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Towards an adaptive education system in Australia

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Overview

School education in Australia has many bright spots, but we do not have a system of excellence or an *adaptive education system* that identifies excellence and systematically spreads and amplifies it.

This discussion paper argues that our current education system is not fit for purpose given the complex challenges it faces. These challenges show up in flat or declining performance in national and international tests; in the unacceptable number of students who are not ready for life after school; and in the persistent equity gaps among our schools, despite increased needs-based funding.

At the most basic level, we know far too little about how to translate the growing research about what works best into daily classroom practice. More broadly, we have failed to create an education system that adapts and improves over time – a learning system that systematically learns.

It is neither possible nor desirable to prescribe what or how to teach in all circumstances. Local contexts differ, and each classroom has its own unique dynamics. Individual teachers are responsible for how they teach their students (informed by the research), and for adapting their teaching over time to maximise impact. This is an inherently local process. The point is that it should not be done independently in every classroom. If each teacher or school tried to evolve and improve in isolation, we would never achieve the gains needed, because there would be no systemic learning or adoption of best practice.

An adaptive education system would balance local decision-making with top-down guidance and resource allocation. This means learning by doing, with an explicit focus on *inputs* (what is done), *outcomes* (what is measured), and a *learning process* that closes each feedback loop. Getting it right will require changes at all levels of the system, including to the evidence base, classroom practice, career pathways, leadership capability, and reporting, accountability and governance.

This discussion paper does not have all the answers. But it aims to highlight the right questions, by exploring the conceptual relationship between adaptation and education: why better teaching is an adaptive process; why we need an adaptive system; and how to create one.

It proposes six ways Australia can make its education system more adaptive, thereby improving outcomes in the medium term and increasing the effectiveness of the improvement process itself over the long term.

First, teachers and schools must be better able to track the progress of their students over time in ways that directly inform their teaching.

Second, we need to continue building better ways to spread and share information and practices, both within schools and across schools.

Third, Australia should make better use of its most expert teachers, using them to teach other teachers and spread evidence at scale.

Fourth, teachers and school leaders should do more to embrace the benefits that come from standardising elements of teaching practice.

Fifth, schools and systems need to innovate more systematically and intentionally to prepare their students for a changing world.

Sixth, and this is a big one, policy makers need to change the way they think about system leadership. In an adaptive education system, the ultimate role of the centre is system design.

Australian school education faces three big – but very different – challenges: to improve learning outcomes in core academic areas; to better prepare young people for adult life; and to do so in a way that is fair for all. The only way to simultaneously tackle these challenges is to make our education system more adaptive.

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1 Better teaching is an adaptive process

The individual teacher makes a big difference to the rate of a student's learning. In Australia, a student with a teacher in the top 10 per cent of teachers in the country can achieve in half a year what a student with a bottom 10 per cent teacher achieves in a full year.¹

What is it about teachers that matters most? Is it their personality? Their IQ? Whether they have a Masters Degree? The best answer is none of the above: it is what the teacher does in the classroom; how each teacher approaches the many tasks involved in teaching, including

- designing each unit of work, and each lesson plan;
- developing effective working relationships with students;
- leading and managing the classroom;
- assessing what individual students know now, to identify what they need to learn next;
- teaching specific ideas and skills;
- supporting students who are ahead or behind the class average;
- helping students develop broader capabilities, such as critical thinking or resilience.

Volumes have been written seeking to describe effective teaching; but teachers are not all alike, just as students and schools are not all alike. So the question is less 'what works best?' than 'what works best, for whom, in what circumstances?'

1. Leigh (2010), cited in Jensen (2010).

Box 1: The language and ideas of adaptation

Biological adaptation displays the dual ability to improve how a species is adapted to its current environment (by increasing the frequency of genes that boost the odds of survival and reproduction), while retaining flexibility to respond to changing circumstances (by retaining a level of variation in each population).

This is analogous to the conflicting challenges facing school education: improving outcomes in traditional academic areas, and finding better ways to prepare young people for a changing world.

Adaptation, however, is more than an analogy. Better teaching is an adaptive process. Teachers should select their teaching practices on the basis that they maximise student learning, but in practice the daily life of a teacher contains a complex range of priorities, complicated by the impact of students' home environments and parent and community expectations.

Recognising that better teaching is an adaptive process helps clarify how education systems can support schools and teachers. This will mean drawing lessons not just from biology but from system design in healthcare, from how companies thrive in an increasingly complex world, from areas of public policy such as public value theory, and from a range of efforts to change behaviour in practice such as behavioural economics, implementation science and improvement science.

However, if we cannot define from the outside how teachers should approach each task, each decision, and each student, how can we improve their effectiveness? (The same logic holds true for principals, system leaders, *etc.*, so the ideas in this paper apply to these roles as well as to the teaching role.)

One way to think about teaching is that it involves a population of behaviours – what teachers do in practice. Each teacher has a repertoire of behaviours but no two teachers have quite the same repertoire.

How did we arrive at the current population of teacher behaviours? It certainly did not arise by design, or by chance. In fact it evolved in response to a range of forces that meant some behaviours got reinforced, while others got dropped. Over time, individual teachers change their approach, as they learn what works for them, refine their personal teaching philosophy, read new research, do professional development, make pragmatic trade-offs, get feedback from their boss, move schools, get a new principal, or respond to the whims of education ministers.

This is a process of adaptation; changing practice in response to various pressures. But it is not necessarily an effective way to improve, less because of a lack of innovation, and more because of a poorly defined selection process – what to keep doing and what to stop. Many different factors influence the choice of one teaching approach over another, not all of which are linked to student outcomes; and wanting to lift student learning is very different from having the means to uncover what works best and turn great practice into everyday practice.

Compare this to biological evolution, where the driving force of adaptation is the interplay between mutation and selection. Natural selection – the ruthless Darwinian logic of survival and reproduction – is an inherent property of life in an environment of scarcity. Only individuals that reproduce contribute their genes to the next generation.

There is no equivalent process to ensure that highly effective teaching practices automatically become more common over time. This will only happen through intentional effort to align the processes of adaptation – which new practices to choose, which to keep and which to stop – with evidence of student learning. John Hattie captures this idea in his phrase ‘know thy impact’, an exhortation for teachers to track how much their students learn, and use that information to inform their future practice.

Efforts to help teachers know their impact are deeply worthwhile, but 400,000 individual teachers working in isolation to improve their teaching is far too slow and inefficient. Better is for groups of teachers or whole schools to identify great practices and implement them consistently – building collective efficacy at the same time as improving consistency of practice.²

This logic goes further. The school is a vital unit of improvement, but years of focus on school autonomy in Australia have not delivered the improvements the advocates of autonomy promised. We need a more systemic approach.

2. John Hattie recently listed ‘Collective teacher efficacy’ as the number one factor influencing student learning. See also Hattie (2015), which discusses approaches to build collaborative expertise.

2 Why we need an adaptive education system

Effective improvement across all schools requires adaptive processes in individual schools, and also across schools, networks, dioceses, regions and states. It requires an adaptive education system that embraces standardisation (to implement what is known to work best) and innovation (to trial new approaches for new challenges).

This chapter explores the over-arching challenges facing Australian school education, why previous reform efforts have struggled, and why we need an adaptive approach to reform. It then explains the difference between a system with some adaptive elements (which we have today in Australia) and an adaptive education system.³

2.1 The three big challenges

Before searching for solutions, we must acknowledge the nature and scale of the problem. School education in Australia faces three over-arching challenges, each demanding different improvement strategies.⁴

2.1.1 Challenge One: Better teaching of core academic skills and content

The first challenge is to improve the teaching of core academic skills and content. This starts with ensuring that all students achieve a high standard of proficiency in the basic building blocks of literacy and numeracy.

3. A useful definition of an adaptive system (from www.businessdictionary.com) is a 'flexible system that improves its performance . . . by monitoring and adjusting its own configuration and operations in response to feedback from its environment'.
4. These challenges need to be addressed in the context of rapidly growing student enrolments in many areas, plus increasing pressure to show value for money from increases in per-student funding levels.

The huge spread of student ability in any school or class complicates this teaching task. How can we expect a secondary school to provide a rich education if 70 per cent of its students entering Year 7 are reading at a Year 5 level or below?⁵

Strong foundational skills underpin a broad, rich and deep education. Knowledge still matters, even in a world of Google, but the ability to appraise and apply knowledge matters even more. School also provides an essential opportunity to develop young people's understanding of the world they in which they live – so vital for a democratic society.

Broadly speaking, the education profession knows a lot about how to teach the core disciplines. Advances in cognitive science are adding to this knowledge base, and sometimes challenging old ideas. However, a recent Australian review highlighted the need to go beyond disconnected pieces of data to create an education evidence base with information that guides decision making at all levels.⁶ This includes evidence on the effectiveness of implementation strategies as well as evidence on the effectiveness of specific policies, programs or practices.

