.

It would cost roughly $300 million per year to roll out the best of today's programs to the schools that need it most. The cost and the changes for schools and school systems are significant, but the rewards are worth it. This report shows the way.

Recommendations

For schools and teachers

1. Schools should develop a plan to collect robust evidence of student learning (what each student is ready to learn next, and how much her learning has progressed) and use this data to target teaching and track student progress over time.

2. All teachers should target teaching in their classroom, with schools providing the time, tools and training needed to embed targeted teaching and track progress.

3. To ensure effective implementation, school leaders should identify priorities, set clear expectations and recognise that change takes time.

For governments and system leaders

Governments and system leaders should:

4. Invest in assessment tools and related resources that help teachers collect and use high quality data about individual student learning. They should, as a priority, evaluate existing resources and make sure schools understand and can use what is already available.

5. Strengthen teacher and school leader capacity to target teaching and track student progress: improve the training of new teachers around assessment and the use of data and provide on-the-ground support and professional development to existing teachers and school leaders.

6. Set high expectations that schools will collect and use data to target teaching and track progress, showcase good practices, and monitor what happens in practice. Invest, where necessary, to accelerate change.

7. Evaluate the impact and cost effectiveness of policies to improve targeted teaching and progress tracking and assess which school-led approaches work best.

For parents

Parents should:

8. Expect that their child's school collects and uses robust evidence of learning to ensure that every student has the opportunity to make a year's progress each year.

9. Talk to their child about their learning progress, as well as their grades.

Chapter 6 spells out the report's recommendations in detail.

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1 Student progress is the goal, targeted teaching the key

1.1 Greater student progress should be our priority

Far too many Australian students make too little learning progress each year. Many students who fall behind never catch up, while many highly able students are not stretched.

Making sure every student learns is the core business of schools. Whatever a student brings to the table on the first day of school in Term 1, he or she should make at least a year's worth of progress by the end of Term 4.[1] Any less and our students will fail to reach their full potential.

Often we equate success at school with strong NAPLAN (National Assessment Program Literacy and Numeracy) or ATAR (Australian Tertiary Admission Rank) scores or good grades on student report cards. But these measures alone can't tell us whether schools have done a good job of helping students learn.[2] High scores or good grades might say more about home life than what a student has learnt in school. About two thirds of the variation in student achievement is due to non-school factors such as prior knowledge, socioeconomic background or raw aptitude.[3] Teachers and schools can't change these factors. But teachers and schools can have a significant impact on how much a student learns in the classroom.

We should judge the success of our education system by how much progress our students make. Progress should be our priority. By definition, stronger progress would lift achievement.

Defining student success in terms of progress also reinforces the value of effort and persistence, fostering a growth mindset in students, which has been shown to support future success in life.[4]

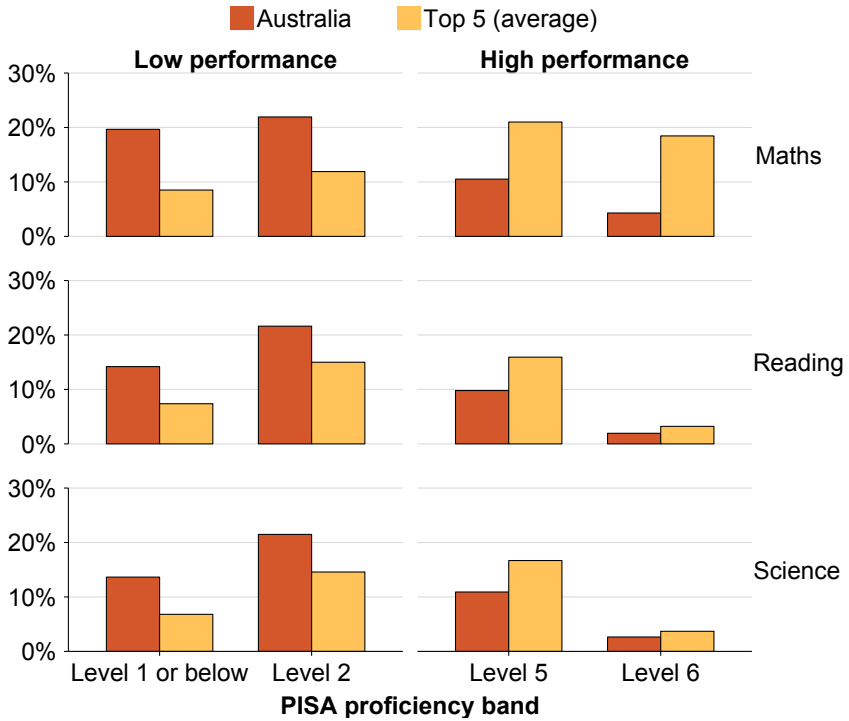
Yet many students do not make enough progress

Australia's performance in the Programme of International Student Assessments (PISA) shows that we are letting down both our strongest and weakest students. These students are not making as much learning progress as their peers in the highest performing education systems.

Figure 1 shows that a disturbing 20 per cent of Australian 15-year olds fell short of PISA's minimum proficient standard (Level 2) in mathematics in 2012.[5] In the world's five best-performing education systems, by contrast, only nine per cent of students failed to meet this benchmark.

[1] See Melbourne Graduate School of Education (2013), p. 4; NSW Department of Education and Communities (2014d), p. 1; Hattie (2014)
[2] Jensen (2010b)
[3] Scheerens and Bosker (1997), p. 182-209 as cited in Rowan, *et al.* (2002)
[4] Dweck (2006); Masters (2013c). A growth mindset is a belief that talents and abilities are not fixed traits but can be developed through effort, learning and persistence.
[5] The level at which students begin to show the 'competencies that will enable them to participate effectively and productively in life'. OECD (2013b), p. 14

Figure 1: Australia's PISA 2012 results
Percentage in each proficiency band, by subject, Australia vs Top 5



Notes: The "Top 5" are the education systems in the top five for each subject ranked by average PISA score. For mathematics: Shanghai, Singapore, Hong Kong, Taiwan, and South Korea. For reading: Shanghai, Hong Kong, Singapore, Japan, and South Korea. For science: Shanghai, Hong Kong, Singapore, Japan, and Finland. Level 1 or below includes Level 1a, Level 1b, and Below Level 1b for reading. Level 6 is the highest band.
Source: Thomson et al. (2013), pp. 26, 137, 175.

Among Australia's strongest students, only 15 per cent reached the highest levels of mathematical proficiency (Level 5 and 6), compared to 40 per cent of students in the five best systems. We also lagged behind the top systems in stretching our most able students in reading or science, while more Australian students (close to 15 per cent) failed to reach proficiency in these two areas.

These results are troubling. They suggest we are not doing enough to ensure all students reach their potential. The competencies our students have by age 15 (which, for some, is close to the end of formal schooling) strongly influence the types of opportunities that will be open to them in a complex and globalised economy.

Targeted teaching means changing attitudes and practice

The best remedy is to focus on how much students learn every year they are in school.[6] A stronger focus on learning progress will require a change both in mindset and in practice. It will set a higher threshold for success in all schools. Targeted teaching means taking responsibility for lifting the performance of students who are many years behind and also finding ways to challenge students who are already well ahead of year level expectations. Great teaching will no longer mean masterful delivery of the year level curriculum, but extending the skills and knowledge of every student in every class, regardless of their starting point.

[6] This should be complemented by early childhood education to ensure all students are ready for school, particularly students from disadvantaged backgrounds. Heckman (2011)

We are beginning to do better at recognising that progress matters most.[7] The Australian Curriculum, Assessment and Reporting Authority's (ACARA) recent efforts to highlight schools where students have made the largest gains in NAPLAN is a welcome example.[8] But more needs to be done to shift thinking in this direction. And much more needs to be done to support teachers and schools to translate this thinking into action that will make a difference in the classroom. The key is targeted teaching.

1.2 Targeted teaching is the key to increase student progress

> *If I had to reduce all of educational psychology to just one principle, I would say this: The most important single factor influencing learning is what the learner already knows. Ascertain this and teach him accordingly.*
>
> - David Paul Ausubel, *American Psychologist*, 1968[9]

Educational researchers have known for decades that a student learns best when teaching is targeted to what she is ready to learn. If the material is too easy, students can become bored and disengage. If it is too hard, students will flounder and may choose to misbehave or give up rather than face continued failure. In either case, little is learnt. But if teaching is targeted at what students are ready to learn, powerful progress can be made.

This idea is not new – psychologist Lev Vygotsky first proposed it 90 years ago.[10] Since the 1970s it has been incorporated into mainstream educational theory.[11] Today, it is widely recognised that teachers should target teaching based on reliable evidence of what students know and are ready to learn. This approach – often described as differentiated teaching, evidence-based teaching, clinical teaching or visible learning[12] – is now built into our expectations of both teachers and schools.[13]

At its heart, targeted teaching is based on the collection and use of evidence of each student's learning to identify how best to advance each student. Using evidence of learning to target teaching underpins two of the most powerful teaching strategies identified by researcher John Hattie in his landmark study, *Visible Learning*, which investigated more than 800 meta-analyses built on 50,000 individual studies.[14] Using evidence of learning to target teaching also underpins researchers Paul Black and Dylan Wiliam's seminal work on formative assessment.[15]

[7] Hattie (2015); Hattie (2014); Masters (2014); NSW Department of Education and Communities (2014d)
[8] Barrett (2015)
[9] Cited in Masters (2013b)
[10] Vygotsky characterised this as teaching to the "zone of proximal development", which describes the difference between what a learner can do without help and what he or she can do with help. Vygotsky (1997).
[11] These ideas underpin leading Australian educational research and practice. Griffin (2014); Masters (2013b), p. 15; Anderson and Scamporlino (2013); Centre for Education Statistics and Evaluation (2015b)
[12] Griffin (2014); Petty (2014); Anderson and Scamporlino (2013); Hattie (2009). Other experts have also referred to the need to 'target teaching'. See in particular Siemon (2006).
[13] See Australian Professional Standards for Teachers Standard 1.5, AITSL (2011a) and National School Improvement Tool Domain 7, ACER (2012).
[14] Hattie (2009). These strategies are formative evaluation of teaching programs and teacher-student feedback. See Chapter 3 for more detail.
[15] Black and Wiliam (1998)

Targeted teaching, as described in this report, requires teachers to identify learning needs and adapt their teaching in response. Before they teach each new topic, they need to understand what each student can already do and is ready to learn. As they teach, they need to check how each student is going and provide tailored feedback or more support to address obstacles or misconceptions and help each student stay on the right track. Over time, teachers also need to review and analyse student progress data. They need to see and understand the impacts of their teaching in order to be able to continuously improve it.[16]

Targeted teaching involves using strategies – including formative assessment, teacher-student feedback and evaluation of teaching programs – that have been shown to have a significant, proven effect on learning.[17] Done well, these strategies can increase the amount of learning by an extra five to 11 months of progress.[18] This makes them more effective than almost all other teaching interventions as well as many student background factors.[19]

If all teachers targeted their teaching more effectively, the improvement in student performance would be very large. Our analysis indicates that it could lift performance enough to put Australia among the top five education systems in mathematics, reading and science in the PISA assessments.[20] Of course, we should not focus solely on PISA results, but on an education that is broad, rich and deep (see Box 1).

Lifting progress through targeted teaching would ensure more students reach the minimum proficiency level needed to participate fully in the economy and in society. It would also ensure more higher achieving students reach their potential. This would help fulfill Australia's twin goals of equity and excellence.[21]

Stronger academic progress would also help individuals and the economy. A recent longitudinal study found that students with NAPLAN scores below the national minimum standard were 11 times more likely to leave school before Year 12 than students with the highest scores. Even for early school leavers, higher NAPLAN scores were related to better employment outcomes.[22] In turn, stronger progress in school would boost future economic productivity.[23] The Organisation for Economic Cooperation and Development (OECD) has estimated that Australia could lift its long run Gross Domestic Product (GDP) growth rate by 0.35 percentage points if students made the equivalent of six extra months of learning progress by age 15.[24]

[16] Ibid.; Hattie (2009)
[17] These strategies are explained further in Chapter 3.
[18] Conversion of effect sizes into months of learning is based on the methodology in Higgins, *et al.* (2012), p. 8.
[19] Hattie (2009); Black and Wiliam (1998)
[20] Implementing formative assessment (effect size of 0.4-0.7), feedback (effect size 0.7) and formative evaluation (0.93) would increase the average Australian student's PISA scores by 40-93 points (which would require an effect size of 0.4-0.93). This would put Australia above the fifth strongest PISA performer in every domain, whose average students scored 24-50 more points than the average Australian student in 2012. This methodology is taken from Commonwealth Department for Education (2011), with PISA scores from OECD (2013c), the effect size for formative assessment from Black and Wiliam (1998), and the effect sizes for formative evaluation and feedback from Hattie (2009).
[21] Australian Government (2008)
[22] ABS (2014)
[23] Jensen (2010a), p.14
[24] Hanushek and Woessmann (2010), p. 25

Box 1: What should we focus on and measure?

Our report does not seek to define the aspects of learning that we, as a society, should focus on and measure. But this debate is vital. What is measured – and assessed – strongly influences what is valued. We must focus on what matters most, not what is easiest to measure. Many reports address the issue of how to link assessment with learning. Some common themes have emerged.

Assess both knowledge and understanding. Hattie recently stated "[t]he art of teaching is to balance the need for surface knowledge with deep processing of this knowledge."[25]

Assess what we want students to learn. A 2013 US report called for "assessment tasks that exemplify the type of learning that we want to occur in classrooms."[26] So-called 'bubble tests' (multiple choice tests) are cheap to mark. But performance assessments such as projects or essays can better measure what students understand and can do.

Literacy and numeracy are foundations of later learning, but we should test and track progress across the curriculum. Finally, we need to learn to measure 21st century skills, including cognitive capabilities such as collaborative problem-solving, and non-cognitive attributes such as grit, resilience or character.

Sources: Breakspear (2014); Zhao (2015); Masters (2013b); Hill and Barber (2014); Hattie (2015); Gordon Commission (2013); Darling-Hammond (2014); Fullan and Langworthy (2014); Soland et al. (2013); Griffin et al. (2012)

[25] Hattie (2015), p. 14
[26] Gordon Commission (2013), p. 174

Yet despite broad acceptance of the theory of targeted teaching, there is evidence it is not happening effectively in many classrooms. That is because while targeted teaching may sound straightforward in theory, in practice it can be very challenging.

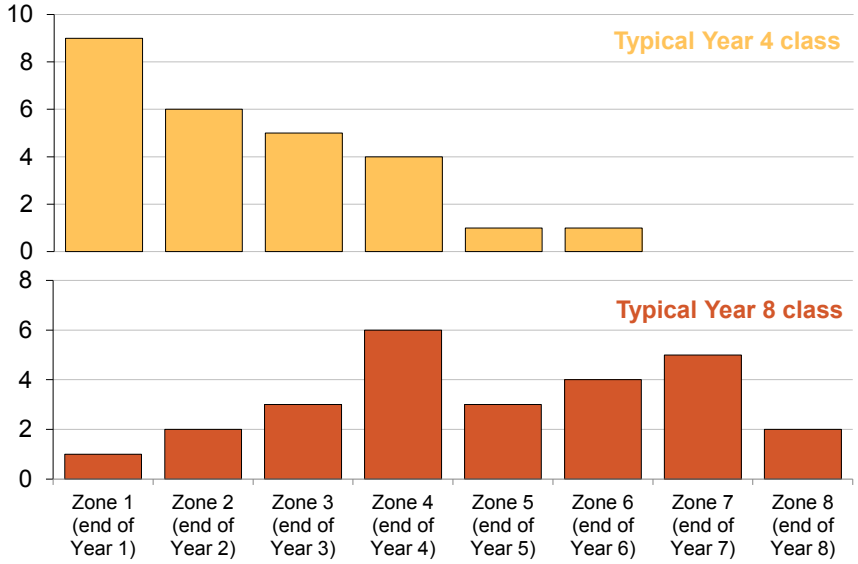
1.3 The wide range of student achievement makes targeted teaching tough

Every day teachers confront a huge range of student achievement levels in their classrooms.[27] In any given year level, there is a five to six year difference between the most advanced and the least advanced ten per cent of students.[28] As researcher Dylan Wiliam has stated, student abilities in a single year level are "only loosely related to age".[29]

There is some research to suggest the range may be even wider in primary and secondary maths classes. A study conducted in Victoria and Tasmania tested students' understanding of mathematical concepts and skills that are critical for success in secondary school. The study found that within a single year level, achievement differed by as much as eight year levels (see Figure 2).[30]

[27] Throughout this report, when we use the term 'achievement' we are referring to 'current achievement' – that is, what each student knows, understands and can do at a particular point in time. 'Achievement' in this sense has no implications for any underlying or fixed 'aptitude' of a student. Teachers should expect that every child can learn, but recognise that children require different opportunities and support to do this. Saffigna*, et al.* (2011), Practice Principle 3
[28] Masters (2013c), p. 2
[29] Wiliam (2006b), p. 7
[30] The study assessed students' 'multiplicative thinking', which means the capacity to work flexibly and efficiently with an extended range of numbers,

Figure 2: In a typical class, there is a wide range of achievement
Number of students in a typical class at different achievement levels



Notes: The typical class assumed here has 26 students. Achievement is measured in terms of zones, where Zone 1 is the lowest achievement level (roughly equivalent to year level expectations at the end of Year 1) and Zone 8 is the highest achievement level (roughly equivalent to year level expectations for the end of Year 8).
Source: Data supplied by Professor Dianne Siemon, Scaffolding Numeracy in the Middle Years Project, 2004-06.

