Reinvigorating and reimagining our schools

A vision for post-pandemic schooling in Australia

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About us

The Mitchell Institute for Education and Health Policy at Victoria University (VU) is one of the country's leading education and health policy think tanks and trusted thought leaders. Our focus is on improving our education and health systems so more Australians can engage with and benefit from these services, supporting a healthier, fairer and more productive society.

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Foreword

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Two years ago, an extraordinary upheaval began in Australian schools: the COVID-19 pandemic. The pace of change was unprecedented, as the lives of teachers, students, families and communities were rapidly disrupted. Schools faced the enormous challenges of sustaining learning online, or delivering on-site learning in new, COVID-safe ways. At the time of writing, many disruptions remain, despite the welcome progress in mass vaccinations.

Yet these difficult times also generated many moments of inspiration. COVID-19 has forced the reimagining of many aspects of Australian society. This goes beyond reimagining how essential services can be provided in remote, digitally-enabled ways. It also involves deeper reconsideration of what matters most for our society, and what kind of world we want our children to inherit.

Schools are places of innovation and hope. They are both curators and creators of knowledge, equipping the next generation to succeed in a world that may be radically different from the one we live in now. To fulfil this role, schools themselves must continually innovate, and find new ways of learning that connect our past to our future.

The Mitchell Institute for Education and Health Policy at Victoria University has a longstanding commitment to helping schools, policy-makers and system leaders to imagine the future of Australian education. Our 2017 report, *The Paradigm Shifters*, promoted entrepreneurial learning in schools, and showcased the success of schools that innovate to meet the future head-on. At the same time, our 2015 and 2020 reports on *Educational Opportunity in Australia* described the enduring inequality in the Australian education system, and the many students who still miss out.

This report sets out a new vision for the future of Australian education that brings together innovation and equity. A third component of this vision – collaboration – recognises that an innovative, equitable education system for Australia can only be achieve through working together.

The report then highlights three practices that are the keys to unlocking this vision: adaptive leadership, responsive pedagogy, and generative assessment. It sets out how all levels of education, from students to school leaders to policy-makers, can apply these practices and mindsets in their work.

As Australian schools revitalise and regroup in the wake of the pandemic, it is the ideal time for new ideas to find a foothold. It is also time for old ideological battles that have hindered progress in Australian schools to finally be put to rest. This report envisages the future of schools in Australia is collaborative, agile, evidence-based – and exciting. I invite you to share in this journey.

Executive summary

The future of Australian education must move beyond post-COVID recovery to reinvigoration. We must take the best of what was learned during the COVID-19 crisis, and build on it to tackle systemic challenges that pre-dated the pandemic. This means reconceptualising Australian schools to be stronger, smarter, and more relevant and resilient than they have ever been.

This paper shows by working together, education in Australia can be delivered to build equity, innovation and collaboration. It explores three practices that will help to shape the future: **adaptive leadership, responsive teaching and generative assessment**. Embedding these practices would amount to a paradigm shift in Australian school education, accelerating the shift towards a future-ready system that has been brewing over the last decade. This can only be achieved with collaboration from the many stakeholders in the education system. It requires both 'top-down' guidance from policy-makers, and a 'bottom-up' push from teachers and school leaders to challenge existing structures. Critically, it requires extending power to students as agents in their learning, to embrace change in what they learn, and how they learn it. This paper shows by working together, education in Australia can be delivered to build **equity, innovation and collaboration.**

Building equity

In the Australian education system of the future, all learners must be supported to succeed. This cannot be achieved with one of the most inequitable school systems in the developed world. The three practices outlined in this paper contribute to building equity in the following ways:

- **Adaptive leadership** embraces diversity by recognising the value of multiple perspectives, creating space for minority voices, and exploring many possible paths to reach a goal.

- **Responsive teaching** builds equity by sharing power between teachers and students, and ensuring that each students gets what they need to succeed in their learning.

- **Generative assessment** builds equity by capturing the strengths of all students in meaningful ways, helping students to monitor and take ownership of their own learning.

Building innovation

The Australian school system of the future needs the capacity to continue innovating, to prepare students to meet new challenges in a world where change is certain. Schools must be future-focused and ready to adapt. The three practices in this paper contribute to building innovation in the following ways:

- **Adaptive leadership** is a force for innovation, exploring new solutions to complex problems, and using insights to identify how capacity can be used in new ways.

- **Responsive teaching** builds innovation by encouraging teachers to experiment and reflect on the pedagogical strategies that achieve results for each of their students.

- **Generative assessment** enables schools to monitor the effects of innovations in teaching and learning and to measure the capacity for innovation that they are developing in their students, including their agency and broader capabilities.