The goal is not for all teachers to take the same approach; but for all teachers to use evidence-based approaches that have been shown to work in their context.⁷ And the more foundational the topic, the less we should expect variation in practice.⁸

5. Ingrid Sealey, Fogarty EDvance, personal communication.
6. PC (2016).
7. At a minimum, each school needs a well-defined core curriculum, a consistent approach to pedagogy, and a school-wide approach to behaviour management.
8. This idea also holds in biology. The genes that code for histone proteins (used to wrap up and protect long thin strands of DNA) evolved hundreds of millions of years ago, and our histone genes are virtually identical to those of all other animals and plants.

Both implementation science and improvement science can help.⁹ We need much better information about the nature and extent of variation in current teaching practice; systematic analysis of how that variation influences student progress; and effective ways to feed best practices back into policy making, teacher training, *etc.*

2.1.2 Challenge Two: Changing some of what we teach and how we teach it

Important as Challenge One is, better teaching of core academic skills and content is not enough. Too many students are disengaged at school. Many who notionally succeed in school are not set up for the world of work or the reality of adult life.

We must go beyond traditional academic skills and content if we are to give all young Australians the capabilities and assets they need for their lives. It matters little whether this challenge is about a unique set of 21st century skills, or the timeless aspiration of education since Plato. Research continues to grow on the importance of skills and capabilities such as critical thinking, collaboration, resilience, initiative and self-direction.¹⁰ Yet we know too little about how to teach or even measure these skills or capabilities.

In the absence of an established body of evidence and best practice, skills frameworks proliferate, and schools and teachers experiment. Challenge Two requires a very different approach than Challenge One: it is less about standardisation and adoption of existing best practice, and more about efficient and effective experimentation.

9. Improvement science is a disciplined approach to educational innovation that supports teachers, leaders, and researchers in collaborating to solve specific problems of practice. See Bryk et al. (2015). Implementation science is the study of methods and approaches to aid the uptake and integration of research findings into routine practice. See Albers and Pattuwege (2017) for a recent review.

10. See Kautz et al. (2014).

2.1.3 Challenge Three: Reducing the disparities between educational haves and have-nots

Challenge Three is different again. While genetics, prior achievement and teacher support are the strongest determinants of educational outcomes at the level of the individual student, socioeconomic factors have a major effect on the overall patterns of educational outcomes.¹¹

Worse, the impact of socio-economic background tends to grow as students move through school. Students who performed equally well in Year 3 NAPLAN fall one to two years behind their more advantaged peers by Year 9 if their parents had limited education. The students who miss out the most are bright children from low SES schools, who fall nearly two-and-a-half years behind their peers by Year 9 even from the same Year 3 starting point.¹²

There are no easy answers to reducing the impact of SES and ‘residualisation’ on educational outcomes. Funding according to need is vital, as are efforts to improve the effectiveness of teaching in all schools and to attract high-performing teachers and principals to disadvantaged schools. The OECD argues that policies around school choice and competition should be moderated so as not to make matters worse.¹³

Regardless of specific solutions, an adaptive education system would take account of these pernicious problems, and systematically identify policies and approaches that reduce the disparities as well as those that tend to increase them.

11. Distinguishing between individual and group variation helps to untangle the argument made by some that genetics and prior achievement outweigh socioeconomic factors. For individual students, this argument has some merit. At a group level, it falls down. It is like saying that gender has little influence on the average time it takes to run a marathon, because the variance in male times and female times are both much bigger than the average time difference between men and women.

12. See Figure 14 in Goss et al. (2016a).

13. Musset (2012).

2.2 Why reform efforts often fail to deliver

These challenges are not new, nor are they unique to Australia, so why do so many attempts at reform fail to deliver?

Again, it is worth looking at the big picture. There are numerous approaches to reform. This paper groups them into three broad types, those focused on: better inputs; better outcomes; or better learning processes (see Figure 2.1 on the following page). Each type of reform effort has benefits but also important limitations.

2.2.1 Reform strategies that focus on inputs

One approach is to identify inputs that should lead to better outcomes, and then get more of them into the system. Input-focused reform strategies include:

- *Raising the calibre of new teachers* by lifting the entry standards, adding graduation requirements such as literacy and numeracy tests, or introducing programs such as Teach for Australia that aim to attract talented young people who might not ordinarily consider teaching as a career;
- Increasing the effectiveness of new teachers by making *initial teacher education* a Masters-level course, or increasing the focus on practical experience;
- Using *integrated teaching frameworks* to increase the use of high-impact teaching practices;
- Strengthening *teacher evaluation* and performance development, for example through teacher observation;
- *Redesigning the curriculum*, to clarify the expectations in core academic areas or incorporate general capabilities; and
- Investing in *educational technology*.

Done well, improving the quality or quantity of any important input should help lift educational outcomes. However, there are three main challenges.

First, the link between inputs and outcomes is unpredictable. What teachers teach and what students learn are different. One size does not fit all. The task is to identify what works best, for whom, under what circumstances. This is an empirical question, not a theoretical one. Evidence-based teaching is not about generic best practice, but demonstrable local impact.

Second, it is not much help to know in theory which inputs are most valuable unless they can be used in practice. It is like giving a farmer a high-yield crop variety without explaining what type of soil it likes best, or how much water and fertiliser it needs.

Third, school education is a complex system where specific challenges vary by context, and priorities change over time. Reform strategies focused on fixed inputs will struggle to produce ongoing improvement.

Effective inputs, while essential, are not enough.

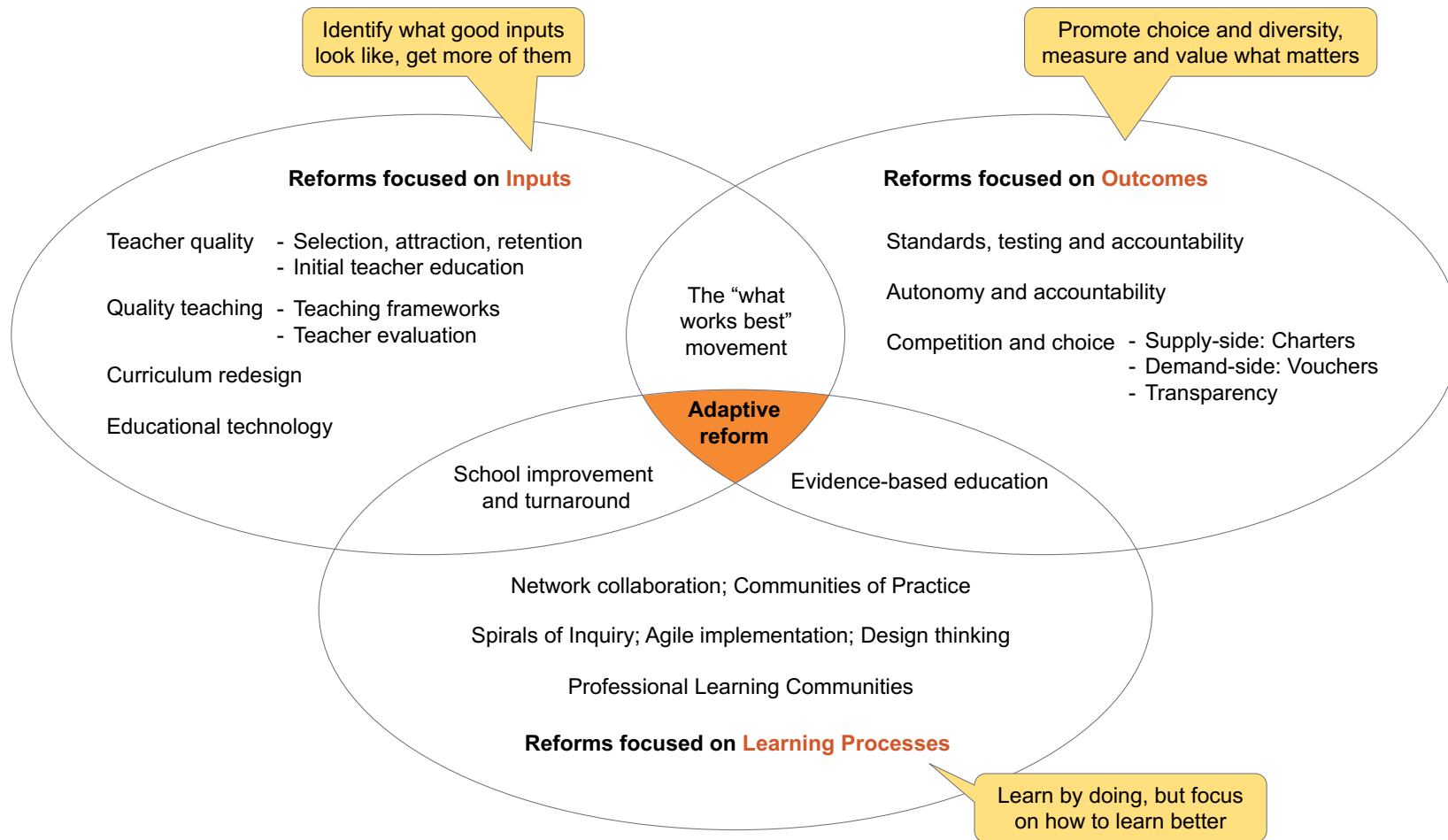
2.2.2 Reform strategies that focus on outcomes

These strategies promote choice and diversity, measure what matters, and then drive improvement via bureaucratic accountability or market forces. Outcome-focused reform strategies include:

- *standards, testing and accountability* frameworks that use rewards and punishments to try to lift student performance on defined standards;¹⁴
- *autonomy and accountability*, where schools are given more freedom to make their own decisions, and held to account for their outcomes;

14. For example, the USA's 'No Child Left Behind' approach.

Figure 2.1: Three types of reform strategy, with illustrative examples



- various efforts to enhance school *competition* by:
 - diversifying supply-side choice by using *charter schools*;
 - strengthening demand-side choice by offering school *vouchers* that lower the cost of attending non-government schools; or
 - increasing *transparency* in the hope that parents will make better choices, for example through the creation of the My School website.