The study examined more than 3000 students in Year 4-8 classrooms. In a typical Year 4 classroom with 26 students (yellow bars), 20 students would be struggling to master the key multiplication concepts expected at their year level, while two would be working at a level well beyond Year 4. The spread had grown even larger by Year 8. In a typical Year 8 classroom, also with 26 students (orange bars), six students would still be struggling to master concepts expected by the end of Year 4, while only 11 could be said to be working at the level expected at the start of secondary school (Year 7).[31]

The wide spread in student achievement in the average classroom, including the long tail of underperformance, suggests that many students have lagged behind their peers for several years by the time they reach secondary school.[32]

If teachers only teach material targeted at the expected year level for their class, only a few students will receive teaching that is at the right level for them. Unfortunately, this appears to be the case in many classrooms. Geoff Masters, Chief Executive of the Australian Council for Educational Research (ACER), notes that "despite the evidence that students of the same age are at very different points in their learning, much teaching is focused on

recognise and solve problems with multiplication, division, fractions, decimals and proportion, and communicate this effectively. Variance in students' achievement in this area is a key driver of mathematical achievement in Years 5-9. Victorian Department of Education and Early Childhood Development (2013a); Siemon and Breed (2006); Siemon, *et al.* (2001); Siemon (2001)

[31] Both this study and a more recent study in 2013 found the Scaffolding Numeracy in the Middle Years assessment tools and teaching resources were highly effective in improving learning. In the 2013 study, the overall effect size was 0.65. Advice from Professor Dianne Siemon.
[32] A wide spread in student achievement in Australian primary school mathematics classes was also identified in 2011 using the Mathematics Assessment Interview assessment tool. See Gervasoni (2011).

delivering the same year level curriculum to all students in a class".[33]

It is clear that teachers face a significant challenge in targeting teaching to what each student is ready to learn next. The typical Year 8 maths teacher must target his teaching in a way that meets the needs of students at eight different levels of conceptual mathematical understanding, while still addressing curriculum requirements. This is no easy task.

One response to the wide range of achievement levels is to try to narrow the spread in each class. Some schools stream students into separate classes by achievement, or retain the least able so that they repeat a grade. But the research is clear: these are the wrong solutions.

Streaming has minimal benefits for learning outcomes and profoundly negative effects on equity.[34] With rare exceptions, retention is highly detrimental for the retained student and is very expensive for education systems.[35] Of the 34 educational interventions listed in the Australian Teaching and Learning Toolkit, repeating a year and streaming classes are the only two interventions with *negative* impacts on average student learning.[36]

Targeted teaching requires robust evidence of learning

Since we can't remove the spread in student achievement levels, we need to adjust teaching in response to it. We must support teachers and schools to accurately identify the range of achievement levels in each classroom and target teaching effectively.[37] But, as the next chapter shows, assessment practices in Australia fall far short of what is needed to enable teachers to accurately target teaching.

[33] Masters (2013b), p. 3-4
[34] Hattie (2009), p. 89-91; OECD (2012), p. 10
[35] Hattie (2009), p. 97-99. Acceleration, by contrast, is very beneficial for gifted children (effect size = 0.88). Ibid., p. 100-101. The term 'education system' generally refers to a collection of schools that are governed by a specific authority, such as a country, state or territory. The term is also used to refer to smaller groups of 'systemic' schools, such as government schools in a particular state or territory, or Catholic schools in a particular Diocese.

[36] Education Endowment Foundation (2015a) As the Toolkit notes, "flexible within-class grouping is preferable to tracking or streaming for low attaining students."
[37] In this report, when we talk about evidence or data, we are not just talking about a test result. We mean information that is collected for reference or analysis to help teachers, school leaders and system leaders make decisions. See also Section 3.2.

2 Schools and teachers need better data to target teaching

Like a doctor trying to identify what treatment patients need to improve their health, teachers need to identify what teaching their students need now to improve their learning.

Good doctors use modern tests and procedures to understand their patients' symptoms and identify the underlying causes. Similarly, teachers should use proven strategies to develop a precise, evidence-based understanding of what their students already know, and of what they are ready to learn next. When patients have an ongoing condition, doctors follow up with them over time to assess symptoms, check on progress and adjust treatment if required. Similarly, teachers should observe and assess how students respond to teaching, track their progress and adjust their teaching strategies accordingly.

This chapter shows that in many cases, teachers and schools don't have the evidence they need to target teaching effectively and track student progress over many years. Teachers generally lack the support, including the time, tools and training, needed to collect and use evidence of learning. When schools do collect good evidence, many fall short in using it well.

2.1 Teachers do not have the evidence

To target teaching effectively, teachers need the right information about learning at the right time. They need fine-grained baseline data to identify where each student is starting from and what he is ready to learn next. They need frequent feedback about whether their students are learning what they are trying to teach them. They need to know when a student has stalled so they can intervene quickly and get him back on track. And they need to monitor learning over time to understand the impact their teaching is having and ensure every student is making enough progress.

Without support, teachers struggle to identify student learning accurately

Teachers are often required to judge where a student is at in her learning. Teachers evaluate learning when they mark students' work, grade report cards or even simply talk to students during lessons. These judgements underpin a teacher's daily practices in the classroom and inform students, parents and future teachers.

Teacher judgements have the potential to be a valuable source of evidence of student learning. Teachers are better positioned to assess their students' depth of knowledge and understanding than are many types of traditional tests, including standardised assessments.[38] When teachers review performance assessments, such as extended projects, presentations and experiments, or when they assess a student's acheivement based on class work, they can measure skills that more closely align with real-life situations. As a result, teacher judgement has the potential to better reflect a student's current abilities, rather than how he was feeling (or how lucky he was) during a test.[39]

[38] Hoge and Coladarci (1989)
[39] Darling-Hammond (2014)

Unfortunately, many teachers in Australia struggle to accurately interpret curriculum standards and use them to evaluate their students' learning.

In 2011, an OECD review of Australian assessment practices found that when teachers graded against national A-E standards, the consistency of their judgements within a given school was very weak.[40] In addition, a recent internal analysis of teacher grading against the Victorian Essential Learning Standards (VELS) conducted by the Victorian Department of Education and Training suggested there is significant variability in teacher judgements of individual students over time.[41]

Our research is consistent with these findings. In some schools we spoke to, grades were based on a student's performance relative to the rest of their class, rather than on external standards.[42] Some teachers awarded As to their top performers, regardless of how these students were performing compared to the expected level for their year. At the same time, some teachers were reluctant to award Ds and Es to students who had fallen behind. Some suggested that teachers were worried such grades would reflect poorly on their teaching. Others said they avoided these grades because they were wary of harming a student's self-esteem and motivation.

In the schools that had strengthened their grading practices, teachers we spoke to expressed little confidence in the grades they themselves had previously awarded. In schools in the earlier stages of reform, school leaders (and some teachers) expressed little confidence in the reliability of the grades given by other teachers in their own school.

Moderation – the term for teachers working together to review student assessments to ensure grading approaches are consistent and the grades line up with external curriculum standards – is one of the best ways to improve the accuracy of teachers' formal judgements.[43] Without moderation, teachers tend to grade in highly variable ways, with little consistency between their judgements and external standards.[44] But many teachers, particularly outside Year 11 and 12 subjects, do not have enough time for moderation. As a result, instead of being a valuable source of evidence of learning, previous grades can provide little useful information. This is a missed opportunity.

[40] Santiago*, et al.* (2011), p 43, 58

[41] Based on the Victorian Department of Education and Training's unpublished preliminary analysis of matched cohort VELS data for a large sample of government school students between 2007 and 2012. VELS is the Foundation to Year 10 curriculum that provides common achievement standards against which teachers assess student progress. Victorian Curriculum and Assessment Authority (2015)

[42] While schools must grade on a five-point scale, they do not need to assign grades in a specific way (such as against a bell curve). However, grades must be clearly defined against specific learning standards determined by the relevant education authority. In theory, this means grades should be applied consistently within a given state. Section 77(2)(f) of the Australian Education Act 2013 (Cth); Regulation 59 of the Australian Education Regulation 2013 (Cth)

[43] Connolly*, et al.* (2012); Darling-Hammond (2014) p 61

[44] Connolly*, et al.* (2012); Harlen (2005a); Harlen (2005b); Klenowski (2011)

Standardised tests have their merits but bring their own problems

When schools and teachers lack confidence in the judgements of other teachers, they don't use them. In their place, they tend to turn to narrower but more consistent measures of student learning provided by external standardised assessments.

Standardised tests have their merits and have an important role to play in a robust assessment framework. High quality standardised assessments that are well-designed and selected for the specific purpose required should be incorporated into every school's assessment program. Some standardised tests designed for diagnostic purposes, for example, can assess students' grasp of very specific skills with high levels of accuracy. Other types of standardised tests can evaluate how a student or class is performing in a broad subject area, such as reading or numeracy, relative to the age cohort or to external standards. But tests that assess breadth of skills generally have less precision and often come with a high level of measurement error for the individual student.[45] While individual test results can contribute to a more complete picture of student learning, they should not be relied on too heavily.[46]

The limitations of standardised tests are often poorly understood. Few educators are trained to interpret national or statewide test reports.[47] Few understand the uncertainty that surrounds individual student scores. As a result, some schools try to extract meaning from tests that they are simply not designed to provide.

[45] Darling-Hammond (2014). See Box 2 for further explanation.
[46] Zakaria, *et al.* (2011)
[47] McKenzie, *et al.* (2014), Figures 6.4, 8.6, 12.17

The tools used to track progress often are not appropriate

Many schools try to track the progress of their students over time, but few seem to be doing it in a rigorous way. This is unsurprising. Progress measurement is highly complex and has many of the challenges of assessment, and more.

The most common way to represent what students have learnt is A-E grading on student report cards. Yet the A-E scale can make progress largely invisible.[48] For example, a student could make two years of progress in a single year but still be so far behind that an E is appropriate. Another student could start so far ahead that she could afford to make no progress for several years and still receive an A. And report card grades cannot be used to track progress across years if the grades are inaccurate to begin with.

NAPLAN, on its own, is not the answer

For years now, Australia has invested heavily in large-scale standardised assessments for system monitoring purposes – including NAPLAN tests – and under-invested in the types of assessments designed to have an immediate and direct impact on teaching.[49] As a result, the tools needed to target teaching are lacking in many schools. Some rely too heavily on NAPLAN, rather than using it as part of a balanced assessment system.

NAPLAN provides essential data for system monitoring. It can point to areas of strength and weakness in a classroom, and provide guidance as to where teachers should look more closely.

[48] Masters (2013a)
[49] Santiago, *et al.* (2011), p. 9

However, it is too infrequent and imprecise to underpin targeted teaching by identifying individual learning needs (see Box 2).

Students take their first NAPLAN tests when they are well into their fourth year of school. The tests occur twice in primary school (Year 3 and Year 5) and twice in secondary school (Year 7 and Year 9). And, as with many other types of assessments, NAPLAN tests have a large margin of error at the individual student level.[50]

Imagine a student, Mary, who has made the expected level of progress over the two years between NAPLAN testing rounds. Because of measurement error, Mary's NAPLAN scores could suggest she has made anywhere between one year of progress, which would appear to be a poor result, or as much as three years of progress, a sensational result.[51] If we judge Mary's learning purely by the change in her NAPLAN test scores, we may form the view that she is stalling (at one extreme), soaring (at the other extreme) or anywhere in between. Clearly, on its own, this is a poor basis for tracking student progress – or targeting teaching – with the level of precision we should expect from our schools.

Measurement challenges are not unique to NAPLAN tests. Many other types of standardised assessments face similar levels of uncertainty. At a classroom level, the expected level of error from a 40-item annual test is so high that 15 per cent of students would appear to have gone backwards between two tests when in fact they have made a year's worth of progress.[52]

Box 2: NAPLAN is not designed for targeted teaching

NAPLAN is primarily designed to provide high level information about student learning to make school performance more transparent and to inform policy. NAPLAN assesses two years' worth of learning in each subject area through about 35-40 questions, most of which are multiple choice. It provides an important snapshot of achievement at the school, system, state and national levels but is, of course, less precise about an individual student's learning.

It is not clear that all schools recognise the high level of measurement error in individual students' NAPLAN scores. By chance, a student's score may be out by more than half a year's learning. The error in measuring student growth is higher still. In addition, NAPLAN tests are designed to have broad coverage, not to diagnose in detail what individual students are ready to learn next or the underlying source of any difficulties they face. Yet that is what targeted teaching needs.

Despite these limitations, some schools report relying heavily on NAPLAN results to measure individual student learning and progress, rather than using them as part of a balanced assessment system.

Improvements to NAPLAN are underway, including adaptive testing. These will make it more accurate and return results sooner, but not address all the issues outlined above. While it has many benefits, NAPLAN is not sufficient to comprehensively assess individual students' learning or track their progress.

Sources: Wu (2010); Wu (2009b); Santiago et al. (2011); ACARA (2015)

[50] Wu (2009a), p. 3
[51] Wu (2010), p. 18
[52] Ibid., p. 18

Standardised tests, such as NAPLAN, have a vital role to play in assessing student learning. But to target teaching effectively, teachers need to collect a wide range of evidence of each student's learning. This evidence should come from formal standardised assessments, students' class work and assignments as well as teachers' daily conversations with students. No single test provides all of the information teachers need.

2.2 Teachers do not have the training

For all the rhetoric about the need for teachers to target teaching to individual students, relatively few are taught how to do this effectively in the classroom.[53]

With some exceptions, notably Melbourne University's Master of Teaching,[54] initial teacher education courses generally do not do enough to train teachers in the theory or practice of collecting and interpreting robust evidence about learning.[55]

New teachers tend to lack the practical understanding and experience needed to conduct assessment effectively.[56] They need substantial additional support, including both training and time, to meet national requirements for assessing their students against standards.[57] They are also underprepared for interpreting assessment data and adapting their teaching in response to it – skills that are vital both to measuring progress and helping students to succeed.[58]

As a teacher's experience grows, so too should her ability to conduct high quality assessments. Ongoing professional development should, in theory, be expected to fill any gaps in a teacher's practice. But this does not always happen. The majority of teachers report that when teacher appraisal does identify a gap, there is rarely follow-up that leads to improvements in assessment practices.[59]

Teachers themselves, from the newest graduate to the most experienced teacher, highlight the need for better training. Student evaluation and assessment is a key area in which teachers say they need further professional development.[60] In 2013, three quarters of lower secondary teachers in Australia said they needed professional development to support evaluation and assessment of learning.[61] Among primary teachers, this was among the most commonly reported professional learning need.[62]

While more effective professional development is essential, teachers also need more time to put their training into practice.

[53] Hattie (2009), p. 198
[54] This approach has been documented in Griffin (2014). See also Anderson and Scamporlino (2013); McLean Davies, *et al.* (2013). Melbourne University's Master of Teaching requires students to pass a clinical praxis exam to ensure they are able to clinically assess student learning and shape their teaching response appropriately.
[55] McKenzie, *et al.* (2014), Table 12.17; Craven, *et al.* (2014), p xvii
[56] Klenowski (2009)
[57] Santiago, *et al.* (2011)
[58] Craven, *et al.* (2014), p. xvii
[59] OECD (2013a), p. 2
[60] McKenzie (2008); Santiago, *et al.* (2011)
[61] OECD (2013a), Table 4.12
[62] McKenzie, *et al.* (2014)

This is critical to ensure the evidence of learning that is collected is actually analysed and used to target teaching effectively.[63]

2.3 All schools collect data, but many do not use it effectively

While Australian schools are awash with data, many do not collect the data they really need, or use the data they do collect effectively. Most, if not all, schools analyse some types of learning data, especially NAPLAN scores and Year 12 results. In some instances we have seen, the analysis and presentation of this data is sophisticated. But this does not mean the school is collecting or using the type of evidence of learning that will have the most impact on teaching in the classroom.

ACER has developed a National School Improvement Tool that identifies nine areas of highly effective school practice.[64] One of these areas – the collection and use of data – is commonly identified as one of the most important areas where schools need to make significant improvements.[65]

According to the Tool, highly effective use of data involves much more than simply reviewing NAPLAN or Year 12 results and presenting the information to staff and parents. Schools need to commit to the systematic collection of high-quality evidence of student learning, to analyse this evidence to identify learning gaps and to monitor progress over time, and to use this evidence to identify successful teaching. The school must support its commitment by providing teachers and leaders with the professional development that will enable them to use the evidence in a robust way, including understanding the limitations of different types of data.

Very few schools perform at this level, which would be judged as 'Outstanding' or 'High' according the ratings used in the Tool. This is a foundational weakness that causes flow-on problems: weak use of data limits schools' ability to perform well in other areas.[66]

The next chapter explains the benefits of collecting and using robust evidence and how schools and teachers can get the evidence they need to target teaching and track progress.