Focusing on what we want education to achieve sounds sensible, but outcome-focused strategies have produced far less than promised. Fullan argues that strategies based around standards, testing and accountability pay too little attention to the instructional improvements that are the key to system improvement.¹⁵ The US experience highlights the risks of perverse results such as the curriculum being narrowed; standards being lowered; students being discouraged from sitting high-stakes tests; and even fraud.¹⁶

Part of the problem with such strategies is that they focus too much on achievement standards and not enough on student progress. Both student achievement and student progress matter; but schools cannot be held accountable for how much their students know on the first day of school, while they should be held accountable for how much they learn by the last day.

Strategies that focus on lifting student progress are more likely to succeed than those based on lifting student achievement, because the focus on progress creates stronger alignment between what matters and what schools can deliver. Also, by definition, stronger progress means higher achievement.

15. Fullan (2011, p. 8).

16. See Box 5 in Goss et al. (2015).

The impact of strategies focused on autonomy and accountability is more nuanced. Many states in Australia have attempted to increase the autonomy of schools, in the belief that unshackling the principal will lift outcomes. More recently, this has been supported by efforts to increase the number of independent public schools. However, there is limited evidence that these efforts have led to systemic improvement. A good recent review of the literature concluded school autonomy is necessary but not sufficient to improve outcomes.¹⁷

As for strategies designed to increase choice and competition, the unique characteristics of school education mean that relying on markets is not the best way to improve student learning at scale.¹⁸

2.2.3 Reform strategies that focus on learning processes

These strategies put ‘learning by doing’ at the heart of reform. Further, they aim to accelerate this process by focusing on ‘learning how to learn’. Reform strategies based on learning processes include:

- *Professional Learning Communities* (PLCs) to foster collaborative learning among teachers, based on the evidence that adults learn best from peers;
- disciplined, iterative learning processes, such as *spirals of inquiry*, *design thinking*, and *agile implementation*;¹⁹

17. Suggett (2015).

18. Jensen et al. (2013).

19. The spirals of inquiry approach builds off earlier work on cycles of inquiry, and broadens the range of stakeholders involved in the inquiry process. See Timperley et al. (2014). Design thinking puts student outcomes at the centre of the process, and then uses a disciplined innovation approach based on insights from teachers and school leaders. See, for example, <https://designthinkingforeducators.com/design-thinking/>. Agile implementation approaches help teams improve outcomes in unpredictable circumstances by using incremental, iterative processes and feedback based on what is working. See Breakspear (2016).

- *Network collaboration or Communities of Practice*, similar to PLCs, but sharing knowledge, expertise and resources across schools rather than within them.

Learning processes all intentionally select and spread what works best, but there are many specific approaches, each with different emphasis. Some emphasise adoption: build off what has worked for others in similar contexts. Others emphasise optimisation: analyse existing variation in practice in the search for incremental improvement. Yet others emphasise innovation: test new ways to do things, compare the outcomes, and iterate.

There are risks with all approaches. Putting people at the heart of change means that teamwork and trust are vital, as are culture and capability. For example, the processes that underpin effective PLCs have been extensively documented since the 1990s, but are still difficult to implement in practice. Innovation is even harder: it requires rigorous problem definition and strong evaluation capabilities. And even if the initial capability is available, a learning process can falter unless participants see enough success to encourage their continued effort.

Devolved learning processes can also be slow and inefficient, or even waste time reinventing the wheel. For teachers and school leaders, time is the most precious resource of all, and often it is better to identify an existing good practice and focus on implementing it with fidelity.

These risks make it vital that someone in the system evaluates which learning processes work best in which circumstances, and then spreads this knowledge. There is a big difference between a set of schools each trying to implement their own learning processes, and a systematic approach where the design and implementation of learning processes are themselves being evaluated, for example to identify the conditions that contribute to the success of PLCs.

2.3 The value of adaptive improvement and adaptive reform

If reform approaches based on inputs, outcomes or learning processes all fall short, what type of reform approach will work? This discussion paper proposes an adaptive approach, blending the best of all three.

To see how this might work, this section examines the concept of *adaptive improvement*. This is best thought of as an iterative, deliberate way to learn by doing, using a feedback loop with an explicit focus on inputs, outcomes and learning (see Figure 2.2 on the next page). This formulation captures the minimal set of steps: *Do* something, *Measure* the result, and *Iterate*. And two points become clear.

First, it is not possible to adaptively improve without paying attention to inputs (what was done) as well as outcomes (what happened as a result). This sounds obvious, but school education policy in Australia is full of analysis of how outcomes differ among different groups of schools or students, with little or no data on how (or even if) teaching practices differ among those groups.

Second, adaptive improvement is only as strong as its weakest link – a key reason why reform approaches based on inputs, outcomes or learning alone often struggle in the face of complexity. The aim is to make each step of the feedback loop as effective and efficient as possible, building adaptive capacity by strengthening inputs, outcomes, or the learning process itself (see Figure 2.3 on the following page).

This is what *adaptive reform* does: it accelerates the rate of improvement by improving the learning process itself and targeting interventions to specific contexts.²⁰ Best practices are selected and spread, but so are the best learning processes and the best ways to measure outcomes.

20. Snyder (2013).

While adaptive improvement aims to solve a specific problem, adaptive reform strengthens the problem-solving process itself. There are strong parallels with the economics of experimentation, which aims to make the process of experimentation faster or cheaper, thereby increasing the volume of experiments and accelerating the rate of learning.²¹

There are also strong parallels between adaptive reform and *adaptive instruction*, which often uses information technology to personalise learning to individual student needs. Adaptive reform and adaptive instruction both use data to link what is done (inputs) to what students learn (outcomes), and systematically improve the learning process over time. Both are inherently iterative. Both are empirically based; the only way to know if a change will deliver better results is to test it. The difference is that adaptive reform is about school or system improvement, rather than better individual learning.

Adaptive improvement and adaptive reform are both valuable. However, they are still not enough for whole-system improvement.

2.4 An adaptive system is more than a system with some adaptive elements

Australia already has an education system with some adaptive elements. For example, schools use data to identify practices that make the highest impact, and school networks use structured improvement processes to learn from each other. But Australia does not have an *adaptive education system*.

This distinction, like the distinction between early farming and modern agriculture (see Box 2 on page 16), is subtle but important.

An adaptive education system would use adaptive improvement and reform processes at many levels: some focused at the level of schools,

21. Reeves et al. (2010).

Figure 2.2: The three essential elements of adaptive improvement

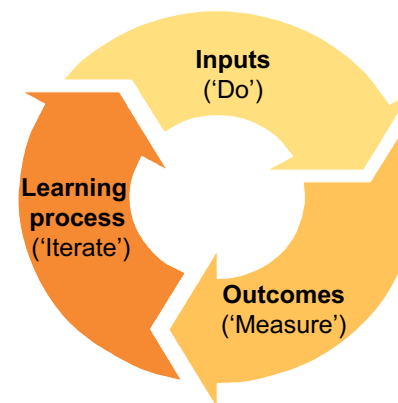
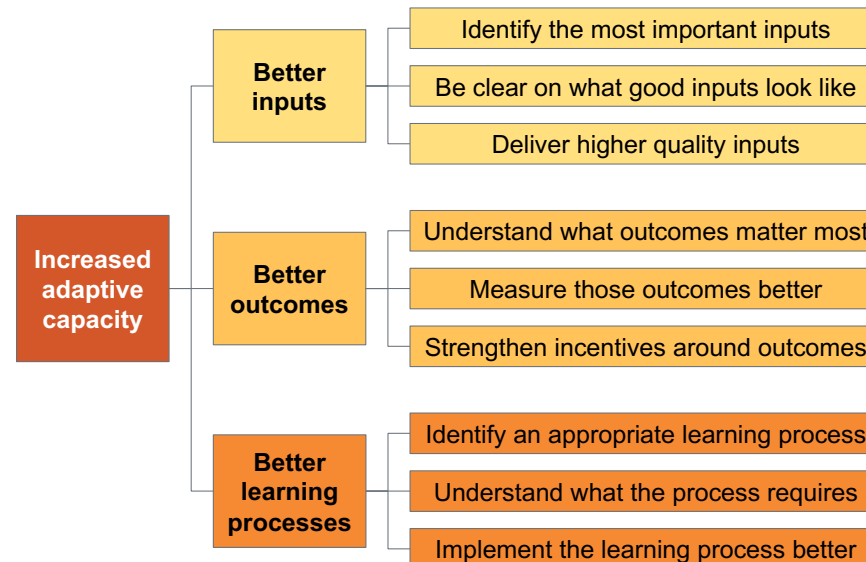


Figure 2.3: Strengthening any part of the loop builds adaptive capacity



others designed to share practices across schools, regions or states. Some processes would focus on better teaching, others on workforce design and planning, and so on.

These adaptive processes would not be centrally designed, but neither would they be completely uncoordinated. An adaptive system would have an intentional, integrated and aligned approach across different parts and different levels of the system. An integrated national evidence education base is essential,²² but the idea of an adaptive system is much broader. All parts of the system would be subject to adaptation, including pedagogy and curriculum, teacher and principal training, regional support structures, and planning processes.²³ The system itself would monitor and adjust its own configuration, in response to its impact on student learning.

Getting the underlying conditions right would require:

- a non-partisan commitment to build the capabilities for an adaptive system, so that there is trust and continuity;
- investment in common standards, tools and language, to make it easier to share knowledge; and
- ensuring that information and knowledge are easily accessible to teachers, principals, and other ‘users’ of evidence throughout the system.

Our education system would improve more quickly under such an adaptive approach. But how do we get there – and how do we get there quickly? Learning too slowly is a big problem: unless the rate of improvement in practice is faster than the rate of change in the context, outcomes will go backwards.

22. PC (2016).

23. See Reeves et al. (2015a) for an example from business, based around how the Chinese online business Alibaba constantly reinvents itself.

Fortunately, we do not have to wait for such an adaptive system to evolve by itself, through chance improvements refined over time. Human systems can be guided, within reason. It is vital to have consistency in strategic direction (otherwise adaptation does not have time to work), but specific policy interventions can be designed to increase the adaptive capacity of the system. The remainder of this discussion paper describes how we might do that in Australia.

Box 2: How agriculture became an adaptive system

The earliest forms of agriculture were pre-adaptive. Each farmer used trial and error to test different crops, and developed idiosyncratic practices about planting, watering and harvesting. Over time, some crop varieties evolved to be better suited to planting and harvesting, and became more widespread. However, this was natural selection, not a deliberate adaptive process.

Higher crop yields come not just from better crop varieties, but from how they are used. Simple crop rotation systems were developed in pre-historical times, but became more systematic from the middle ages. This started to become a deliberate, adaptive improvement process as farmers increasingly measured the yields from different crop rotation schemes to inform future planting and harvesting decisions.

Plant breeding – the deliberate attempt to improve crop yield, flavour or some other desired outcome – is another example of adaptive improvement. Early efforts involved systematically choosing what to plant and then evaluating the yields. Over time, farmers developed increasingly sophisticated and effective breeding schemes, from back-crossing to hybridisation of inbred lines and so on. Natural selection became guided selection.

These better plant-breeding processes greatly increased the ability to generate new varieties. For example, Granny Smith apples were developed in Australia in 1868 for cooking and eating. Red Delicious apples – now the world's most prolific variety – were developed about two years later in Iowa. These are just two of about 70 major varieties of apples developed in the 1800s, up from about 20 varieties developed in the 1700s and fewer than 10 in the 1600s.

Modern plant breeding involves meticulous experimental design and extensive use of data, but the outcome of each experiment is not knowable in advance. Instead, success is judged by observing the outcome – the hallmark of adaptive improvement.

Breeding is just one of many adaptive agricultural processes. Farmers use remote sensing to decide when, where and how much water and fertiliser to use. Integrated pest management uses monitoring, inspection and pest identification to create healthy crops with the least disruption to agro-ecosystems. Seed banks maintain diversity for future resilience and the development of new plant varieties. Research institutions test and promote better management practices as well as better crops.

An adaptive system is what happens once these individual processes are knitted together, a bit like an integrated supply chain. This linking of multiple agricultural processes is a hallmark of developed countries. Information flow becomes as important as moving physical crops or investing in infrastructure. A key characteristic of the most sophisticated adaptive systems is the ability to explicitly identify which parts of the supply chain are working worst – or even failing to improve fast enough – to focus improvement efforts on those steps.

The more adaptive that agricultural systems become, the better they can meet conflicting challenges: optimising yields in response to current conditions, while innovating to develop new crops and techniques for a changing climate. The same is true of education systems.

3 How to develop an adaptive education system

An adaptive education system would enable good local decision-making, and capture and share the learnings from local improvement. It would optimise and standardise some elements of teaching, while developing better ways to innovate in other elements. But how do we develop such a system?

To make this more tangible, this chapter describes some elements of what an adaptive system might look like for targeted teaching, and then suggests what should be included in an adaptive system more broadly.

3.1 Targeted teaching as an adaptive improvement process

Targeted teaching is a practical response to a problem every school faces: the huge spread of capabilities within each classroom. Learning differences exist by the time students first enter primary school, and grow as students move through school. NAPLAN data suggest that in a typical secondary school, the top 10 per cent of Year 9 students are about seven years ahead of the bottom 10 per cent.²⁴

Our 2015 report *Targeted Teaching* described the issue as follows.

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.

Goss et al. (2015, p. 1)

24. Goss et al. (2016a, p. 18).

This process is shown in Figure 3.1 on the following page. Steps 1 and 2 are input-focused, ensuring each student gets taught at the right level. Step 3 is outcome-focused, while Step 4 completes the learning process through analysis and reflection. Thus targeted teaching is an adaptive improvement process driven by selecting the practices that produce the greatest learning gains. However, it is easier to describe than to deliver.

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.

Goss et al. (Ibid., p. 1), emphasis added.

3.1.1 How system support can make targeted teaching more adaptive within each school

Schools can't make all the required changes on their own. However, school and system support can make each step easier (see Figure 3.2 on the next page). Among other benefits, this reduces the cognitive load on teachers, and frees up time.

The first step in targeted teaching is for every teacher to understand in some detail what his or her students know now. Too often, assessment is left up to each teacher. Schools should help teachers develop common assessment tasks, and systems should provide teachers with validated assessment tools.

Step 2 is to ensure classroom teaching is informed by the data on each student's current stage of learning. School timetables should enable teachers to meet regularly to talk about teaching. Systems should provide expert support on how to deal with a wide spread of student achievement, and on what to do if individual students stall in their learning.

Step 3, tracking student progress, is made easier if teachers are given access to learning progressions linked to curriculum standards. These progressions are available in NSW, at least for literacy and numeracy, but in another state there is at least one school that took two years inventing its own approach – time that would have been much better spent building on and unpacking an existing progression.

The feedback loop gets closed in Step 4, adapting future practice by doing more of what works best and improving or stopping what does not.²⁵ Darwinian evolution is sometimes called 'survival of the fittest'; in education, only the highest impact (fittest) teaching approaches should survive and spread.

However, changing practice is hard. Teachers need time, tools and training, along with teamwork and trust. School and system support make a huge difference. For example, adaptation works better if schools can track student progress over multiple years and cohorts.

Any school that follows these four steps should see its teaching practices and student outcomes improve. The improvement will be much slower, however, if each school drives its own improvement cycle in isolation (the 'thousand flowers blooming' approach), rather than if schools learn from their peers.

25. Reviewing the impact of teaching on student learning is called 'formative assessment of programs'. It is one of the most powerful of all education interventions, with an effect size of 0.90. See Hattie (2008).