[63] For examples of the how East Asian education systems invest in teacher professional development see Jensen, *et al.* (2012). For strategies Australian schools can use to redirect time towards teacher professional development activities, see Jensen, *et al.* (2014).
[64] ACER (2012). The Tool incorporates material developed by ACER in collaboration with the Queensland Department of Education, Training and Employment.
[65] Based on unpublished analysis by ACER of school reviews conducted using the National School Improvement Tool in 2013-2015.
[66] Ibid.

3 How schools and teachers can get the data they need

Targeted teaching is one of the most powerful techniques in a teacher's toolkit. But targeted teaching requires evidence of what a student is ready to learn, and the quality of that evidence matters. This chapter shows how schools and teachers can gain high quality evidence of learning, and use it to best effect.

3.1 Using evidence of learning has powerful benefits

The evidence is clear that three teaching strategies have powerful effects on student learning.[67] These different strategies – frequent formative assessment, teacher-student feedback and formative evaluation of teaching programs (see Box 3) – all centre on a common theme: making teaching more effective by responding to evidence of individual student learning.

Done well, these strategies can have an effect on learning that is larger than almost all other teaching interventions, according to John Hattie in his seminal 2009 study, *Visible Learning*, the world's largest evidence-based analysis of the factors that improve student learning.[68] The study ranks different factors that affect learning based on their effect size. Effect size is a metric that can measure the observed impact of an intervention on a

Box 3: Effect of strategies that use evidence of learning

Three teaching strategies that use evidence of learning have been shown to have a strongly positive impact on student learning. They are:

Formative assessment: the frequent use of assessment to identify individual learning levels and needs, with teachers using the results to adapt their teaching in order to meet those needs. Formative assessment has an effect size of around 0.4-0.7, which represents five to nine months of additional learning over a year.[69]

Feedback: information about learning that is transmitted between students and teachers, allowing teachers to understand what their students do and do not understand, and target their teaching accordingly. Feedback has an effect size of just over 0.7,[70] which represents around nine months of learning over a school year.

Formative evaluation of teaching programs: the use of student learning data by teachers to understand and analyse the effects of their teaching strategies and the impact they are having in class. Formative evaluation has an effect size of 0.9,[71] which represents 11 months of additional learning over a year. This makes it the most effective teaching strategy that Hattie's study evaluated.

Sources: Hattie (2009), p. 173-181; Black and Wiliam (1998); Higgins et al. (2012).

[67] Hattie (2009), p. 173-181; Black and Wiliam (1998)
[68] Based on the ranked effect sizes of teaching strategies in Hattie (2009), which compares more than 800 meta-analyses of 50,000 individual studies.
[69] Black and Wiliam (1998); Wiliam (2006a). Reporting of all effect sizes in terms of months' worth of learning is based on the methodology presented in Higgins, *et al.* (2012).
[70] Hattie (2009), p 173
[71] Ibid., p. 181

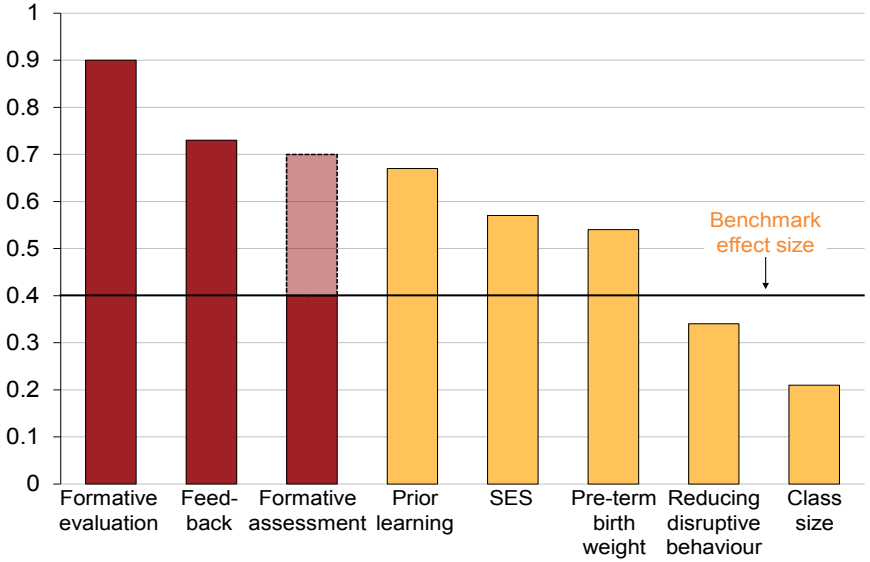
common scale.[72] The higher the effect size, the larger the impact of the intervention on learning.

Hattie shows that the average effect size of a teaching intervention is 0.4 (see Figure 3). Of the 49 teaching strategies he ranks, formative evaluation (using learning data to evaluate teaching programs) has the highest effect size, or positive impact.[73] He also finds that using teacher-student feedback to help target teaching has a very large effect on learning.[74]

Hattie's study does not directly analyse the impact of formative assessment (assessments used primarily to identify student learning needs), although the concept of feedback is closely related.[75] However, a landmark systematic review found the effect size of formative assessment ranges from 0.4 to 0.7, making it a highly effective teaching strategy.[76]

Figure 3 shows that these three teaching strategies can have a greater impact on student learning than a range of other student and classroom factors, including a student's prior learning, their socio-economic background and class sizes.

Figure 3: Formative evaluation, assessment and feedback have powerful effects on learning
Effect size of teaching intervention or educational factor



Notes: The typical effect size of education interventions is 0.4. Hattie proposes using this as a benchmark to judge other interventions. The shading for formative assessment reflects the 0.4-0.7 range in reported effect sizes. SES: socio-economic status.
Source: Hattie (2009); Black and Wiliam (1998)

[72] The effect size captures both the size of the average change in score due to the intervention, and how consistently a change of that size would be observed.
[73] Hattie (2009), p 181. Some other interventions had higher effect sizes (e.g. self-reporting grades) but these were not classified as teaching techniques.
[74] The effect size of comprehensive interventions for learning disabled students (0.77) and reciprocal teaching (0.74) were smaller than formative evaluation (0.9), but slightly larger than feedback (0.73). Ibid.
[75] Formative assessment can be broadly defined as "all those activities undertaken by teachers, and/or by students, which provide information to be used as feedback to modify the teaching and learning activities in which they are engaged." Black and Wiliam (1998)
[76] Based on a review of 580 different publications. Ibid.

The three strategies are interrelated. They help to shape an approach that embeds the use of evidence of student learning into teaching. Formative assessment is critical to establish an accurate picture of where students are at in their learning. Back-and-forth feedback between teachers and students ensures this picture is deepened and updated, and teaching is targeted to it. Finally, formative evaluation of teaching programs ensures that teachers examine and understand their impact, and continually adapt their practice to better meet student learning needs. Taken together, these strategies ensure teaching is well targeted, both on a daily basis and over time.

The end result of these strategies should not be individual lessons for each student. It is clearly not feasible or even optimal for a teacher to develop and deliver individual lessons for 25 or more students in a classroom. But teaching should not ignore difference either. Too many miss out when teaching is pitched at the average student or the curriculum level.

Rather than teaching to one level, or 25 different levels, teachers should use assessment to identify individual learning needs and group students accordingly.[77] In this way teaching caters to differences in learning needs, without excessively stretching teachers' time. Schools should support teachers in this respect by providing them with reliable information on their students' prior learning, along with assessment and teaching materials (which many teachers otherwise have to source or develop on their own).

[77] Griffin (2014)

3.2 Teachers need the right evidence and need to use it well

The quality of evidence teachers collect and the way it is used are vital if the benefits outlined above are to be captured.

'Evidence' isn't just a number

Evidence of learning is much more than just student test scores. It includes what a student can write, make, do and say, as well as what they can't.[78] Teachers can collect this evidence in many different ways. They can do so formally through standardised assessments, traditional teacher-set tests and performance assessments such as essays or projects. Or they can do so informally through interactions with students and by observing their behaviour in class, for example. Different types of evidence are necessary to build a complete picture of each student's learning.

The quality of assessment tools matter

In practice, a large proportion of the evidence teachers use to target their teaching can be collected using assessment tools, such as tests, that are designed to identify what students currently know and can do. They can also track their progress over time as their abilities improve.[79] But the quality of these tools matters.

[78] Ibid.

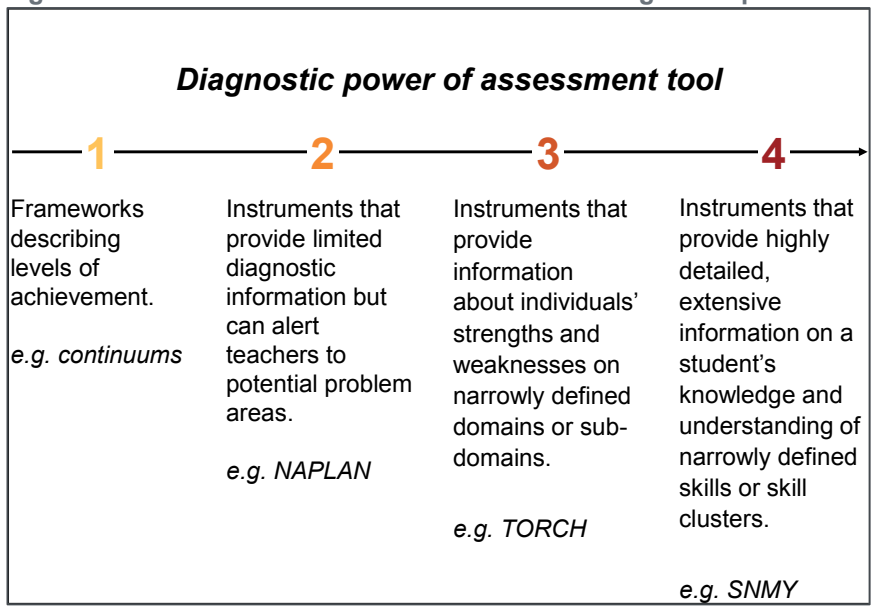
[79] Throughout this report, we use the term 'assessment tools' to cover the full range of approaches that teachers can use to gather evidence about student learning. It includes, for example, the use of standardised assessments, teacher developed tests as well as simple questioning techniques used in the classroom.

Poor quality tools will produce poor quality evidence, which is a weak foundation for targeted teaching.

Assessments are most valuable when they are used for the purpose for which they were designed.[80] Therefore, teachers should have access to a range of assessment tools that can provide the different types of information they need.

Different assessment tools have different levels of diagnostic power.[81] Figure 4 provides a framework for understanding the diagnostic power of different tools. Some, such as NAPLAN, are primarily designed for system-wide assessment and provide limited diagnostic information for individual students. Although they can alert teachers to potential problem areas, they have a relatively low level of diagnostic power.[82] Other tools, such as the Scaffolding Numeracy in the Middle Years (SNMY) Learning Assessment Framework, are designed to provide detailed, extensive information on specific aspects of students' understanding.[83] They have a much higher level of diagnostic power.[84]

Figure 4: Assessments have different levels of diagnostic power



Notes: TORCH: Tests of Reading Comprehension; SNMY: Scaffolding Numeracy in the Middle Years
Sources: Forster (2009), Northern Territory Department of Education and Training (2013a)

[80] UK Select Committee on Children Schools and Families (2008). Assessments designed for a given purpose may still have value when used for other purposes, as noted in Masters (2013b), p. 37.
[81] Masters (2013b), p. 5-6 notes that "the fundamental purpose of assessment is to establish where learners are at in their learning at the time of assessment." He also notes that different tests are likely to be valid in different circumstances.
[82] Forster (2009), p. 17
[83] Victorian Department of Education and Training (2015a); Siemon and Breed (2006)
[84] Forster (2009), p. 18

For an assessment to provide information that is useful and trustworthy, it must also be dependable.[85] Teachers need to be confident that a student who does well on the assessment has mastered the topic, and vice versa.[86] The results should not vary wildly depending on the occasion or marker, and they should come with a margin of error that is small enough for teachers to make reliable judgements based on them.[87]

When assessments are used to assess student progress, they must be built on accurate vertical scales that can measure specific skills as they develop from basic to complex.[88] Vertical scales are vital to measuring student attainment and progress over a number of years of schooling. Developing them is complex, time-consuming and requires sophisticated statistical techniques.[89] No school can do it on its own.

All evidence is imperfect. Inevitably, test results will be distorted by margins of error, or by how a student felt on a given day. Likewise, teacher judgments may not be consistent with those of other teachers or with external standards.[90] While these limitations should be recognised, they should never lead us to give up on using evidence to target teaching. Instead, it is important to seek out multiple sources of evidence to target teaching with greater confidence.[91]

The way teachers use evidence is vital

Above all, evidence must be used.[92] If it is not, it will have little impact on teaching practices or student learning. For example, if teachers don't review students' individual responses to an assessment task to work out where and why they got stuck, provide effective feedback to each student, and reflect on the implications of students' results for their own practice, teaching and therefore learning is unlikely to improve.[93]

Assessments should be conducted in a way that encourages students to respect but not fear the process and the results. Students should not see assessment as a tool for exposing failure but an opportunity to track their own progress, receive constructive feedback and continue to grow.

Teachers should support students to develop a growth mindset. Continued improvement, measured relative to each student's starting point, should be the goal, whether a student has already

[85] This term combines the concepts of reliability and validity. Harlen (2005b)
[86] This is known as validity. Ibid., p. 247. For example, a maths test with worded problems assesses numeracy and literacy. This makes it appropriate for testing numerical literacy but not for testing numeracy alone. Teacher judgements can have the same problem if they are influenced by social perceptions of a student (for instance, perceived effort or behaviour) rather than the quality of their work.
[87] This is known as reliability. See ibid., p. 247.
[88] Wu (2009b), p. 3
[89] Ibid., p. 28; Duncan and Hmelo-Silver (2009), p. 607. One challenge is linking assessments with different levels of difficulty to each other and to the curriculum. Another is that the scale's underlying assumptions about expected growth over time must be consistent with a robust theory of cognitive development and ideally tested against evidence of how student learning actually develops.
[90] Harlen (2005b). See Chapter 2 for other challenges that may affect teacher judgement.
[91] Coe, *et al.* (2014), p. 47
[92] Ljungdahl and Prescott (2004), p. 473; Griffin, *et al.* (2010), p. 385
[93] Hattie and Timperley (2007), including for an explanation of the differences between effective and ineffective forms of feedback.

exceeded the expected year level standard or is several years behind.[94]

Defining success in the classroom in terms of progress rather than achievement at a single point in time does not mean lowering expectations. On the contrary, it requires high expectations that, with effective teaching and hard work, every student can improve. As Geoff Masters puts it:

> *self-confidence is built, not through success on easy tasks, but when [students] are able to see the progress they are making, when they appreciate how the quality of their work has improved, and when they succeed on tasks that once were beyond them.*[95]

Teachers cannot do this alone

Collecting and using evidence of learning to target teaching is difficult. Designing high quality assessments is technical and time-consuming – it is very challenging for individual teachers working in isolation.[96] Schools should ensure teachers have dedicated time to work together to select or design robust assessments that test relevant knowledge and skills and are consistent with curriculum standards. Teachers also need dedicated time for moderation.[97]

Using evidence of learning to target teaching well is just as challenging. Teachers need to be able to interpret and analyse evidence to identify their students' needs and then know how best to teach them to meet those needs. Again, it is difficult, if not impossible, for teachers to achieve best practice in isolation.[98] Teachers who work together – in professional learning teams, for example – can draw on a broader range of experience and expertise, and test their interpretations and approaches with each other.[99]

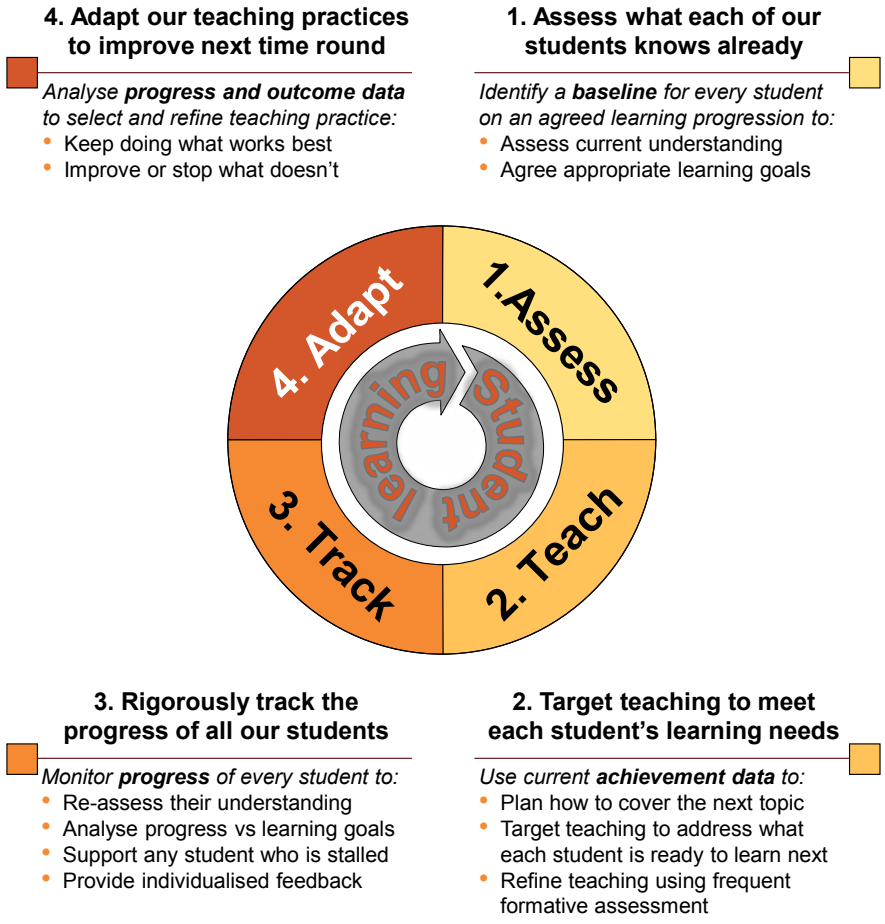
Done well, professional learning teams can be a highly effective form of training that helps teachers develop a strong understanding of the link between their practice and student learning.[100] Students also benefit when teachers take greater shared responsibility for learning.

3.3 Putting it all together

The greatest gains come when evidence of learning is deeply embedded in the day-to-day practices of schools and teachers. Figure 5 describes a framework for integrating evidence of individual student learning into a positive feedback loop that shapes teaching and improves learning over time.[101]

[94] Griffin (2014)
[95] Masters (2013c), p. 5
[96] Connolly, *et al.* (2012)
[97] Klenowski (2011); Connolly, *et al.* (2012)
[98] Harris (2003) p. 378-9
[99] Griffin, *et al.* (2010). Note that the structures of and processes followed by these teams will shape their effectiveness. See ibid. and Griffin (2014) for further detail, and Catholic Education Office: Archdiocese of Melbourne (2010) for an example of system-wide implementation of this approach.
[100] Phillips, *et al.* (2004); Ladson-Billings and Gomez (2001); Timperley and Robinson (2001); Harris (2003) p. 378-9
[101] The Melbourne Graduate School of Education has a comparable set of five questions for professional learning teams engaged in clinical teaching. See Griffin (2014), p. 23.

Figure 5: Rigorous use of evidence supports a positive feedback loop that can improve teaching and student learning



Source: Grattan framework, which draws on research in the field, including Hattie (2009); Griffin (2014); Black and Wiliam (1998); Anderson and Scamporlino (2013).

Teachers start by developing a clear understanding of where each student is at in his learning. **Assessments**, or prior evidence of learning, establish a baseline for each student. Teachers identify gaps in knowledge, set learning goals and gauge the level of support needed to advance each student.

Teaching is then targeted to address what each student is ready to learn next, using teaching strategies that are supported by research. Teachers look for frequent feedback from students on the effectiveness of their teaching. They ask questions, review work and conduct other types of formative assessment in order to refine their teaching as they go.

Teachers and schools **track** students' progress over time against both learning goals and grade-level expectations. This helps to identify students who have stalled so teachers can intervene early. In some instances, additional assistance or support from other teachers is needed to get a student back on track. The process allows teachers to understand whether all students are making adequate progress. It also enables teachers to give feedback to each student on his growth.

Finally, the evidence of learning collected at each stage is used to enable teachers to evaluate and **adapt** their practices. The analysis is sufficiently detailed to identify when teaching has ensured that every student has learned enough (using progress data), and whether all students have met learning goals (using outcome data). Where teaching approaches aren't working as well as expected, teachers and schools either improve their implementation or they stop using them.

Changing practice is hard, but possible

The practices described here represent big changes for many teachers and schools. But change is possible. Schools often say they are starting to use robust evidence of learning but our research suggests that many are falling short of what is required to target teaching.

The next chapter describes how three schools have radically overhauled their approaches to collecting and using evidence of student learning. Their experiences show there are different ways to do this, but all involve a more strategic approach to collecting evidence and, critically, more collaboration and robust conversations among teachers about how this evidence is used to target teaching. Support from education systems has been required to underpin change in these schools. Chapter 5 provides examples of the support that systems have provided.

4 Three schools that are showing the way

Many schools in Australia are striving to use evidence of learning to better target teaching. We spoke to leaders and teachers in over 15 schools who were trying to improve. We profile three (see Box 4): **Bright Vale, Big Sky College** and **St Aspire** (not their real names).[102]

These schools are working hard to put evidence of student learning at the centre of their daily practice. They haven't always done so. Their leaders and teachers spoke frankly about how much their practice had changed in recent years. Previously they thought they had used evidence effectively. They now all agreed the new approaches are a radical improvement.

Change hasn't been easy. Strong leadership, investment in teachers' skills and making time for teacher collaboration have been essential. **Bright Vale** and **St Aspire** have received substantial ongoing support from education systems (see Chapter 5), while **Big Sky College** received additional funding that helped the change process at the outset. It is unlikely this level of change would have been possible without such system support.

None of these schools claims to represent best practice across the board. But they provide practical examples of how to collect robust evidence of student learning and use it to target teaching to the wide range of ability levels in each classroom. Each school emphasises the importance of student progress and monitors it

[102] Appendix 1 describes the methodology used for the case studies, including how these three case study schools were chosen.

Box 4: Three case study schools

Bright Vale is a small government primary school in regional NSW. Its Index of Community Socio-Educational Advantage (ICSEA) is extremely low and a significant proportion of its students are indigenous. Bright Vale is in the NSW government's Early Action for Success strategy, which funds a full-time instructional leader to work with their early primary teachers. Teachers track progress regularly using the NSW literacy and numeracy continuums and use evidence of learning to target teaching. In 2014 the principal used school funds to employ another instructional leader to extend the approach school-wide.

Big Sky College is a large government secondary school in Melbourne. Its ICSEA is below average and half its students are from a non-English language background. The middle school maths program (our focus) is strongly informed by student data, including a detailed understanding of where each student is starting from. All maths teachers have a consistent approach to assessment and teaching. They use a large bank of differentiated teaching resources to support targeted teaching. Student learning growth has exceeded the state average for several years.

St Aspire is a Catholic primary school in the Parramatta Diocese in Sydney's western suburbs. Its ICSEA is just above average and well over half its students come from a non-English language background. The school has started using more rigorous diagnostic tests to develop a better understanding of where each student is starting from. It is working with coaches from the Diocese to target teaching to evidence of student learning.

closely, alongside achievement against external standards. Teachers use evidence of learning to evaluate and adapt practices; school leaders use it to support decision-making.

4.1 How data is embedded into daily teaching practices

Each case study school has systematically developed its assessment and teaching practices in a way that reflects the positive feedback loop described in Chapter 3. In particular, the schools are collecting fine-grained evidence of each student's current level of achievement and using it to target teaching, track progress over time and adapt approaches based on student outcomes. We describe below the practices of the three schools in each of the four steps set out in Figure 5.

Step 1: **Assess** what each student already knows

All teaching should start with clear picture of where each student is at in her learning. Our case study schools invest time and effort to identify their students' starting points accurately and quickly.

At **Bright Vale**, teachers work closely with the school's instructional leaders (who are expert teachers that have been trained to coach others) to identify each student's starting point using the NSW literacy and numeracy continuums.[103] The continuums describe the general learning progression from Prep to Year 10 as well as the expected standard for each year (see Appendix 2).[104] Identifying a student's starting point becomes easier after Prep because the school already holds high quality data on prior learning.

Under the Early Action for Success program (described further in Chapter 5), Bright Vale has invested heavily in improving the accuracy of teachers' judgements. It uses common tools to identify students' starting points, and has established a common language and standards of learning among teachers. Before adopting the program, teachers said they did not form a clear view of each student's ability level until Week 6 or 7 in Term 1. Now that they have greater trust in their peers' judgements, teachers know exactly where each student is at by around Week 2. Better data has meant that teaching is accurately targeted to meet individual student learning needs for an extra 4 or 5 weeks each year.

Teachers at **St Aspire** use the Mathematics Assessment Interview, among other tools, to identify each student's level.[105] These tools have revealed a much wider distribution of achievement within each year level than teachers previously thought. While this has been confronting, it has helped teachers reflect more critically on their practice. Administering the Interview

[103] NSW Department of Education and Communities (2012a); NSW Department of Education and Communities (2012b); NSW Department of Education and Communities (2012c). An extract of the NSW literacy continuum K-6 is provided in Appendix 2.

[104] For consistency, we use the term 'Prep' to describe the first year of school in Australia. It goes by different names in different states. In NSW it is called 'Kindergarten'. Many other jurisdictions use 'Kindergarten' to describe early childhood education programs in the year *before* school commences.

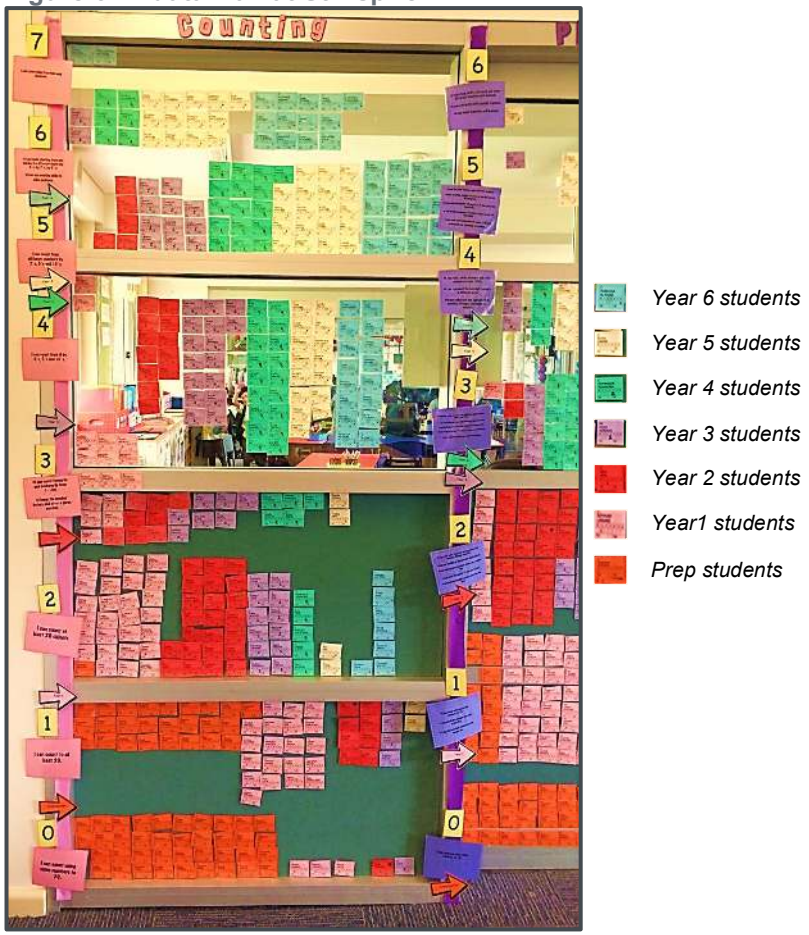
[105] The Mathematics Assessment Interview is a diagnostic test that measures children's conceptual understanding of number. The assessment involves a 30-45 minute conversation between the teacher and each student, including numeracy activities. Catholic Education Diocese of Paramatta (2015); Gervasoni (2011).

takes time – up to 45 minutes per student – and training. But teachers say it has been valuable professional development that has deepened their understanding of the concepts tested, and highlighted what robust evidence of learning looks like in practice.

At St Aspire, student data are now prominently displayed on data walls in a staffroom (see Figure 6).[106] These data walls make the spread of student achievement highly visible, prompting more meaningful conversations between teachers.

Table 1 shows the distribution of current achievement levels in the 'Counting' domain of numeracy (data is from Figure 6). In most years, current achievement is spread across five or six 'growth points'.[107] In Year 3, the spread is seven growth points; one student is working at growth point 0 (the lowest level), while two students are working at growth point 6 (the second highest level).[108]

Figure 6: A data wall at St Aspire



Notes: A segment of the St Aspire data wall. It shows student results for the eight 'growth points' identified by the Mathematics Assessment Interview in the Counting domain. Each card represents one student, colour coded by student year level.
Source: St Aspire

[106] See Sharratt and Fullan (2012) for a discussion of the value of data walls.
[107] The Mathematics Assessment Interview 'growth points' provide a framework for describing students' development in each domain. Each growth point represents additional knowledge. Identifying each student's current growth point enables teachers to target their teaching to the student's zone of proximal development. Progression between growth points can be used to measure the impact of teaching practices. Growth points are not a benchmark expected for all students in a year level but they are aligned to the mathematics syllabus and provide an 'entry point' for teachers into the syllabus. Catholic Education Diocese of Paramatta (2015); Gervasoni (2011)
[108] The distribution of student growth points within each year level is broadly consistent with the distribution found in other schools using this assessment tool. Gervasoni (2011)

Table 1: Distribution of students in the 'Counting' domain – Mathematics Assessment Interview

	Actual year level						
Growth Point	**Prep**	**1**	**2**	**3**	**4**	**5**	**6**
7							2
6				2	6	13	13
5			5	11	16	19	20
4		2	12	16	18	15	16
3		14	8	7	5	2	0
2	1	27	23	12	5	2	7
1	25	20	8	4		2	
0	38	3	1	1			
Total	**64**	**66**	**57**	**53**	**50**	**53**	**58**

Source: Grattan analysis of St Aspire data wall.
Note: Growth point 0 is the lowest level of proficiency. Growth point 7 is the highest level of proficiency.

At **Big Sky College**, Year 7 to 10 teachers use the Scaffolding Numeracy in the Middle Years test in the first week of the school year. This test identifies students' baseline understanding of proportional reasoning, a core concept underpinning secondary school mathematics.[109] The test identifies student proficiency against eight skill levels that roughly align to curriculum expectations for Year 1 to Year 8. On Demand testing and student self-reporting are used to round out the picture.[110] Most students start Year 7 at Big Sky well below year level expectations, while a few start well ahead. Robust assessment of students' starting positions has made the extent of student variation highly visible, supporting the school's commitment to targeted teaching.

Step 2: **Teach** in a targeted way to each student's learning needs

Robust evidence of students' achievement levels shows teachers what their students already know, understand and can do, and enables them to target their teaching to what each student is ready to learn next. This is not about dumbing down the curriculum but finding a balanced and realistic teaching approach that gives all students tasks that enable them to learn. Without taking the time to ensure these students grasp the basic conceptual building blocks in each subject, they cannot be expected to master more difficult material.

Collaboration is vital. At **Bright Vale** and **Big Sky College**, teachers work together to develop lessons that are targeted to evidence of student learning. **St Aspire** is working hard to move in this direction. At each school, classes are either team-taught or there is a clear open door policy, with instructional leaders or coaches observing teachers and demonstrating techniques on a regular basis. Teachers say their practice has become more consistent as it has become more strongly based on evidence.

At **Big Sky College**, maths lessons are designed to meet each student's level. Classes are combined and team-taught; up to 56 students may work with four maths teachers in the same room on some occasions. Teachers cope with the broad range of abilities by using different, pre-prepared tasks to extend each student. For example, small groups work on different Scaffolding Numeracy in the Middle Years tasks once a week.

[109] Victorian Department of Education and Training (2015a). At Big Sky College our research focused on the middle school mathematics program.
[110] The school uses the On Demand adaptive general test twice a year and the On Demand adaptive number test twice a year, in alternating terms. On Demand is a computer-based standardised student assessment available to Victorian schools and provided by the Victorian Curriculum and Assessment Authority.

Twice a week, students work through curriculum material, focusing on the same topic but undertaking different tasks based on their level of ability.[111] In a Year 8 class we observed, all students were asked to calculate the surface area of a three-dimensional object. Each student selected a picture with a two dimensional representation of one of three objects (a cube, a triangular prism or a cylinder). The pictures offered varying levels of support (there were gridlines on some objects but not others; one was not drawn to scale, requiring more abstract reasoning from students). Teachers intervened if a student selected too easy or too hard a task. Interestingly, teachers told us that students almost always choose a task that is challenging but achievable. If they err, they are more likely to choose a task that is too hard. Students like to take responsibility for their learning and are highly motivated when they feel stretched, but can complete the task with some guidance.[112]

Big Sky has invested heavily in developing lesson plans and teaching resources for mathematics that target different ability levels. Teachers have developed most of the materials collaboratively and use them consistently in all lessons across the school.[113] The investment has freed teachers to focus on planning their team teaching approach and reflecting on how each lesson went, rather than having to prepare for each class individually beforehand. One teacher said he had had more professional growth and job satisfaction in the last few years at Big Sky than at any other school during 30 years of teaching.

At **Bright Vale**, teachers also work together to develop lesson plans and assessments that cater for different levels of ability. Together, teachers set explicit expectations for student work that are benchmarked against external standards. As a result, a consistent teaching approach is being adopted across the school. Compared to previous practice, teachers at Bright Vale say they feel much "busier" now they have a clearer sense of their objectives. The ongoing focus on progress has also created a sense that there is "no time to waste". Yet teachers also feel more satisfied than in the past, when they had less confidence in their approach. Students are also more engaged, and behave much better in class. The Principal noted that the number of students reported for bad behaviour has dropped by 80 per cent since the new teaching approach was implemented.[114]

Step 3: **Track** the progress of each student

Rigorously tracking the learning progress of each student performs two important functions. It provides an early warning system to identify when a student has stalled, regardless of whether he is ahead of or behind expected year level standards. And it enables teachers to analyse the effectiveness of their practice by gauging whether every student has made enough progress.