Figure 3.1: The four steps of targeted teaching

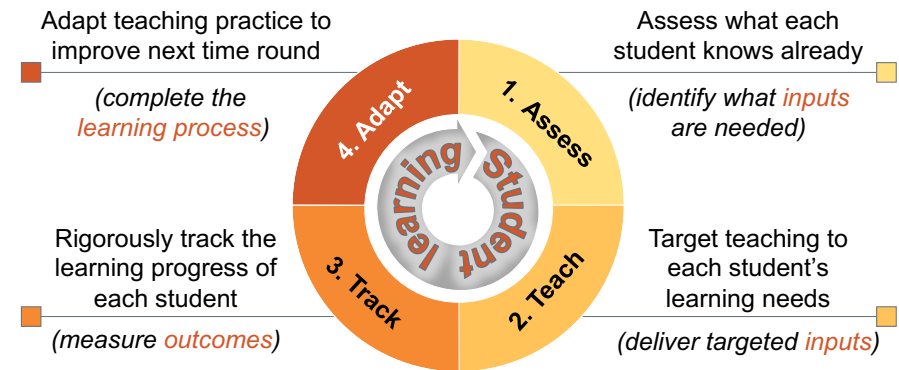
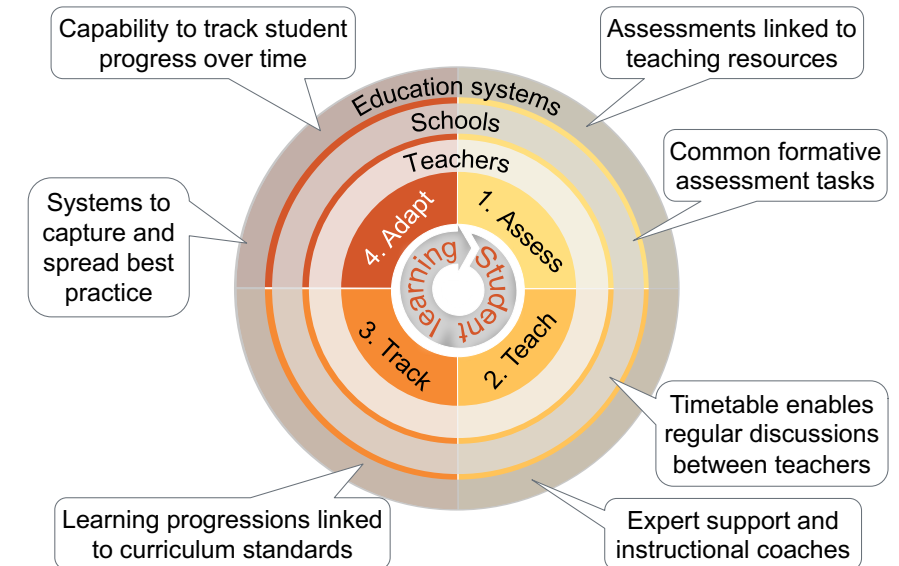


Figure 3.2: Schools and systems can help teachers target their teaching



3.1.2 Feedback loops at different levels

Adaptive improvement is much more effective when each school has an ‘out group’ – a peer group of schools – that can share learnings and challenge preconceptions and existing approaches.

At a minimum, getting feedback and benchmarking data from peers reduces the likelihood that each school will reinvent the wheel. Further, understanding what your peers are doing might stop you from trying to optimise an approach that is inherently limited. Returning to the example of plant breeding, it is a waste of time for a farmer to optimise a three-crop rotation system if neighbouring farmers have already shown that a four-crop rotation system is inherently better.

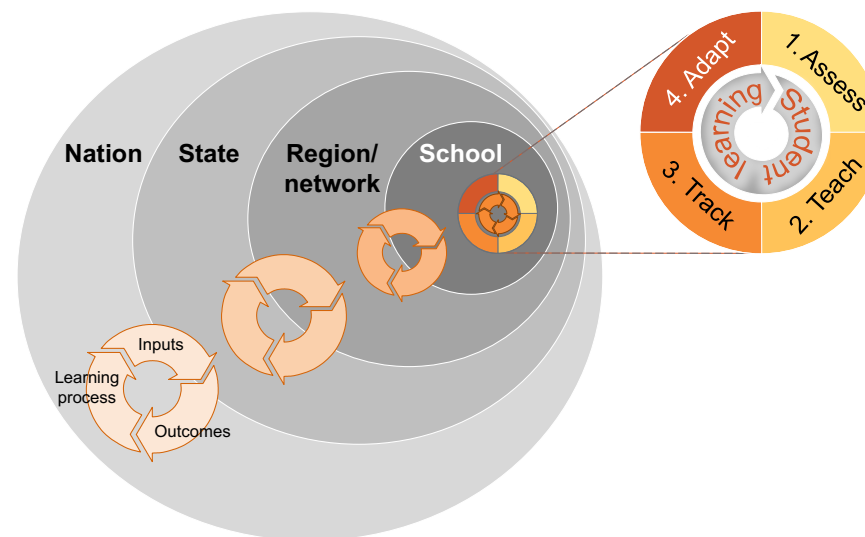
In education, this change has been described as ‘moving from a community of schools with common aspirations, to a system of schools’. Acting together means that the rate of system improvement is no longer limited by how quickly each school can identify better teaching practices.

The same logic holds true at higher levels of the education system (see Figure 3.3): networks, dioceses or regions of schools within each state (sometimes called the ‘middle layer’) should learn from each other; states should learn from each other; and so on.²⁶ These ‘nested feedback loops’ balance the benefits of local decision-making with the benefits of learning at scale.

For schools to learn efficiently from each other, the discussion needs to be quite specific: How is timetabling arranged? How is reading being taught? What assessments are used? Which students are learning well, and which are not? Schools can also learn from each other about learning processes: How do you mentor your new teachers? How did

26. This framework extends to include learning from other countries. However, there are limitations in learning from other countries, particularly due to differences in legislation, funding, and culture.

Figure 3.3: An adaptive system for targeted teaching needs feedback loops at multiple levels



Note: A version of this diagram was published in our 2016 report *Circuit Breaker* (Goss et al. (2016b)). It was inspired by Reeves et al. (2016) ‘The biology of corporate survival’.

you implement a school-wide approach to comprehension? Even then, talking about different approaches is not the same as seeing them in action.

Peer-to-peer learning requires nuanced understanding of inputs, outcomes, and context; and we should ask whose day job it is to make these discussions happen. Too often, in Australia's highly autonomous schooling system, the answer is 'no-one'.²⁷

Competition between schools can also create incentives **not** to share ideas: this may help individual schools develop a competitive advantage, but it does not help our nation.

The size of the region matters: too small is inefficient; too large and the opportunity to discuss the nuances of teaching practices will be lost. Proximity to practice is one element of what makes networked learning work, but so do the right types of relationship and interaction.

For regions (or other middle layers) to learn efficiently from each other, the discussion will necessarily focus less on inputs and each individual context, and more on outcomes and learning processes.

For states to learn from each other, the discussion will be different again. Robust benchmarking is valuable, but comparisons are inevitably abstracted from daily teaching practice. Developing shared tools or a common evidence base helps all states, especially the smaller ones.

27. Asking 'whose day job is it?' is often more useful than asking 'whose responsibility is it?' In government and Catholic schools, there is usually a regional structure, and regional leaders are responsible for ensuring good practice is shared within the region. It is not necessarily their day job, however, in part because they are too far from the coalface, in part because they are not experts in every subject, and in part because they just do not have the time to understand in detail the teaching practices in each school.

This idea of nested feedback loops is easier to describe in theory than to put into practice. Each level of the system needs to pay attention to the details of what is being done ('inputs') at the levels below. For example, if the centre is only interested in governance, structures, funding and outcomes, it will not have sufficient depth of knowledge to play an effective role in the feedback and improvement cycle for regional networks, let alone provide clear guidance to schools.

Appendix A gives some examples of interventions that would build adaptive capacity at different levels of the system, and Appendix B describes an Australian example of adaptive reform.

3.2 What it takes to be an adaptive system

Australia's school education system needs to adapt in order to improve. We need to test new approaches to teaching, as well as make more use of best practices in those areas of teaching that are better understood. That means that there needs to be strong processes to select and share existing great practices, at the same time as effective exploration of promising new approaches.

Figure 3.4 on the next page illustrates the importance of balance. The x-axis of the two-by-two matrix describes how effectively good practice is selected and shared, while the y-axis describes the level of variation in teaching practice across the whole education system.

Variation in practice may arise because of genuine differences in context, or because the evidence about what works best is inconclusive and innovation is warranted. The changing needs and expectations of schooling mean that we do need more variation than previously; we now want all students to complete Year 12 or equivalent, so education pathways are needed to support students who struggle in the traditional academic subjects. Educational technology is also enabling new ways of teaching, and we need to explore and select the best of them.

However, different practices are not necessarily good practices, and more variation is not necessarily better. In biology, most mutations are either neutral or harmful. Still, healthy populations maintain a degree of diversity, not least as a hedge against a change in the environment.

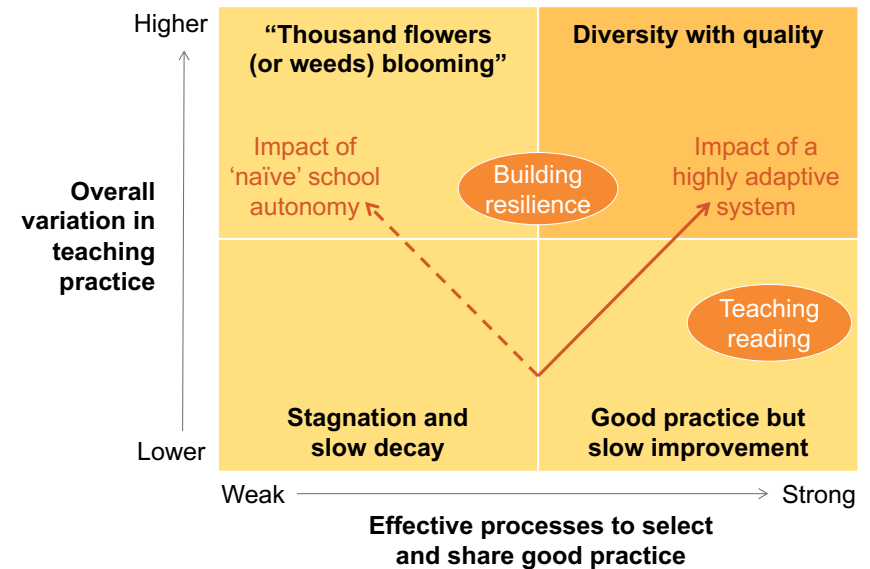
The worst place to be is in a system that has limited variation in practice combined with weak processes to identify better teaching approaches. This is a recipe for stagnation and slow decay, represented by the bottom-left quadrant of the matrix.

The outlook is better for systems in the bottom-right quadrant. They have strong processes to select and share good practice, but limited variation in practice. Over time, this would lead to consistently good practice and outcomes but only slow improvement.

At times, higher levels of variation in teaching practice are necessary, because of legitimate local differences, or because there is not yet an established best practice. Despite the potential benefits of greater variation, systems should aim not to be in the top-left quadrant. High variation in teaching practice without the ability to weed out poor practices is fraught. A thousand flowers would bloom, but with a thousand weeds alongside them. Disparities among schools would continue to grow, with the best schools getting better but other schools floundering with constant change in practice and little learning.

Arguably, the autonomy agenda that has prevailed in parts of Australia for a decade or more has pushed us towards the top-left of the matrix, as middle-layer support structures were weakened in favour of maximum devolution. In many places this has gone too far, and in some it is now being reversed.²⁸

Figure 3.4: A highly adaptive education system balances variation with effective processes to select and share good practice



28. When regional structures are rebuilt, they should focus on the support they provide to schools, as well as accountability. Unfortunately, it is easier to destroy regional capabilities than to rebuild them.

Generally, the best place to be is the top right quadrant, with an appropriate balance between variation and selection. Systems in this quadrant would have diversity with quality: a range of approaches, but only those that have been forged in the fire of rigorous evaluation and tempered by experience of what it takes to implement them effectively.

3.2.1 Horses for courses

Digging a little deeper, the best place to sit in this matrix will depend on the topic. Being further to the right is generally good, but not always possible, especially for some of the general capabilities and non-cognitive skills that we are still learning to measure.

The 'right' level of variation also varies. Teaching foundational skills should become more standardised over time as the research base improves. Every profession goes through this process – standardising some core practices while innovating in others.

Thus, a spot more towards the bottom-right of the matrix may be highly appropriate for the teaching of reading, which is well researched. A position more in the middle may be better for a topic such as building student resilience, which the education profession is still working to understand (*i.e.*, weaker ability to select good practice), and which may look quite different in different schools (*i.e.*, more variation is warranted).

3.2.2 Smart variation

To move up the y-axis of Figure 3.4 on the preceding page in a smart way – to enable effective innovation, and ensure variation in practice improves rather than harms outcomes – requires subtle decisions about which teaching practices should be standardised, which need substantial tailoring to local context, and which are best left entirely up to local decision-making.

One popular way to get more variation is to devolve as many decisions as possible to schools; after all, they understand their students better than does someone in an education department. So long as schools are held to account, the argument goes, everyone else should get out of the way.

However, this form of naïve autonomy expects too much of each teacher and each school. The principle of subsidiarity says decisions should be devolved to the most decentralised competent authority, not to the most decentralised possible authority. In education, balancing autonomy with accountability helps, but is not enough. For example, we described in Section 3.1 on page 17 how hard many schools find it to implement targeted teaching without system support.

Rather than naïve autonomy, a dynamic, adaptive system would keep or strengthen the processes to select and spread good practice, at the same time as devolving more power to schools to tailor their practices to the needs of their students. It is time to explore what that might take.

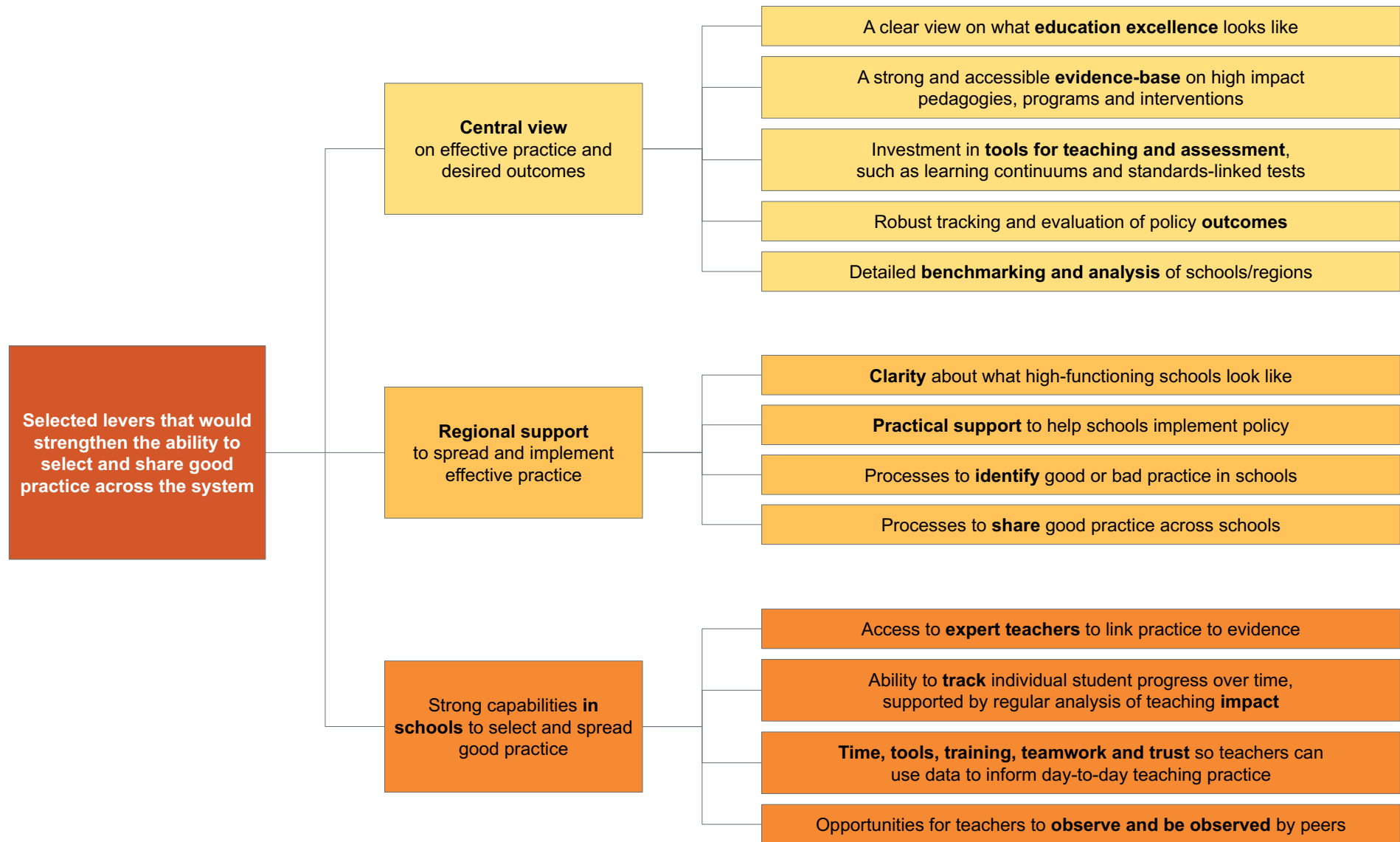
3.3 How to get better at selecting and spreading good practice

Figure 3.5 on the following page details what is needed within schools, what should be done at a regional level, and what role the centre should play in an adaptive education system.

Each lever could act to strengthen inputs, outcomes or learning processes, or all three at once.²⁹

29. For example, statewide or national formative assessment tools strengthen the input steps of the targeted teaching feedback loop; while instructional leaders strengthen all three steps, by bringing better practices, increasing the focus on outcomes, and leading a better learning process. Instructional leaders are therefore likely to have greater impact, albeit at greater cost.