[111] A fourth maths class each week focuses on mathematical literacy and a fifth class focuses alternatively on ICT applications or mathematical fluency.
[112] This is consistent with Vygotsky's theory that students learn best when they are working within their Zone of Proximal Development. Vygotsky (1997)
[113] The Scaffolding Numeracy in the Middle Years tool includes freely available teaching resources prepared by experts over a number of years, although Big Sky teachers have further refined and supplemented these resources. Victorian Department of Education and Training (2015b)
[114] Advice from Bright Vale Primary School.

At **St Aspire**, student learning is continuously tracked using the Maths Assessment Interview growth points and the NSW literacy continuum, with a strong focus on writing. Students and teachers now have a clearer understanding of what needs to be shown before the student can move to the next level. Having to demonstrate explicit individual learning goals is a great motivator for students – some regularly ask their teachers to test them so they can demonstrate progress. Students must demonstrate a skill four times before they can move to the next level.

At **Bright Vale**, teachers are required to identify students' progress every five weeks, using the NSW literacy and numeracy continuums. In each classroom student progress is made visible, albeit anonymously (see Figure 7). Each student has an avatar that he moves forward when he reaches the next skill. Students have embraced the avatars and look forward to being assessed to show off their progress. In contrast to previous years, students can now clearly explain what skills they need to show to move to the next level and they are taking greater responsibility for their own learning.

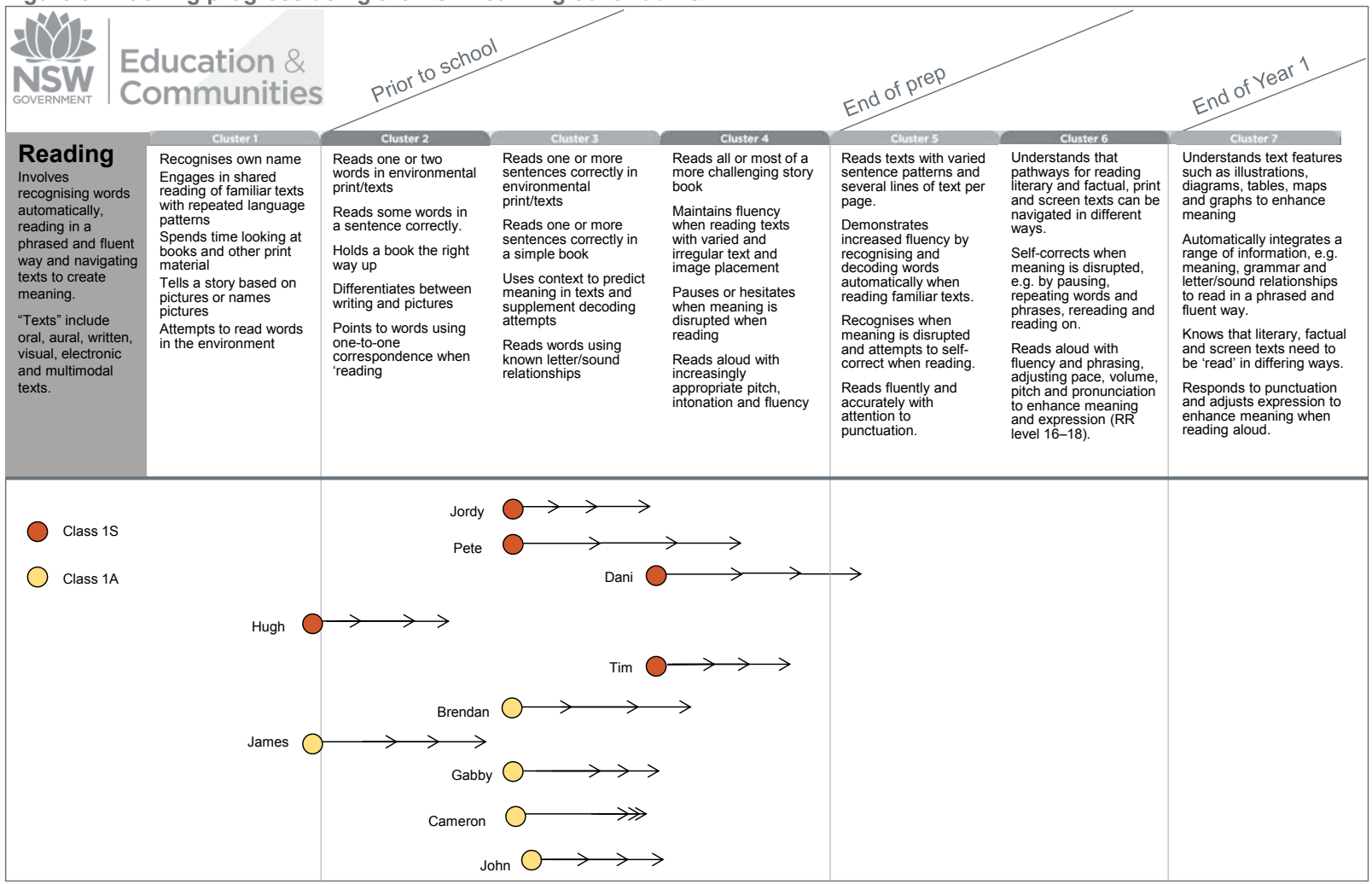
Bright Vale teachers track progress by hand on large printed copies of the NSW continuums. They can see at a glance how much each student has progressed and how he compares to the rest of the class and year level standards (Figure 8). Teachers discuss progress at weekly team meetings, identify stalled students and develop strategies to move them forward. Teachers say it is now impossible for a student to fall through the cracks.

Figure 7: Tracking progress in the classroom with student avatars

Source: Bright Vale Primary School

The visibility of student learning makes Bright Vale's teachers feel more accountable. They say the emphasis on progress rather than achievement has "levelled the playing field", given the significant disadvantage their students face. That said, the teachers acknowledge that it is critical to benchmark achievement against external standards to maintain high expectations, as the strongest performers at Bright Vale are generally average performers by statewide standards.

Figure 8: Tracking progress using the NSW learning continuums



Notes: Each arrow marks five week's progress. Source: Grattan recreation of a diagram used at Bright Vale to track individual student progress

At **Big Sky College**, teachers track progress regularly using Victoria's On Demand assessment, the Scaffolding Numeracy in the Middle Years assessments and student self-assessments. Students maintain their own learning data and are encouraged to focus on their rate of progress compared to average progress rates for Victorian students, rather than on their current achievement level.

Teachers at Big Sky also publish each student's On Demand progress, but not achievement, scores. This reinforces the school's philosophy that every student can achieve great results, no matter where they start. In fact, students who had previously thought of themselves as poor mathematicians commonly top the progress rankings.

Step 4: **Adapt** teaching practices based on student evidence

Evidence of what works best in the classroom should be used in order to select which teaching practices to keep, and which to improve or stop.[115]

At **Bright Vale** and **Big Sky College** data on student learning is embedded in teacher planning and school management. Evaluating impact and adapting approaches happens both informally on a daily basis and through periodic reviews of school-wide practices. Building a common language to understand evidence of learning has been vital. **St Aspire** is at an earlier stage, and acknowledges that it has further to go to embed evidence of learning into its regular planning.

At **Bright Vale**, instructional leaders work with and provide feedback to teachers every day. They also guide weekly planning sessions where teachers review the impact of their teaching on student learning. Previously, asking for help was an admission of failure. Now teachers recognise that, like students, they can stall and may need help to adjust their approach. Conversations about practice are now commonplace and teachers are more comfortable constructively challenging each other. Because teacher judgements are rigorously discussed and debated, using high standards of evidence, they are more trusted. Developing a common language, based on shared assessment tools, has been critical.

At **Big Sky College**, maths classes are team taught. The teachers taking each class discuss what worked and what did not both during and after each lesson. In group planning sessions, teachers also critique lesson outlines and materials. Nothing is left to the whim of an individual teacher. Teachers can present new ideas, which are then debated, developed and trialled – a process one teacher described as "structured creativity".

Adaptation has happened at Big Sky over longer time scales as well. The materials used for maths teaching have evolved in response to active selection of what works best, and by modifying or stopping what does not. When analysis showed that a particular unit of work had consistently failed to generate the desired learning progress, it was rewritten from scratch.

[115] This step closes the loop and generates a self-improvement cycle based on the evidence of what is working within each school, in the way that it is currently being delivered. See Caldwell and Spinks (2013) and Petty (2014).

4.2 Change required persistent implementation

Embedding the use of evidence and data into all aspects of teacher practice has been a big change at each school. Changing practice is always hard but setting priorities, investing in teacher capacity and staying the course over time made it easier.

The importance of prioritisation

Setting priorities is essential for effective change.[116] Changing too many things too quickly can be self-defeating, especially if teachers do not have enough time or support to adjust.

Bright Vale spent two and a half years focusing solely on the Early Action for Success program in early primary (Prep to Year 2). Only when it was well established, in 2014, did the Principal agree to teachers' requests to extend the approach across the school. The staged roll-out and adoption of a school-wide strategy has had clear benefits. Now there is greater consistency across the school and student progress can be tracked from Prep to Year 6 using the same set of tools.

Big Sky College attempted to change practice more quickly. The new maths program was first developed in 2009, rolled out in Years 7 to 9 a year later and to Year 10 in 2011. The program involved significant change from business as usual and some strongly resisted it. Five years later, it is largely embedded. School leaders recognise that a slower roll-out, perhaps prioritising Years 7 to 8 before extending it to Years 9 to 10, might have been smoother. When teachers saw clear evidence of the impact on student learning they were convinced of the program's benefits. A staged rollout could have demonstrated these benefits and increased teacher support before change went school-wide.

Investment in time, tools and training to build teacher capacity

Building teacher capacity has been vital at each school. **Bright Vale** has an extensive program of in-school professional learning. Most of it is conducted internally by the school's two experienced and respected instructional leaders. Each works with seven teachers only. They spend mornings in the classroom, directly observing or demonstrating, and coach teachers in the afternoons. They guide weekly teacher planning sessions and training based on common issues and concerns. The Principal has strictly quarantined instructional leaders' time by exempting them from yard duty and similar requirements.

Maths teachers at **Big Sky College** have also had significant training and release time. They have all been trained to assess students effectively, analyse student data and team teach. Release time has enabled them to build and review a large library of shared resources tailored to student ability levels. Maths teachers have two periods of quarantined release time set aside for joint planning per week as well as two full days of additional release time a year set aside for collaborative work developing lessons and resources (down from four full days in the first year of the change). Release time is also quarantined to ensure the maths team has a standard weekly meeting as well as an additional planning afternoon each term. Maths department leaders also have release time to ensure a consistent, school-wide approach.

[116] Zbar (2013), p. 4

The Parramatta Catholic Diocese has also helped **St Aspire** to build teacher capacity. This year it has funded a teacher educator to work with staff and a literacy coach to work the equivalent of three and a half days a week. It has also provided an additional $20,000 to fund teacher release time and access to experts.

Ongoing effort will be required

Changing practice is not a set-and-forget exercise. Even with significant professional support at **Bright Vale**, the Principal said that it took at least six months to change teachers' attitudes back in 2012. A few strongly resisted the new approach and some of them chose to leave. All teachers found the approach time consuming as they developed an understanding of the new tools and practices. Now they feel the workload is manageable and justified by the impact on learning. School leaders have made a commitment to ongoing training, especially as new teachers join the school.

Embedding change at **Big Sky College** has taken at least six years. It is still in the final stages of implementation across the school. Team teaching, an established assessment schedule and shared teaching resources have underpinned a consistent approach and ensured a good standard of teaching across the school, even as individual teachers are still developing their practice.

St Aspire is at an earlier stage of the transition. Teachers support the new approaches and believe they are having an impact. But there is still much new information to take in and more time is needed to embed the use of evidence into standard practice. Ongoing professional support and release time will be needed to embed the approach. In contrast to Bright Vale, which invested heavily in teacher capacity building under the Early Action for Success program, change may take longer at St Aspire.

4.3 Schools find it hard to target teaching well without external support

While researching this report, we spoke to more than a dozen other schools that were trying to target teaching or track progress better. All recognised the importance of using good data to inform teaching yet few, if any, embedded a consistent approach in every classroom. Several emphasised the analysis of student results on external standardised tests (such as NAPLAN, ACER's PAT tests, or Year 12 ATAR scores) to support management decisions or comparisons with local schools. Yet, their use of assessment to inform daily teaching practices was typically more ad hoc, with some individual teachers adopting different approaches depending on past training or philosophy.

While these schools differed widely in their approaches, two factors seemed to be common. They were finding the transition hard. And unlike the case study schools, they had received little support from system leaders and were making the journey on their own. They had received little guidance on what "good" looks like and, in our judgement, were having to reinvent the wheel.[117]

The next chapter describes the approaches by the two education systems that supported change at Bright Vale and St Aspire.

[117] Bentley and Cazaly (2015), p. 64 found the same: "The greatest challenge evident in case study sites was the data being accessible and useable. Too many schools are currently inventing their own solutions to this problem, resulting in systems that further fragment and isolate schools from each other."

5 Support from education systems is required

Teachers and leaders in every school must do the hard work of embedding evidence of student learning into their daily practice. But they should not be expected to do it on their own. Support and guidance from education systems is required to ensure deep change occurs in *every* school.

All three of our case study schools received system support to change their practices. This chapter describes two models:

- the NSW government's Early Action for Success strategy, which has supported Bright Vale
- support provided by the Catholic Diocese of Parramatta, which is seeking to improve the use of evidence of learning in all its schools, including St Aspire.

Our third school, Big Sky College, developed its approach with less explicit system guidance or support than Bright Vale or St Aspire. Yet, it did receive more than $1 million in National Partnership funding between 2009-13.[118] This funding helped make its new approach possible. Since then, the extra investment in teachers, including time for collaboration and professional development, has been partly funded through rigorous prioritisation, although the school's budget is now in deficit. Big Sky will require additional government funding to maintain its approach in the longer term.[119]

The research on school improvement has also distilled a number of lessons on what systems should not do. This chapter concludes by highlighting the most relevant of these.

5.1 Focusing on progress in literacy and numeracy in NSW primary schools – Early Action for Success

The NSW Department of Education and Communities' Early Action for Success strategy seeks to improve learning outcomes in early primary school (Prep to Year 2).[120] Established in 2012, the program provides significant investment in teacher capacity, clear direction to participating schools and monitoring of their progress. The strategy is operating in more than 300 of the state's most disadvantaged government schools, serving 29,000 Prep to Year 2 students.

The program has helped schools and teachers to significantly change their practice. Schools are required to:

[118] Big Sky received additional funding under the National Partnership on Low Socio-economic Status School Communities and the National Partnership on Improving Literacy and Numeracy. Advice from Big Sky College.

[119] Advice from Big Sky College.

[120] NSW Department of Education and Communities (2014a); NSW Department of Education and Communities (2014c). The Early Action for Success strategy operates in NSW government schools only. The strategy is part of the NSW government's broader State Literacy and Numeracy Action Plan, which will provide $261 million across government, Catholic and Independent sectors from 2012-2016. NSW Department of Education and Communities (2014b)

- formally assess each student's learning needs by identifying her level on NSW's literacy and numeracy learning continuums
- target teaching to what each student is ready to learn next
- explicitly track each student's progress against the literacy and numeracy continuums, formally recording evidence of progress every five weeks and providing it to the Department for analysis every 10 weeks.

The Department has allocated an average of $233,000 per school in additional funding under the program in 2015.[121] The funding has enabled the appointment of instructional leaders to work with the Early Action for Success schools – either singly or as a small school cluster.[122] Their job is to equip early primary teachers with the skills to assess students effectively, identify learning needs using the continuums and target teaching in response. Instructional leaders are in turn supported by a learning network established by the Department.

The funding also allows for targeted assistance for students who require additional support and more professional learning to enable teachers to target their teaching.

The Department exercises substantial oversight of the strategy. It regularly analyses each school's individual student data and performance in lifting student progress, and it shares the analysis with all participating schools on a de-identified basis. Every term the Department identifies schools with the smallest gains and provides them with additional support and coaching.

Initial reports from the evaluation, now underway, of the Early Action for Success strategy suggest it has reduced the proportion of early primary students that fail to meet expected benchmarks. The most recent report says that the proportion of early primary students anticipated to reach end-of-year benchmarks increased by roughly 20 percentage points from 2013 to 2014. In other words, an extra one in every five students is now expected to be academically ready when they start their next year of school.[123]

5.2 Supporting every school to use data and target teaching – the Parramatta Catholic Diocese

The Catholic Education Diocese of Parramatta, in Sydney's west, is responsible for 78 primary and secondary schools. Over the last four years, the Diocese has taken a focused approach to improving student outcomes, including an explicit strategy to

[121] The funding is calculated based on student numbers. Individual school funding ranges from $32,600 (for a school with one student in Prep-Year 2) to $516,685 (for a school with 323 students in Prep-Year 2). In 2013-14, Bright Vale received just under $300,000 in Early Action for Success funding. NSW Department of Education and Communities (2014c); advice from NSW Department of Education and Communities.

[122] By May 2015, there were 224 instructional leaders supporting 311 schools. Instructional leaders were shared across some schools, including small and very isolated schools. NSW Department of Education and Communities (2014a); advice from NSW Department of Education and Communities.

[123] Advice from NSW Department of Education and Communities; NSW Department of Education and Communities (2014c). This analysis includes only the 59 schools that started Early Action for Success in 2012, including Bright Vale.

improve schools' collection and use of evidence about each student's learning.

Assessment and teaching practices within the Diocese used to vary widely. Some schools did not monitor students' reading progress effectively in the early years, while others had a weak understanding of how much students were stalling in the middle years of secondary school. There was much talk about the need to focus on the learner, but less about what was needed in the classroom to make that happen. Principals were also less likely to share information and seek help to address poor student progress.

To fix this problem, the Diocese has developed a focused approach to improving the consistency and quality of teaching practices across its schools.[124] All schools are now required to collect robust evidence on individual student learning using a common set of tools. These include Running Records for reading in the early years, the Maths Assessment Interview and ACER's PAT-R tests in Years 2 to 10. About a quarter of the Diocese's schools also use the literacy and numeracy continuums developed by the NSW Department of Education and Communities. The tools enable teachers to form a clear view of what each student knows and what they are ready to learn next.

All schools are required to use data walls, such as the one at St Aspire, to display evidence of learning. The walls have made the spread of student achievement and the rate of progress highly visible. The use of quality assessment tools and data walls has helped motivate teachers to make the evidence they collect more rigorous, and enabled them to focus more precisely on student learning.

The Diocese has also invested in building school leadership and teacher capacity to improve the quality of evidence and how it is used. Instructional leaders in literacy and numeracy work with teachers in most schools for one to two days a fortnight. More resources are directed to schools with the greatest need – some have received three extra instructional leaders to work with teachers. The investment is helping teachers embed the new approaches. The Diocese also encourages principals to visit classrooms in nearby schools, share examples of good practice and provide feedback to each other.

Within the Diocese, four Directors each work with about 20 schools to improve their performance. The Diocese maintains a data wall tracking each school's improvement, with a strong emphasis on student progress as well as high achievement.

While there is much work yet to do, the approach has reduced the amount of variation in assessment and teaching practices among schools.[125] To ensure consistent good practice, the Diocese recognises it will need to maintain its focus on effective strategies and resist the temptation to add new priorities.

It is too early to measure the success of the Diocese's approach, although it reports that its 2014 NAPLAN results for Year 3 were the best to date. Initial signs from St Aspire, our case study school, suggest things are improving. Yet the lighter investment in

[124] Catholic Education Diocese of Paramatta (2014)

[125] Advice from the Diocese

professional development, compared to the Early Action for Success strategy, may slow down change.

5.3 What education systems should not do

Education systems can provide support to school leaders and teachers to improve the use of evidence to target teaching. They can also help to create the conditions and climate where success can occur.[126] But the wrong policy settings can inadvertently set schools up for failure.

Don't create the wrong incentives

Systems should not undermine their reform efforts by moving too quickly from an improvement focus to an accountability focus.

How much students learn (their progress) is a much better measure of school effectiveness than student achievement. But even progress data provide an incomplete picture, particularly when background factors such as socio-economic status, tutoring and home environment have a large but unmeasured impact.

Systems should therefore avoid the temptation to use data that schools collect internally to track the progress of each student as an accountability measure. The progress data described in this report is designed to improve teaching, not penalise or reward teachers or schools. The same data cannot successfully serve both purposes.[127] Box 5 shows why increasing the stakes around progress data is a high-risk approach. Systems that have placed too much pressure on student results have created the wrong incentives around teaching, and seen highly undesirable results.

Don't underestimate the challenges of implementation

Change is hard. Integrating evidence of learning into teaching in every classroom requires action across the school.[128] Turning around a school's performance can take six to seven years, and even high-performing schools can take years to embed new practices.[129] Systems should therefore not assume that implementation will be quick or easy. Robust evidence around student learning will need to be a reform priority for several years. System leaders will have to make consistent decisions, and limit the number of other policy changes that they throw at schools.

Systems should avoid spreading their support too thinly – nothing undermines change faster than early failure. Instead, before scaling up they should consider encouraging examples of success, and building momentum for change by proving the concept through pilots that are rigorously evaluated and used to refine the approach to implementation.

[126] Dinham (2013), p. 47. See Dougherty (2015), p. 19-22 for details of the support provided by two districts in the United States to help schools analyse and use data.

[127] UK Select Committee on Children Schools and Families (2008); Coe, *et al.* (2014)

[128] See, for example, Fullan (2011).

[129] Zbar, *et al.* (2009)

Box 5: Why high-stakes testing is a high-risk approach

In theory, student progress data could be used to determine teacher promotions or sackings, or to reward high-performing schools with increased funding and punish low-performing schools with closure. But research shows that use of assessment data in this way can have harmful and corrupting effects.

In the US, high-stakes testing has led to narrow and shallow classroom instruction – or teaching to the test. In a high-stakes environment, there is often an increased focus on tactics that are irrelevant to learning, such as familiarity with an exam's format, to maximise marks. Further, high-stakes tests are often in basic literacy and numeracy skills so less attention is paid to other subjects. And because it is often easier to test basic knowledge, less time is spent teaching elements such as problem-solving that are harder to test. In addition, some schools have discouraged students from participating in high-stakes tests or even excluded them from school altogether. If the stakes are high enough, schools or teachers may resort to desperate measures to alter test records if the existence of the school or teachers' jobs is on the line.

In April 2015, 11 teachers from Atlanta public schools were convicted of racketeering and fraud. They had been feeding answers to students or changing answers after they had been turned in. Cheating occurred in 44 schools. An inquiry into the scandal found that it "was caused by a number of factors but primarily by the pressure to meet targets in the data-driven environment."

Even if the problems of a narrow curriculum and corruption could be solved, identification of effective teaching is still quite technically difficult: the challenge of disentangling student socioeconomic advantage, prior achievement and school background factors from measures of teacher quality have not been overcome.

As a result of misidentifying good teachers as poor ones, high-stakes testing can demoralise teachers, reduce the appeal of the profession, and accelerate teacher attrition. Further, when the tests are designed to identify individual teachers' performance compared with their peers, teacher collaboration can be undermined.

Lastly, there is little indication these tests have improved learning in the United States. Neither PISA nor the National Assessment of Educational Progress has shown any significant change in America's learning as a consequence of the introduction of high-stakes testing. Using test results to reward or punish teachers and schools will never produce system-wide reform.

Sources: Au (2007); Heilig and Darling-Hammond (2008); Office of the Governor of Georgia (2011); Fullan (2011)

6 How to embed targeted teaching in every classroom

We have known for a long time that we need to target teaching effectively if we want to maximise individual student progress. Many educational researchers have documented what good practice looks like. Differentiated teaching and using data are built into the Australian professional standards for teachers. Yet many schools and teachers don't have the high quality evidence they need to effectively target teaching and track progress.

Change is hard, but it is possible, especially with support from education systems. To ensure all our students make the progress they deserve, we must act: schools and teachers, governments and system leaders, and parents. This chapter describes our recommendations.

6.1 What schools and teachers should do

6.1.1 Develop a plan to collect and use robust evidence of learning

Recommendation 1: *Schools should develop a plan to collect robust evidence of student learning (what each student is ready to learn next, and how much her learning has progressed) and use this data to target teaching and track student progress over time.*

Schools should develop a plan to target teaching consistent with the practices outlined in Chapter 3 and summarised in Box 6.

Each school should have a shared vision of teaching and learning that helps every student to maximise progress. Higher achieving students should be stretched, lower achieving students should be supported to catch up, and no student who stalls should go unnoticed.

The plan should outline how teachers will work together to:

- **assess** the starting point for each student to establish a baseline, identify learning needs, set individual progress goals and gauge the support needed to meet them
- target what they **teach** to address what each student needs, refining their teaching using frequent formative assessment
- **track** each student's progress over time against individual learning goals and year-level expectations, rapidly identifying and supporting any student who stalls in her learning
- use evidence of student learning to evaluate their impact as teachers and **adapt** their practice when necessary.

With limited resources, schools need to develop an efficient and integrated assessment strategy. It should include a range of assessment tools, balancing teacher judgement with standardised tests. It should also describe the processes and systems that will be used to collect the right type and amount of evidence, analyse the results and track individual student progress over many years. Finally, the strategy should describe how the right information will be put in the hands of teachers at the right time and in a way that supports the teacher with his teaching.

Box 6: Collecting and using evidence of student learning: a checklist for good-practice in schools

- The school fosters a **culture of progress** in which teachers, students, and parents see learning success as being about effort and improvement, not ability and attainment; and assessment as a way to improve, not to expose student failures.
- Teachers and school leaders have a **shared sense of responsibility** for student learning. Collaborative teaching teams and the transparency of learning data enable teachers to support each other and track student progress over time.
- Teachers share a **common language** of learning standards and work together to discuss evidence of student learning and teaching strategies.
- The school **puts a priority on assessment** and the strength of learning data. Teachers have dedicated time to jointly develop, mark, and moderate assessments across all grade levels – not just in Years 11 and 12.
- Teachers have access to a range of **assessment tools** and related resources, understanding that different assessments and sources of evidence are appropriate for different purposes. These will include diagnostic tools to identify students' initial learning needs and tools to track student progress reliably over time and to map achievement to external standards.
- **Professional development** is provided in-house to develop the capacity of teachers to select and develop assessments, mark consistently, and interpret and learn from the results.
- **Teaching practices are chosen from the best available evidence** and the effectiveness of implementation is continuously assessed by analysing whether students make *enough* progress.
- Teachers use frequent **formative assessment** to refine teaching in response to individual learning needs, through identifying the source of student misunderstandings and understanding what each student is ready to learn next.
- The **progress of all students** is assessed regularly (at least twice a year) and rigorously using fit-for-purpose assessments. Individual student progress is also **monitored across multiple years**. Teachers have a clear sense of how much each student needs to progress to reach expected year level standards.
- The school **uses assessment data appropriately as an input into strategic teaching and resourcing decisions**. The school recognises the impact of measurement error and triangulates results of various assessments. It emphasises the use of data as a tool to improve teaching and learning and **minimises negative incentives** that could undermine the quality of data or teacher collaboration.

Source: These principles are distilled from the literature discussed in this report

Schools should plan how to use this data to inform their decision-making. For example, diagnostic data enable school leaders to analyse where students most need extra support. Progress data give a sense of where resources and strategies are having a strong impact and where teachers need extra support. Data should also be used to inform school-level decisions, interventions and initiatives.[130]

6.1.2 Target teaching in every classroom

Recommendation 2: *All teachers should target teaching in their classroom, with schools providing the time, tools and training needed to embed targeted teaching and track progress.*

Teachers should target teaching in every classroom to what students are ready to learn next and track progress over time.

Schools should support teachers by providing the time, tools and training teachers need to do this well. Schools should provide:

- **Time:** It takes time to collect good data and use it effectively. Teachers need dedicated time to develop good assessment, analyse and interpret the results, and plan how to target teaching accordingly. Changes to timetables or staff meetings may make it easier to schedule this time.[131]
- **Tools:** High quality assessments and related tools (for example, links to teaching materials) help teachers gather the data they need and build consistency, and can also save time.
- **Training:** Developing effective classroom practices should be schools' highest priority. Schools need to develop individual and collective competencies. Teachers who are more effective will also be more motivated to achieve results.[132] The case study schools showed the value of on-the-ground support from instructional leaders to develop teachers and guide professional learning teams.

6.1.3 Steer changes in teaching and school practice effectively

Recommendation 3: *To ensure effective implementation, school leaders should identify priorities, set clear expectations and recognise that change takes time.*

Changing practice is hard. Research on organisational change shows that many efforts fall short of their goals.[133] To ensure success, school leaders must clearly communicate the reasons for the change and mark success along the way. They must also:

- **Set priorities.** Schools that achieve change have relatively few priorities. They select them on the basis of what students

[130] ACER (2012), p. 4
[131] See Jensen, *et al.* (2014) for examples of how reforming schools make difficult but crucial trade-offs around how time is spent.
[132] Zbar (2013); Harris (2003); Fullan (2011), p. 33-35
[133] An IBM survey of over 1500 project leaders, sponsors, project managers and change managers found 44 per cent of all projects failed to meet either time, budget or quality goals, while 15 per cent were either stopped or failed to meet all objectives. Jørgensen, *et al.* (2008)

need most, and what is likely to have the greatest impact.[134] They direct energy and resources strictly towards priority areas, quarantine time for high-impact activities, and take time and resources from low-impact activities.[135] They schedule changes in a sensible order, in line with priorities, so that change is manageable.

- **Be clear about what teachers are required to do.** Targeted teaching involves a balance between consistent practice (for example, using an agreed assessment strategy) and professional autonomy. To change behaviour, principals should make clear what teachers must do, and what is up to professional discretion.

- **Recognise that ongoing effort will be required.** All change processes are bumpy and complex to manage. Many teachers and schools will have to put in a lot of effort before they see results. Schools must be realistic about how quickly change can be embedded, flexible in managing unforeseen obstacles, and persistent in staying on the reform path.[136]

[134] Zbar (2013), p. 4
[135] Ibid., p. 4
[136] Fullan (2011), p. 35

6.2 What governments and system leaders should do

Education systems and governments provide the time, tools and training needed to change classroom practice. They should focus on creating the conditions and climate where success can occur; prioritise the reforms that will have the biggest impact on student learning; and develop processes to support implementation.

6.2.1 Improve assessment tools and resources

Recommendation 4: *Government and system leaders should invest in assessment tools and related resources that help teachers collect and use high quality data about individual student learning. They should, as a priority, evaluate existing resources and make sure schools understand and can use what is already available.*

Every school needs a clear picture of each student's learning. Painting this picture requires a set of tools that can provide the right information at the right time to the right people. Tools must be easy to use, and should help teachers gather fine-grained diagnostic evidence as well as measure progress over time. NAPLAN provides valuable information but, on its own, is not sufficient to target teaching and track progress in schools.

Developing high quality assessment tools is technical and time-consuming.[137] For example, learning continuums must be based on a robust theory of learning and should be tested to make sure they describe the way most students actually acquire skills.[138]

[137] Duncan and Hmelo-Silver (2009), p. 607
[138] Wilson (2015)

Standardised tests should help teachers evaluate student learning against external standards and, ideally, identify what each student is ready to learn next.[139]

Matching teaching resources to assessment tools also takes time and expertise. For example, the Scaffolding Numeracy for the Middle Years assessment framework includes high quality teaching resources that were developed by a team of experts and tested in a range of schools over several years.[140] These resources provide explicit support for teachers to help them move each student to the next level.

As the volume of data grows, schools and teachers increasingly want tools that integrate and analyse different data sources and help them visualise progress over time.[141] But schools should not over-rely on information management systems. They should also be wary of IT systems that require teachers to spend a significant amount of time inputting data, unless there are clear benefits. Data get power when they inform discussions among professionals. Our case studies show that even the simplest visual approach – such as using data walls – is incredibly powerful when it becomes part of daily practice.

It is impractical and inefficient for each school, or even small education systems, to develop all these tools and resources alone. Governments and system leaders should set the direction, and also encourage private sector and university involvement.

With the National Curriculum being implemented, now is the time to take stock of today's tools and invest to fill the major gaps.

Evaluate existing tools and resources

Governments should work together to identify and evaluate existing assessment tools (see Box 7). The evaluation should primarily focus on whether the assessment tools provide valuable information to teachers on student learning and provide practical support and guidance as to what to teach next.

The evaluation could build on the initial work done by ACER in 2009 and the Northern Territory government in 2010 to review literacy and numeracy diagnostic tools.[142] Since then, IT capabilities have improved, curriculums have changed, some tools have been withdrawn and new ones have been developed.

Ideally, the review should also evaluate assessment tools for learning areas outside of literacy and numeracy. It would also be valuable to try to understand how widely the various assessments are being used in schools today. The evaluation should be updated over time as new tools are developed and others become out-dated. The results of the evaluation should be published, with clear guidance to schools on how to select an appropriate set of tools. The Northern Territory's *Diagnostic Assessment Selector* website, based on New Zealand's *Assessment Tool Selector*, could be a useful model.[143]

[139] Griffin, *et al.* (2010); Griffin (2014)
[140] Victorian Department of Education and Training (2015b); Victorian Department of Education and Training (2015c)
[141] Appendix 2 provides some examples of progress tracking tools used overseas.
[142] Forster (2009); Australian Government and Northern Territory Government (2010)
[143] Northern Territory Department of Education and Training (2013a); New Zealand Ministry of Education (2015)

Box 7: Evaluation of assessment tools

At a minimum, evaluation of each tool should identify its:

- **purpose**: is it designed to provide a broad measure of achievement or provide fine-grained diagnostic information?
- **validity**: can you make appropriate, meaningful and useful inferences about a student's learning from their scores?
- **reliability**: does the assessment produce reliable results? What is its margin of error at the student and classroom level?
- **formative power**: what level of guidance does it provide as to what students are ready to learn next? Is it linked to related teaching resources?
- **alignment**: does it identify student achievement against external standards? Is it aligned to the National Curriculum?
- **power to track progress**: is it aligned to a vertical scale that covers many years? How frequently can it be used to assess student progress?
- **efficiency**: how much teacher time is required to administer, mark, moderate and analyse the assessment?
- **implementation costs**: how much teacher training is required to use the assessment tool effectively?
- **cost and availability**: is the tool available to all schools?
- **accessibility**: is the tool user-friendly? Are the scores easy to interpret accurately?