Figure 3.5: Levers to strengthen a system's ability to select and share good practice



3.3.1 Good selection processes within schools

Each school needs processes that allow it to identify which existing practices are working well, which need to be improved, and which need to be dumped. Even if local measurement of outcomes is imperfect (and it always is), selecting and spreading the practices with the best outcomes will tend to drive improvement over time.

In-school selection processes benefit from:

- access to expert teachers (such as instructional leaders), whether to link current practices to the evidence base or to lead local innovation;
- the ability to track individual student progress and analyse teaching impact;
- time, tools, training, teamwork and trust so that teachers can use data to inform their day-to-day practice; and
- opportunities for teachers to observe and be observed by others.

No doubt there are other important within-school factors, and there is a long literature about school-level improvement. However, leaving selection all up to the school is not a recipe for system-wide success – even the most successful charter schools are generally part of networks that provide extensive guidance and support.

3.3.2 Regional support to help schools identify and implement effective practices

Regional support does not necessarily mean the administrative infrastructure that many states use to oversee and support their government schools. Regional support could equally come from a university or non-profit organisation that has chosen to help a network of schools.

The point is to create ways in which schools can learn from each other's experience, with sufficient proximity to practice and evidence. Such regional learning processes benefit from:

- clarity about what high-functioning schools look like;
- practical support to help schools implement agreed policy;
- processes to identify good or bad practice within schools and then share the best practices across schools.

Regional learning takes time and effort. Too often, regional offices are the first to suffer cuts when education departments are under budget pressure. And the complexities of Australia's three-sector education model means it is hard to develop regional learning across government, Catholic and independent schools.

If regional learning is left up to chance, or the goodwill of busy school leaders, there will be huge variability in its effectiveness. Some schools will make the most of it; some will push it to the bottom of their priority list; others will tick boxes about learning from their peers if they are required to as part of their improvement plans, but only go through the motions. An adaptive system would not leave regional learning up to chance or goodwill.

3.3.3 The role of the centre

Regional learning is vital, but not enough to make a whole system adaptive. There is still a role for support from the centre, whether a state or territory education department, a Catholic diocese, or an independent school body. Sometimes, national consistency or scale is also needed, requiring Commonwealth Government intervention.

Schools and regions will benefit from central support that has:

- a clear view on what education excellence looks like;

- a strong and accessible evidence base on high-impact pedagogies, programs, and interventions;
- investment in tools for teaching and assessment, such as learning continuums and standards-linked tests;
- robust tracking and evaluation of policy outcomes; and
- detailed benchmarking and analysis of student outcomes across schools and regions, to identify high-achieving schools and slow-progress schools, as well as what distinguishes them.

System leaders have many other responsibilities, including provision of schools, accreditation of teachers, accountability for the funds they disburse to schools, and a duty of care for the students and teachers under their purview. It is certainly possible to stop there, and devolve the responsibility for improvement to individual schools; but that is not the hallmark of high-performing systems around the world, even those that have devolved many responsibilities to school leaders.

The centre has an invaluable role in supporting the selection and spreading of good practice. At times, the centre needs to step up and resolve major issues at a system level, whether about specific reading practices or programs, the use of explicit instruction, or the benefits of positive behaviour programs. The optimal way to do this is through randomised controlled trials, the strongest form of evidence available. More often, the role is not to try to specify what schools and teachers should do. Rather, it is to guide, monitor and provide feedback; to invest where appropriate; and to create the structures and institutions that enable schools and teachers to adapt and improve their own practices over time.

In an adaptive education system, the ultimate role of the centre is actually system design.³⁰

Education departments should use their scale and oversight to shape an ecosystem that learns well at multiple levels. This means letting go of the idea that policies should have predictable outcomes, and embracing a willingness to learn and improve, recognising that learning involves failure. It means being smarter about the learning processes themselves, and it means policy settings need to be more consistent, because adaptation cannot work if the settings change too quickly.

Education decision makers should ask the following questions:

- Does this policy strengthen the way good practice is selected and spread within or across schools?
- Is this an effective and efficient lever?
- How do we know?

If a policy decision strengthens the adaptive capability of the system, then teaching practice will probably improve, because more effective practices will continue and less effective practices will stop. Not everything will work first time, but a system with stronger adaptive capacity will be better at learning from both success and failure, and understanding why an approach might fly in one context but flop in another.³¹

30. This has strong parallels with the Shaping Strategy approach in Reeves et al. (2015b). The goal is to shape the ecosystem and orchestrate the interaction between stakeholders.

31. It is worth revisiting the Early Action for Success case study (Appendix B) in the light of this description. Teachers have got better at using evidence, tailoring their teaching to individual student needs, *etc.* The strategy has strengthened the adaptive capacity of each school, and of the NSW Government system as a whole.

4 How to make Australia's education system more adaptive

This discussion paper showed how the concept of adaptive systems offers a new way of thinking about system design that is neither top-down nor bottom-up.

It then explored the relationship between adaptation and education, and described how better teaching is an adaptive process.

It explained why Australia needs an adaptive education system; outlined the three big challenges; showed why addressing them requires a blend of standardisation and innovation; explained how adaptive reform trumps reform based solely on inputs, outcomes or learning processes; and drew the distinction between an adaptive system and a system with some adaptive elements.

Next, it discussed how to develop an adaptive education system. To do this, the paper explained why targeted teaching is best approached through adaptive improvement with support from systems; highlighted the importance of effective processes for selecting and spreading good practice; and showed how building system-wide adaptive capacity involves levers that operate at multiple levels: school, region, and centre.

Now comes the key question: how to make Australia's school education system more adaptive? Appendix C outlines the 'cross-cutting' building blocks that will need to be reconfigured to make the system more adaptive: the evidence ecosystem; the teacher workforce; school leadership; resource allocation; use of technology; and system governance. But to make things more tangible, this paper proposes six broad areas where we should focus first, each of which builds the adaptive capacity at some level of the system.

First, teachers and schools must be better able to track the progress of their students over time in ways that directly inform their teaching.

Giving the right data to teachers helps them judge their impact on learning and, in turn, fosters individual professional responsibility and collective efficacy, the best forms of accountability. Data in the hands of teachers is a big change in emphasis for Australia, which has a well-established national evaluation and assessment framework, but has not as clearly articulated how the national agenda will generate improvement in classroom practice.³²

Second, we need to continue building better ways to spread and share information and practices, both within schools and across schools.

The de-privatisation of the classroom is well and truly under way, and most states and schools are investing in learning processes within and across schools. Improving the effectiveness of these collaborative approaches pays dividends, including through increased collective efficacy. Such discussions must focus on specific teaching practices and other inputs, not just test results or other outcome metrics. This means that the expertise of whoever is leading the group is vital, as well as their ability to get others to collaborate.

Third, Australia should make better use of its most expert teachers, using them to teach other teachers and spread evidence at scale.

Professions from nursing to medicine to engineering and accounting make best use of their best and brightest. So do high-performing education systems such as Singapore's and Hong Kong's. It is time for Australia's education system to do the same, building on the Australian Institute for Teaching and School Leadership's Highly Accomplished and Lead Teacher standards, but at much larger scale and formalised through an Australian College of Teaching.³³ Career pathways for

32. Santiago et al. (2011, p. 9).

33. Ingvarson (2015).

instructional leaders and master teachers would keep many of our best teachers in the classroom, make the teaching profession more attractive, and strengthen the adaptive capacity of the system.

Fourth, teachers and school leaders should do more to embrace the benefits that come from standardising elements of teaching practice.

From common lesson plans and formative assessments, to better textbooks and careful use of educational technology, more use of tried and tested support materials can enhance student learning and reduce 'reinvention of the wheel'.³⁴ Standardising practice might seem like a surprising place to start in a paper on adaptive improvement, but it is essential. In addition to making classroom teaching more consistent, it would free up teachers' time to build relationships with their students, better target their teaching, or create bespoke instructional experiences that no textbook can hope to achieve.

Fifth, schools and systems need to innovate more systematically and intentionally to prepare their students for a changing world.

Systems can help by developing better ways to measure non-cognitive capabilities, and by investing in longitudinal studies to get more insight into which capabilities are most valuable for helping young people succeed once they leave school. And rather than innovation being spread across many schools but done poorly, it would make more sense to have a smaller number of schools – those with either a pressing need for a new approach, or those that are already performing well and have the capability to stretch themselves further – to test and evaluate new approaches on behalf of the broader system.

34. Better evaluation of commercial programs and textbooks is an important piece of this puzzle. For example, when the Education Department in the UK was pushing the use of phonics, it assessed the quality of all the commercially available programs and then provided incentives to schools to use the best.

Lastly, and this is a big one, policy makers need to change the way they think about system leadership.

In an adaptive education system, the ultimate role of the centre is to design the rest of the system, and build adaptive capacity at multiple levels. A good place to start is by identifying which feedback loops are weakest, and figuring out how to strengthen them.

Meanwhile, all those interested in school education should recognise that system design will not always work: developing an adaptive education system is a journey, not a destination. The goal is never stasis, but better managing change, learning from failure, and capturing success.