Source: Grattan synthesis of key dimensions required for good assessment

Invest to fill the major gaps

Further investment will be needed to make sure all schools have access to the full range of assessment tools required. Some new tools will need to be developed. Some existing ones, such as Victoria's On Demand assessment system, will require further investment to align them to the new curriculum or make them more user friendly.

Investment is also needed to ensure tools are classroom ready. They will have little impact on learning if schools don't have the infrastructure to administer them, and teachers don't have the right training to interpret the results, guidance as to what to teach next and the teaching resources to do this.

The cost of this investment will be small, relative to governments' total education expenditure. For example, the Scaffolding Numeracy in the Middle Years assessment framework and teaching resources cost approximately $1.1 million to develop.[144] ACARA's budget for delivering national assessments, including NAPLAN, is about $16 million a year.[145] This investment represents a tiny fraction of the $44 billion spent on school education by all governments in 2013-14.[146]

[144] This includes an Australian Research Council grant and additional support from project partners. Advice from Professor Dianne Siemon, Scaffolding Numeracy in the Middle Years project leader.
[145] Commonwealth of Australia (2015), p. 95
[146] This figure covers expenditure on primary and secondary education only. It includes $41.8 billion on operating expenses and $1.9 billion on gross fixed capital formation. ABS (2015), Table 1

6.2.2 Build capacity across the system

Recommendation 5: *Government and system leaders should strengthen teacher and school leader capacity to target teaching and track student progress: improve the training of new teachers around assessment and the use of data and provide on-the-ground support and professional development to existing teachers and school leaders.*

Access to good assessment tools and resources is not enough. Systems must also build the capacity of school leaders and teachers to use the tools, interpret the results, and adjust their teaching in response to the evidence of student learning needs. Building capacity requires a focus on existing teachers and school leaders as well as improving initial teacher education.

Develop the capacity of existing teachers to use evidence

The Australian Institute for Teaching and School Leadership's (AITSL) Professional Standards for Teachers recognises the need for teachers of all levels of experience to be able to collect evidence of learning, target their teaching, and evaluate their impact.[147] Yet Chapter 2 shows that many, if not most, teachers require significant professional development in these areas.

Ongoing investment in professional learning is needed to have a sustained, positive impact on teacher practices and, therefore, on student outcomes. An occasional workshop or coaching session will not lead to lasting improvements.[148] Professional learning should challenge teachers and encourage them to reflect. It should engage them in activities directly related to classroom practice and provide opportunities to learn from experts and colleagues. Building subject-specific content knowledge and understanding of how students learn is also important.[149] Effective professional learning requires a significant commitment of teacher time, as well as access to experts to work directly with teachers in their classrooms or in professional learning teams.

Some high-fee, independent schools may be able to prioritise their existing resources to invest in teacher capacity without system support.[150] But our research suggests most schools will need additional, targeted support.

The NSW government's Early Action for Success strategy, discussed in Chapter 5, provides an example of highly targeted investment in teacher capacity to both collect and respond to evidence on student learning. About 60 per cent of the $66 million allocated to this strategy in 2014/15 has been used to develop early primary teachers' capacity in the targeted schools, including by working with dedicated instructional leaders on a daily basis.[151] Initial reviews suggest the strategy has had a significant impact on improving teacher practices.[152]

[147] See, in particular, Standard 1: Know students and how they learn, Standard 3: Plan for and implement effective teaching and learning and Standard 5: Assess, provide feedback and report on student learning. The standards set out distinct competencies at the Graduate, Proficient, Highly Accomplished and Lead teacher level. AITSL (2011a), specifically 1.5, 3.6 and 5.

[148] Zbar (2013), p. 6-8

[149] Timperley, *et al.* (2007); Yoon, *et al.* (2007); Blank and de las Alas (2009); Desimone (2009); Joyce and Showers (2002)

[150] For strategies to prioritise, see Jensen, *et al.* (2014).

[151] Advice from NSW Department of Education and Communities.

[152] NSW Department of Education and Communities (2014c)

If more funding is not available, systems would need to set rigorous priorities to divert expenditure away from initiatives that have been shown to have a weaker impact on student learning.[153]

Develop the capacity of principals to lead change and improve teaching practices

While individual teachers can have a significant impact on learning in their classrooms, ensuring there is excellent practice in *every* classroom requires skilled and effective leadership. Effective leadership is particularly important if significant change is required to establish a common assessment schedule, embed the use of evidence in decision-making, increase teacher collaboration, or otherwise shift an existing school culture.

School leaders who focus on improving teaching and learning can have a strong impact on student outcomes.[154] They must also have the skills to manage the process of change, and the ability to articulate a clear vision of how change needs to happen.[155] Governments should invest in building the capacity of all school leaders to embed targeted teaching in every classroom in a way that maximises the progress of every student.[156]

Improve initial teacher education

The Teacher Education Ministerial Advisory Group (TEMAG) found that initial teacher education providers are generally not providing graduates with the ability to use assessment data to improve teaching and target instruction.[157] In our three case studies, most beginning teachers we spoke to felt their initial training fell a long way short in this regard. Their views echo a 2011 OECD evaluation of assessment practices in Australia, which found that many new teachers needed "considerable support" to analyse and interpret student assessment data and use it to adjust their teaching practice.[158]

This is disappointing. Research clearly shows what is needed and the University of Melbourne's Master of Teaching program shows it is possible to train new teachers to use evidence of learning with confidence.[159]

Governments should insist that all initial teacher education providers equip students with these essential skills. To make this happen, TEMAG recommends strengthening the accreditation and monitoring of initial teacher education programs, with a focus on improving new teachers' ability to collect and use data to analyse learning needs.[160] The Commonwealth has agreed to strengthen accreditation processes.[161] Doing this will force some course providers to significantly change their programs. Through the new accreditation processes, governments must ensure that they do make the changes required.[162]

[153] Education Endowment Foundation (2015a)
[154] Dinham (2012); Hattie (2009), p. 83; Marzano, *et al.* (2005), p. 10-12; Robinson, *et al.* (2008), p. 666
[155] Zbar (2013), p. 13
[156] This is in the National Professional Standards for Principals. AITSL (2011b).
[157] Craven, *et al.* (2014), p xviii
[158] Santiago, *et al.* (2011), p. 61-62
[159] Anderson and Scamporlino (2013), p. 33
[160] Craven, *et al.* (2014), p. xiv-xvii
[161] Australian Government (2015), p. 5
[162] Roberts-Hull *et al* note teacher education should be viewed as an ongoing process, not just initial training for new teachers. Roberts-Hull, *et al.* (2015)

6.2.3 Set high expectations and monitor what happens in practice

Recommendation 6: *Government and system leaders should set high expectations that schools will collect and use data to target teaching and track progress, showcase good practices, and monitor what happens in practice. Invest, where necessary, to accelerate change.*

Set high expectations and showcase 'what good looks like'

Governments and education system leaders should set clear expectations that collecting and using robust evidence of student learning is part of schools' core business.

At the least, governments should set high expectations that government and non-government schools alike will collect accurate evidence of every student's learning, use it to target teaching and track students' progress over time. Governments can help this process by showcasing what good practice looks like on the ground, and facilitating knowledge sharing.

Monitor what happens in practice

System leaders should monitor how data is collected and used. School review and evaluation processes may offer a mechanism.

In government sectors, the use of school review and evaluation processes is well established.[163] The reviews are intended to provide constructive feedback and recommendations for improvement, rather than to check for compliance with minimum standards.[164] But while reviews may help, improvement will only happen if schools receive feedback on teaching practices, including the way they collect and use evidence of student learning and track student progress.[165]

State education departments may need to strengthen their school review policies and fund more in-depth reviews by independent, experienced and rigorous review teams. Schools should be expected to improve their teaching and assessment practices and they should be guided by the review team on how to do so. Schools should then be monitored to see if recommendations are adopted or if additional support is needed.

System leaders responsible for non-government schools, such as most Catholic schools, should adopt similar school evaluation and review mechanisms.

Independent schools are subject to less oversight under current regulatory settings. While they must meet accreditation and registration requirements, these generally prescribe minimum standards that fall far short of the practices described in this report.[166]

Given the differences between sectors, state and territory governments should require all schools to undertake a regular, formal, external evaluation, such as that supported by the

[163] E.g. Santiago, *et al.* (2011). Examples of specific state policies include: Victorian Department of Education and Early Childhood Development (2013b); Queensland Department of Education Training and Employment (2015)

[164] In the case of priority reviews, outcomes may include specific departmental support and/or intervention to lift school performance.

[165] Santiago, *et al.* (2011) p. 113-8

[166] See, for example, Victorian Registration and Qualifications Authority (2015).

National School Improvement Tool, which Commonwealth, state and territory education ministers endorsed in 2012.[167]

Consider investing to accelerate change

Strengthened school review and evaluation processes will help drive change, as will increasing the visibility of good practice. But change will happen more quickly in more schools if system leaders directly invest to raise the quality of targeted teaching. The Early Action for Success strategy in NSW government schools and the approach taken in the Catholic Diocese of Parramatta are clear examples. Such options should be considered as each system identifies the most effective way to lift student outcomes in their context.

Australia could, for example, implement a national strategy, similar to NSW's Early Action for Success, across 20 per cent of government, Catholic and independent primary schools that were identified on the basis of consistently poor learning outcomes.[168] It would cost about $300 million per year – about 0.7 per cent of all governments' combined spending on school education.[169]

[167] Standing Council on School Education and Early Childhood (2012)
[168] This would be similar to the NSW government's strategy of extending Early Action for Success to approximately 20 per cent of all government primary schools in the state, which prioritises those with highly disadvantaged students and consistently poor learning outcomes. Funding instructional leaders more broadly would offer some of Australia's best teachers a new career pathway that would keep them in the classroom. This is similar to Singapore's Lead Teacher and Master Teacher roles. Jensen, *et al.* (2012), p. 110
[169] This calculation is based on what all levels of government spent on the operating expenses of primary and secondary schools in Australia in 2013-14. ABS (2015), Table 1

Of course, targeted teaching should be a feature of all schools – not just those with poor learning outcomes. Our research suggests that most schools, even those with relatively strong results, can target teaching more effectively to stretch their students so that they reach their potential. Governments should consider the most effective way to accelerate change so that targeted teaching is embedded in all schools. Where possible, this could include scaling up existing approaches that have been proven to work.

6.2.4 Evaluate the effectiveness of efforts to target teaching

Recommendation 7: *Government and system leaders should evaluate the impact and cost effectiveness of policies to improve targeted teaching and progress tracking and assess which school-led approaches work best.*

A wealth of Australian and international research supports the effectiveness of the individual interventions that underpin targeted teaching (see Chapter 3). High quality implementation is necessary if we are to see the full benefits. We know that schools struggle to make the changes on their own. Yet our research (which is not comprehensive) has not identified any Australian program to help schools implement targeted teaching that has a rigorous evaluation of its impact, value-for-money or scalability.

This is a shame. We lack robust research around what it takes to implement targeted teaching at scale. Governments and system leaders should formally evaluate their programs and policies to improve targeted teaching and progress tracking. They should also assess which school-led approaches work best, so that they can be used as examples (Box 8 describes the UK approach).

Box 8: Evaluating school programs – the UK approach

The UK team behind the Australian Teaching and Learning Toolkit has shown the way. Together, the Sutton Trust and the Education Endowment Foundation in the United Kingdom have funded 100 interventions in the last four years, many as randomised controlled trials. Over 4900 schools have been involved, accounting for nearly 20 per cent of all UK schools and 620,000 pupils.[170]

One evaluation currently underway in the UK is particularly relevant. It will test the effectiveness of a program to embed formative assessment processes in secondary schools. Schools will receive a professional development pack designed around 18 workshops that occur monthly, plus additional support for one staff member. The evaluation is set up to test whether the program can work in a large number of schools. 120 schools across England will be recruited, and randomly allocated to receive the intervention or be in the control group. The evaluation project will run for three years at a cost of £489,602, with the evaluation report due to be published in spring 2018.[171]

There have been recent steps in the right direction in Australia. The NSW government has created the NSW Centre for Education Statistics and Evaluation (CESE) (see Box 9). Through CESE, the NSW government has shown a strong commitment to embedding the use of robust evidence in education policy design and implementation. This will help to bridge the gap between evidence and practice by making research more accessible to schools and teachers. In addition, drawing on the success of the UK's Teaching and Learning Toolkit, the Victorian Department of Education and Training has supported the introduction of an Australian Teaching and Learning Toolkit that will bring up-to-date education research to practitioners in an accessible way.[172]

Box 9: NSW Centre for Education Statistics and Evaluation

Created in 2012, NSW's CESE is responsible for supporting decision-making in education with strong evidence and reviews of best practice. It analyses and evaluates education programs and strategies, along with student outcomes, across education sectors including early childhood and schools.

As well as undertaking data analysis and evaluations to improve effectiveness and efficiency, CESE also develops tools to make data both easy to use and to understand, and provides research reports that help make evidence more accessible to end users, including government ministers and departments, teachers and school leaders. CESE also maintains a data hub, which brings together a range of publicly available education data sets, and is developing a professional learning clearing house for teachers and school leaders.

CESE's recent reports include *What works best: evidence-based practices to help improve NSW student performance* (2015) and *School improvement frameworks: the evidence base* (2014).

Source: Centre for Education Statistics and Evaluation (2015a)

[170] Education Endowment Foundation (2015b)
[171] Education Endowment Foundation (2014)
[172] Education Endowment Foundation (2015a)

6.3 What parents should do

6.3.1 Expect that their child's school collects and uses robust evidence of learning

Recommendation 8: *Parents should expect that their child's school collects and uses robust evidence of learning to ensure that every student has the opportunity to make a year's progress each year.*

Parents have the right to demand an excellent education for their children. They should expect that their child's school collects evidence of learning to target teaching and track progress. Parents are an important voice in building support for change.

Schools are already required to provide information on student progress in end-of-year reports. Parents should press schools to ensure this information is based on robust evidence and provides meaningful and accurate comparisons of learning gains across multiple years. Parents should also expect schools to respond to evidence of stalled progress over time. Parents should reinforce this focus on progress, and seek more information where necessary. When parents talk to their child's teachers, for example during parent-teacher interviews or school information nights, they should ask: 'How will you know that my child makes a year's worth of progress each year?'[173]

[173] Other questions that could be useful for parents include: 'is my child growing appropriately toward meeting expectations?', 'is my child growing as much in maths as in reading?' and 'did my child grow as much this year as last year?' See Yen (2007), p. 281.

6.3.2 Talk to their child about progress as well as grades

Recommendation 9: *Parents should talk to their child about their learning progress, as well as their grades.*

Parents should not only look at their child's grades, but also their improvement over time. Talking to children about progress puts the focus on learning, not on what they already knew. It emphasises that intelligence is not fixed, but can be developed through dedication and hard work. This mindset encourages children to embrace challenges and persist in the face of setbacks, rather than to avoid challenges or give up easily.[174] Parents should celebrate strong progress, as well as great marks.

[174] Dweck (2006)

Conclusion

Australian schools perform well in many respects. Yet the world's best education systems perform much better. More than twice as many of their students achieve exceptional results and half as many fall below minimum standards. Our students have the potential to do just as well. It's up to teachers, educators, school systems and parents to get them there.

Fortunately, Australia is well placed to make the transition. We have a clear research base that shows what we need to do and how to do it. We have dedicated teachers and principals, pockets of practice that are among the world's best, world leading educational researchers, a strong national curriculum, and sound National Professional Standards for Teachers and Principals.

The challenge is to translate this research into consistent practice. This means providing teachers with the time, tools and training they need to collect robust evidence of student learning, discuss it with other teachers, and use it to target their teaching to the wide range of student learning needs in their classroom.

This is not just about more data. Schools are awash with data. But too often the data schools have is not the information teachers need and it does not improve teaching. This must change.

Every school must develop a consistent approach to using evidence of student learning to target teaching. They must set clear expectations and develop a common language around the kinds of evidence teachers need to support their judgements about student learning and determine their teaching decisions.

For teachers, the transition will be demanding. Some may see it as restricting their professional autonomy. But evidence of learning supports teaching. It provides clear guidance about what is needed in much the same way that a blood test clarifies what a doctor's options are when they are treating a patient. And working together with colleagues to evaluate and discuss evidence of learning increases peer support and professional development.

The transition will also require committed leadership. Change will take time, money, and consistent action. Schools should not be expected to do it on their own. The level of support from education systems will determine how deeply and quickly change occurs and whether it reaches *every* school, not just pockets of excellence with exceptional staff and access to resources.

The result will be worth the effort. Targeting teaching better would increase learning, raise achievement, and allow us to better evaluate the impact of future reforms. Focusing on progress will build students' self-confidence and help them develop a mindset focused on learning – vital for success at work and in life.

How will we know when we have achieved this ambitious vision? Imagine it through the eyes of a student, of any age. When asked "How did school go this term?" we want them to say "It was great. The teachers understood what I could already do, and we set a goal for what I needed to learn. They gave me work that was challenging but not too hard; and when I showed I had learned it we both celebrated." In some schools this dream is becoming a reality. Let's make it so for every child.

Appendix 1: Case study methodology

As part of this project, Grattan staff spoke to approximately fifteen schools about their approaches to using evidence of student learning to inform teaching and visited six. Three of those six schools are profiled as case studies in this report.