The ideas presented in this discussion paper can help move Australia towards being a more adaptive education system. Becoming more adaptive is the only way we can simultaneously tackle the three big – but very different – challenges confronting school education in Australia: better teaching of core academic skills and content; better preparing young Australians for life after school; and doing so in a way that is fair for all.

Appendix A: Examples of interventions that build adaptive capacity at different levels of the system

Within schools	Across schools	Across regions	Across states
Collaborative unit design and lesson planning	Principal networks	Formal evaluations and case studies	Formal evaluations and case studies
Common formative and summative assessments	Communities of Practice <i>e.g.</i> maths teachers	Best practice guides, illustrations of practice	National evidence clearing-house
Professional learning communities	Master teachers working across schools ^a	Staff rotations	Subject-based national professional associations
Action research	Professional conferences and workshops	Regional visits	Common curriculum and assessment standards
Instructional leaders (or coaches) within schools ^a	Peer-to-peer site visits	State-wide benchmarking and information systems	National benchmarking of student progress
HR processes that focus on staff development	Lighthouse schools	Central monitoring and support	Development of shared tools (<i>e.g.</i> learning continuums linked to teaching materials)
Self-assessment tools	School inspections with formative feedback	Consistent policy direction and settings	
Mentoring new teachers	Regional support staff		

a. Instructional leaders and master teachers are described in our 2016 report Circuit Breaker (Goss et al. (2016b)). Both would be subject specialists, in line with high-performing systems such as Singapore and Hong Kong.

Appendix B: Early Action for Success as an example of adaptive reform

Early Action for Success (EaFS), run by the NSW Department of Education and Communities, is a strategy that seeks to improve learning outcomes in government schools in the first three years of schooling.³⁵ Established in 2012, the program invests in teacher capacity and provides clear direction to participating schools. Teachers and schools are required to:

- assess each student's learning needs against NSW's literacy and numeracy continuums;
- target teaching to what each student is ready to learn next;
- track each student's progress against the continuums, record evidence of learning every five weeks, and provide it to the Department every 10 weeks.

The Department appoints Instructional Leaders to work in each EaFS school. They do not have a class themselves. Instead, their job is to equip teachers with the skills to assess students effectively, identify learning needs, and target their teaching. Instructional Leaders also lead an adaptive professional learning process in each school, using empirical evidence to help teachers select and spread practices that boost student learning.

For example, three Prep teachers in one school I visited had decided to focus on getting their students to settle at the start of each lesson. Analysis of the previous year's data showed that students in one of the three classes were learning much more. Through discussion and observation, the routine used to settle that class was identified as a key factor, and then implemented in the other classes.

35. Parts of this appendix are adapted from Section 5.1 of *Targeted Teaching* (Goss et al. (2015)).

Feedback loops are built into EaFS at multiple levels. The data sent by schools is used for improvement, not just accountability. The Department regularly analyses student and school progress data, and shares the analysis with all participating schools in a way that does not identify particular students, classes or schools.

Under EaFS, Instructional Leaders do not work in isolation, but participate regularly in local learning networks, as part of a tiered structure that gives 'visibility' from the centre to the classroom and back again. Thirteen literacy and numeracy trainers work directly with Instructional Leaders to help implement Department decisions.

EaFS has people, processes, systems and structures that enable ongoing adaptation at different levels of the system. The results are promising, including early indications from the latest National Assessment Plan – Literacy and Numeracy (NAPLAN).³⁶

A recent evaluation of the NSW Literacy and Numeracy Action Plan, of which EaFS is the government component, found:³⁷

While the improvement in student learning outcomes from the Action Plan may not have been as great as desired, this does not mean that the Action Plan did not provide a range of benefits for students, teachers and schools. Rather, when its impact on the quality of teaching and learning and school culture is considered, the evidence demonstrates widespread impact on a range of school practices, including:

- evidence-informed practice, personalised and student-centred learning;

36. Preliminary NAPLAN 2017 results came out after the most recent evaluation. Further analysis is needed, but NSW's Year 3 results are encouraging.

37. Erebus International (2017, p. 40).

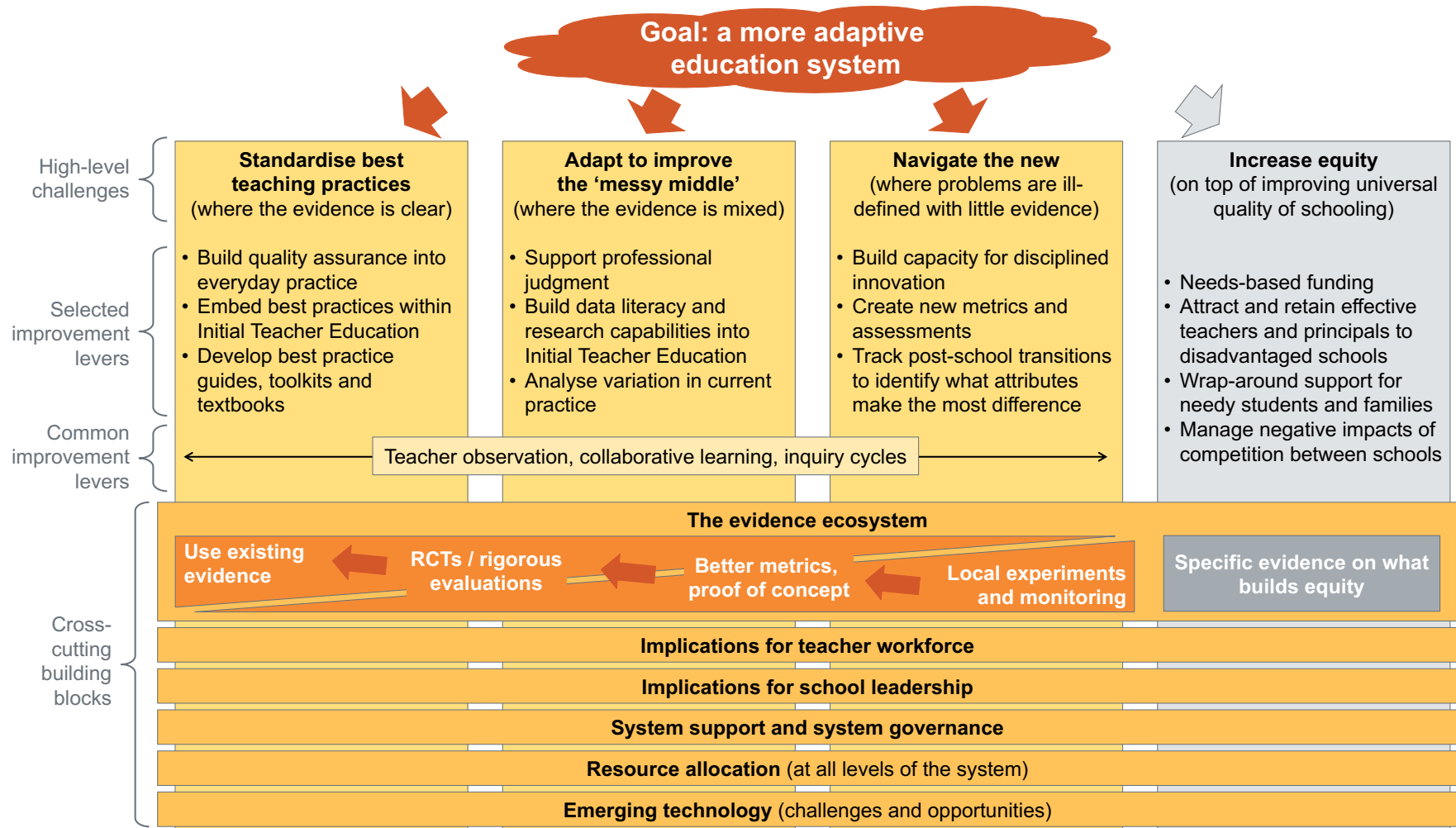
- enhanced teacher capacity to tailor learning experiences according to identified student need;
- greater sense of collective responsibility for student outcomes;
- more tailored use of interventions for students at risk;
- more appropriate use of specialist and paraprofessional staff;
- stronger accountability for outcomes and understanding, and acceptance of critical reflection on the effectiveness of practice.

This extract illustrates both the benefits and challenges of adaptive reform. Change is hard. Rigorous evaluation and learning is vital – as is persistence. However, EAfS has already strengthened the adaptive capacity of the NSW system, and lessons from this evaluation are already informing the next iteration of the Action Plan. Principals in more than 70 per cent of schools have broadened the focus of the Action Plan from K–2 to K–6.³⁸ The principals seem to think the approach works.

38. Ibid. (p. 23).

Appendix C: Mapping out a future program of work

Figure C.1: An overview of the different building blocks that will need to be adjusted to create a more adaptive education system



Note: RCTs = Randomised Controlled Trials.

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