Purpose of the case studies

The purpose of the school case studies and discussions was:

- to hear directly from practitioners about how they use evidence of learning to inform teaching;
- to understand the range of different approaches being used by schools; and
- to understand how schools and teachers changed practices over time to collect and use robust evidence of learning.

How schools were selected

During the course of this project, system leaders and education experts recommended a range of schools that were relatively advanced in their use of evidence of student learning.

We spoke to a wide diversity of schools in order to identify a short list of potential case study schools. Our discussions covered schools from four states, all three school sectors, both primary and secondary, serving students from a very wide range of socio-economic backgrounds.

The three schools profiled in this report are those that, in our opinion, are using evidence of learning the most systematically to inform and improve teaching practice.

How the case studies were conducted

Following formal agreement with the case study schools (and their system leaders, as appropriate), Grattan staff conducted a site visit. The principal of each school also completed a survey about how they collected and used evidence of learning. Schools provided further details and clarifications in subsequent conversations.

Grattan staff spent approximately one day at each school. Site visits included semi-structured interviews and focus groups with teachers and school leaders to understand:

- current practices relating to student assessment and progress monitoring;
- the contextual background to current practices, including the change process that was undertaken and the strategy to drive improvements in assessment quality and progress monitoring;
- the challenges teachers and school leaders have faced along the way and strategies that have been successful in overcoming these; and
- specific support that could be provided by schools or education systems to enhance assessment quality and

progress monitoring in the classroom and across the school.

Within each school we spoke with:

- the principal and the school leadership team;
- school staff who had specific school-wide responsibility for student assessment or tracking learning data;
- a sample of Heads of Curriculum or equivalent roles;
- a sample of beginning teachers; and
- a sample of mid-late career teachers.

Schools selected the teachers we spoke to. However, in all three case studies we profile in this report, we spoke to a substantial proportion – up to 50 per cent – of the relevant teaching staff.

Case studies were conducted on an anonymous basis. Principals and staff were informed that their school would not be named in our report. Individual staff were also assured their responses would be anonymous. This was done to encourage a frank discussion that addressed the genuine challenges and benefits of using rigorous evidence of student learning to inform teaching.

What was out of scope with the case studies

With the case study schools, we did not set out to gather primary evidence of the impact of their practice on student learning. Where principals and teachers provided evidence of their impact, we did not attempt to independently confirm its validity.

We did not formally evaluate the consistency or effectiveness of the teaching and non-teaching practices that schools described to us and that are documented in this report.

We did not analyse the academic or non-academic outcomes of each school against established standards of evidence or the metrics used by their local jurisdiction.

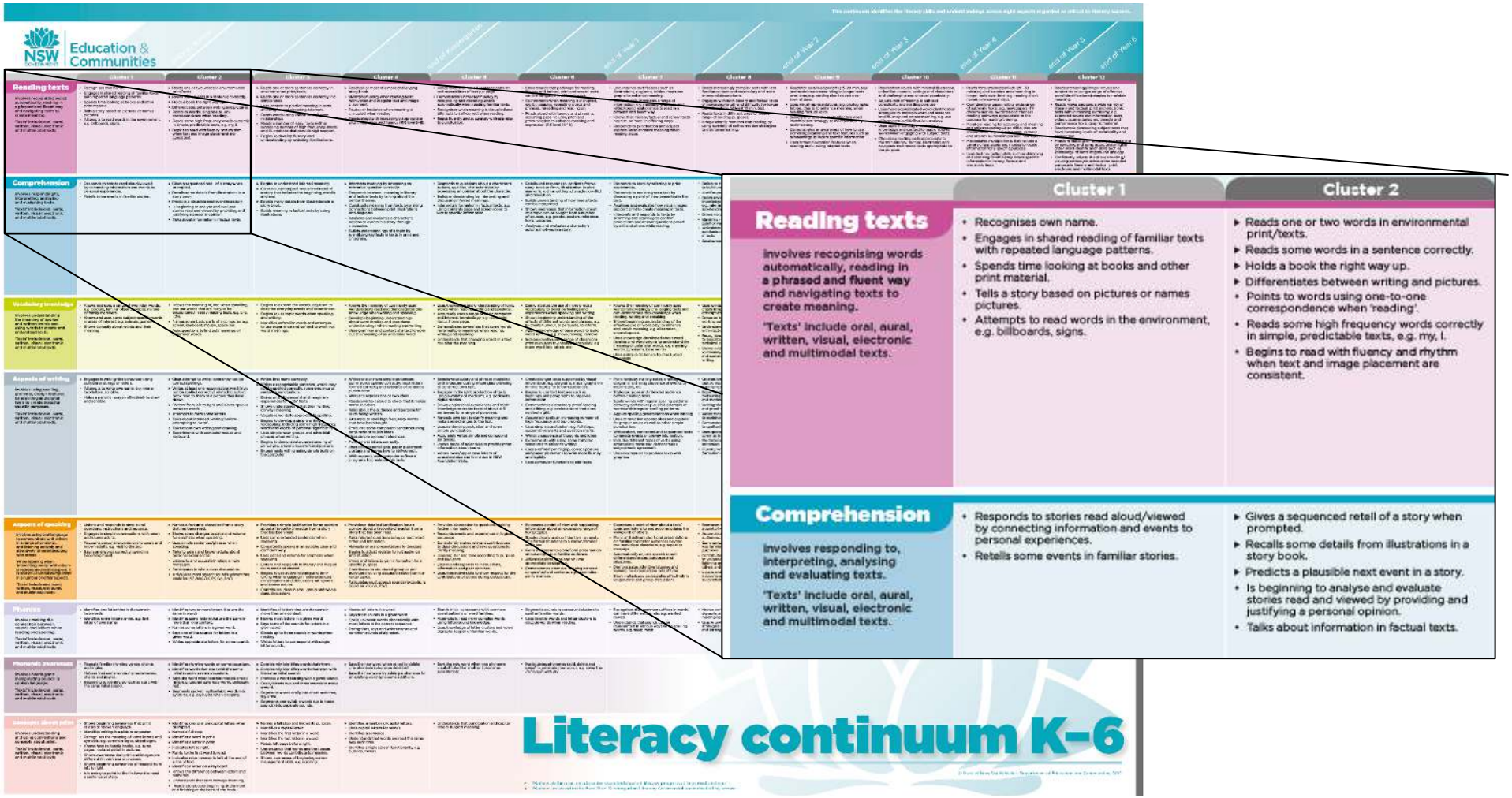
Benefits and limitations of this methodology

The case studies in this report add depth and detail to the conceptual framework around the collection and use of evidence of student learning to improve teaching practice.

There are clear limitations to this type of case study approach. In particular, we do not offer the case study schools as models of best practice that other schools should attempt to emulate. We do not have the evidence to prove whether the practices and processes described in the case studies are having a significant and positive impact on student learning. We therefore cannot, and do not, claim that they are either cost-effective or higher impact than other potential approaches. Finally, we do not claim that the practices would be applicable in the wide variety of contexts in which schools and teachers operate in Australia.

Instead, the case studies show what is possible, by illustrating ways in which some schools embed evidence of student learning into their practice. They also illustrate some of the difficulties other schools are likely to face along the journey. The system challenge is to learn how to do this repeatedly, cost effectively, at scale, and in a way that has a demonstrable positive benefit on learning.

Appendix 2: NSW Literacy Continuum



Appendix 3: International examples

Around the world, governments have started to concentrate more on the progress of their students, how policy can lead to better use of evidence and how this in turn improves student learning.

Geoff Master's paper "Is School Reform Working?" provides a recent (December 2014) discussion of this topic. His findings can be encapsulated by the following quotes:

> *Significant improvements tend to be associated with sustained, long-term policies and deliberate national action to lift performance.*
>
> *… In summary, improvements in national student achievement levels depend on continual improvements in the quality of what happens inside every school and every classroom.*[175]

In this review, Masters highlights four general principles that underpin highly effective teaching:

- establish where individuals are in their learning
- tailor teaching to the progress and needs of individual learners
- provide personalised feedback to students that guide action
- and assist learners to see and appreciate the progress they are making.[176]

They all rely on the use of high quality evidence of student learning.

Given the direct relevance of Geoff Master's paper, Box 10 includes further key extracts that illustrate some general lessons from international systems.

This appendix shows how two of the highest performing systems (Finland and Singapore) have developed holistic approaches to use evidence of learning to target teaching, followed by four examples of systems that focus on tracking student progress.

Lessons from Finland and Singapore

Beginning in the northern parts of **Finland** in 1972, teaching has focused heavily on differentiated learning for different pupils.[177] Each teacher is responsible for monitoring the achievement and overall progress of all of their students.[178] Entry into teaching

[175] Masters (2014), p. 6-13

[176] Ibid., p. 12-13

[177] Sahlberg (2015), p. 30. The focus on differentiation was a response to a new model of schooling, the *peruskoulu*, which brought together students with diverse abilities.

[178] Ibid., p. 91

Box 10: Extracts from "Is School Reform Working?"

"Countries in which there has been an improvement in student performance over recent decades appear to have placed a particular priority on building teachers' capacities (knowledge and skills) to deliver more effective teaching. Some education systems, including Finland and the Shanghai province of China, have trained teachers to undertake systematic research into their own teaching. Through classroom-based research, and with the assistance of diagnostic tools, teachers have been supported to identify and address the learning needs of all students."

"Another feature of high-performing and rapidly improving school systems is that they have put in place system-wide processes to identify students who are falling behind and to intervene quickly to put students back on track. All students are expected to make excellent learning progress and are considered capable of meeting high standards given time, motivation and appropriate support."

"These countries also appreciate the importance of effective system and school leadership. Leaders are supported to create school cultures in which teachers collaborate around the continual improvement of teaching and learning. They also evaluate and promote high quality teaching throughout the school. Some countries, such as Singapore, have national policies in place to identify, develop and support prospective school leaders of this kind. And in consistently high-performing countries, the 'central' administration is oriented towards monitoring school outcomes, intervening where necessary and ensuring that schools have the resources they need."

Source: Masters (2014), p. 6-7

requires a Masters degree with a research-based thesis, and teachers are trained to identify students who are falling behind.[179] Every Finnish school has a teacher who works with such students to help them catch up.[180] Special education is not seen as a failing – almost one-third of all pupils were involved in special education in 2012.[181]

Assessment is frequent but primarily teacher-led. For example, teachers assess the achievement of upper-secondary pupils at the end of each six or seven week period.[182] In some subjects, the students have to pass each module of a course before moving on, ensuring that they are learning. Students' progress in school is also assessed externally, using a sample-based methodology.[183]

While Finnish teachers have a high degree of autonomy, consistency comes from a "common culture of schooling" that covers curricula, teacher professional requirements, and pedagogy.[184] Professional collaboration between schools and teachers is core to the model.[185] In effect, with sufficient training of teachers and collaborative local leadership, the system can take a back seat. But Finland has been on this journey for 50 years.

[179] Masters (2014), p. 6; Sahlberg (2015), p. 109-116
[180] Masters (2014), p. 6
[181] Sahlberg (2015), p. 65-66
[182] Ibid., p. 31
[183] Ibid., p. 94. The sample-based methodology includes about ten per cent of an age cohort. Testing occurs on three or four year cycles, depending on the subject.
[184] Ibid., p. 36, 130
[185] Ibid., p. 149

In **Singapore**, the system has also focused on initial teacher education and ongoing professional development to ensure that all teachers have the capabilities to maximise learning. The National Institute of Education (NIE), which educates all teachers, cut a range of electives from their undergraduate teacher education syllabus to allow more time on subjects emphasising practical classroom teaching.[186]

Professional learning communities within schools in Singapore undertake action-based research with a strong focus on data, including evaluating their impact on students. If the evaluation shows positive results on student learning it is incorporated into the teaching throughout the school.[187]

Finally, Singapore has developed different career tracks that enable expert teachers to stay in the classroom. Principal Master Teachers, the highest level of the teaching track, are required to engage in pedagogical research and innovation.[188]

Selected system-level approaches to tracking progress

Several countries and jurisdictions have developed processes and tools to track student progress over time. We briefly describe approaches from the Netherlands, New Zealand, Ontario and the United Kingdom.

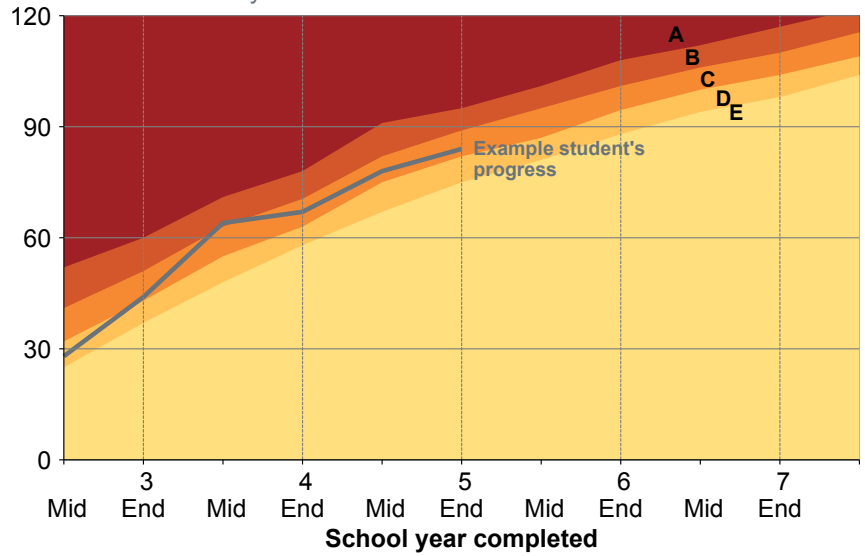
The OECD has recognised the **Netherlands'** long tradition of high quality school assessment. New laws introduced in 2013 require all primary schools to monitor student learning regularly. The *Leerling Volg Systeem*, or LVS, is one system of tests that allows schools to track student learning across Years 1 to 8. It is used by nearly all Dutch primary schools.[189] Figure 9 shows an example of a student's report at the end of Year 5, which enable educators to monitor student growth. LVS assessments also provide teachers with information on what students are ready to learn next.[190]

In **New Zealand**, the assessment Tools for Teaching and learning (asTTle) and Progressive Achievement Tests (PAT) assessment tools are frequently used.[191] asTTle is a web-based program for ongoing assessment tailored to individual student needs. The tool emphasises self-assessment in students. Teachers have identified the ease of constructing assessments, the clarity of the reports generated, and its power in engaging students in self-assessment as its most notable strengths.[192] Although designed and validated for the New Zealand curriculum, a version has been aligned to the Australian Curriculum.[193]

The Canadian province of **Ontario** is recognised by the OECD as a high performing system both in terms of achievement and equity.[194] It has invested heavily in the web-based Ontario School Information System (OnSIS), which was launched in 2005/06. OnSIS itself is part of a broader initiative, *Managing Information*

[186] Jensen, *et al.* (2012), p. 53
[187] Ibid., p. 98
[188] Ibid., p. 111
[189] Santiago, *et al.* (2014) p. 36; Lubbe (2009) p. 10
[190] Santiago, *et al.* (2014) citing Scheerens, *et al.* (2012)
[191] Nusche, *et al.* (2011)
[192] Northern Territory Department of Education and Training (2013b)
[193] Ibid.
[194] See, for example, OECD (2011), pp. 71-77.

Figure 9: Example of student progress report, The Netherlands.
Units of student ability



Source: Based on the chart in Van Der Lubbe (2009

for Student Achievement (MISA), designed to increase both provincial and local capacity to use data and information for evidence-informed decision-making to improve student achievement.[195]

Three times a year, OnSIS collects data on courses, classes, students and educators; data that was previously held in different systems. Efficiency of data collection has improved dramatically over time; what took 9-12 months to collect in 2005-06 now takes about 3 months. Individual student data can be linked using each student's unique Ontario Education Number (OEN) allowing for tracking of student achievement and other outcomes at an individual or cohort level. This longitudinal tracking provides opportunities to identify students at risk of not graduating for early intervention, as well as helping students improve and maintain achievement. OnSIS data also enables the Education Ministry to conduct statistical modelling and trending activities.[196] Finally, Ontario does not just rely on data held centrally; the Education Department has been advocating the use of data walls in classrooms since at least 2008 as part of its capacity building approach to reform.[197]

The **United Kingdom** is also refocusing educators' attention on student progress. Ofsted, the government authority charged with evaluating and certifying schools, takes both raw achievement and student progress into account and expects schools that start with high performing students to continue to stretch them.[198] The UK tracks progress more explicitly than Australia. However, it has struggled with some of the side-effects of high-stakes testing for accountability purposes. The use of national test results, even progress measures, has resulted in some schools narrowing their curriculum and teaching to the test.[199]

[195] Ontario Ministry of Education (2015)

[196] Haile (2014)
[197] Ontario Ministry of Education (2008)
[198] The Ofsted Handbook for Inspectors states "When judging achievement, inspectors must have regard for pupils' starting points". Ofsted (2015).
[199] A Select Committee of the House of Commons found the education of some children had been 'distorted' as a result of this use of test results and concluded the multiple purposes of the test should be decoupled so as to remove schools' "imperative to pursue test results at all costs." UK Select Committee on Children Schools and Families (2008)

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