Building collaboration

The Australian education system of the future will make better use of collaborative effort, and harness contributions from stakeholders inside and outside of schools. When boundaries are permeable between schools, and between schools and communities, then ideas can flow and

resources can be shared for the benefit of the entire system. The three practices in this paper contribute to building collaboration in the following ways:

- **Adaptive leadership** harnesses the power of networks and collaboration, recognising that leaders cannot navigate complex challenges alone (Heifetz, 1994).

- **Responsive teaching** builds collaboration by framing teaching and learning as a shared responsibility, where teachers and students work with each other and with their peers.

- **Generative assessment** builds collaboration by creating a shared language for understanding and describing success, and by involving multiple stakeholders in the assessment process.

Each of these practices is also closely aligned to contemporary pedagogical approaches in Science, Technology, Engineering, the Arts and Mathematics (STEAM). STEAM learning can incorporate these practices to prepare students with the skills and mindsets for the future.

Practice 1: Adaptive leadership

The COVID-19 crisis has increased interest in adaptive leadership in Australian education. Adaptive leaders navigate change with purpose and agility, skilfully balance competing agendas, and work collaboratively to engage constructively with complexity. They imagine and assess a range of options, and 'read' their context to make good decisions.

Growth in adaptive capacity for students, school leaders, teachers and policy-makers can help to build the adaptive capacity of the education system as a whole. An 'adaptive education system' would enable diversity and innovation to flourish and to ensure that the best ideas and practices are shared. To achieve this vision, Australia must continue to develop adaptive leadership at all levels of education, to ensure that our schools and society are well-prepared to cope with change.

Adaptive leadership can also be applied to the unhelpful dichotomies that plague education policy and practice. Adaptive leaders can reframe dichotomies as *polarities,* recognising the need to hold competing ideas in tension while charting a course between them. Gradually, the search for 'silver bullets' in education can be replaced by thoughtful attention to complexity, and how adaptive systems can deliver better results.

What students can do

- **Explore different ways of thinking** rather than seeking certainty from a single source, by accessing and appraising diverse resources and ideas, and cultivating curiosity and inquiry.

- **Learn from others and help them learn** to move beyond a narrow focus on individual achievement, and recognise knowledge as something that is shared and socially produced.

- **Engage with 'problems that matter'** to explore complex challenges without easy solutions, which challenge students to develop adaptive capacity and apply their knowledge and skills.

What teachers and school leaders can do

- **Model reflective practice** as a critical component of adaptive leadership and openly share reflections with staff while working through setbacks and changes.

- **Actively develop adaptive capacity within the school** to help teachers engage with complex challenges and find solutions that respond to their unique school community.

- **Treat external partnerships as adaptive resources**, leveraging mutually beneficial relationships to authentically connect to community and share insights and resources.

- **Balance standardisation and diversity** by balancing the policy orientation towards consistency with openness to diverse approaches that respond to local contexts.

- **Invest in innovation and 'dynamic efficiency'**, so results of adopting adaptive capacity across the education system can be seen sooner and improved over time.

- **Invest in 'boundary spanners'** (individuals or organisations that create connections within an adaptive system) to develop links between schools and other parts of the education system to support policy implementation and break down silos.

Practice 2: Responsive teaching

Responsive teaching places students at the centre of education. Responsive teachers not only know their students well, but also respect them as agents in their learning. They have in-depth pedagogical content knowledge and skill, but remain alert, adaptive and intentional, attending to all elements of the explicit and hidden curricula.

Responsive teaching transcends the false dichotomy between teacher-led instructional approaches such as explicit teaching and student-led approaches like inquiry learning. By shifting the focus from pedagogies to students, it empowers teachers to be reflexive in their practice, and partner with students to make decisions about the methods and modes of instruction to best support learning.

Around the world, the COVID-19 pandemic demanded a renewed focus on individualised learning, causing teachers and school leaders to refocus on students as the centre of their practice. In Australia, teachers and leaders have worked with families to keep education going in extraordinary circumstances. They have also offered unparalleled levels of support for student wellbeing, as the pandemic brings new challenges to students' lives.

The Australian education system must sustain and nurture its focus on students, as the country moves into the next phase of the pandemic and beyond. Teachers and school leaders must be equipped with a repertoire of tools and strategies to meet their students' needs – including academic learning, wellbeing and broader development – as well as permission to use them.

What students can do

- **Take ownership of the learning process** and become active participants in learning by setting goals, cultivating a growth mindset, and developing strategies to learn at their best.

- **Positively contribute to the learning climate in class** by recognising their role in contributing to the learning of their peers and fostering a sense of belonging for all students.

- **Connect learning inside and outside of school** to recognise that learning is not limited to the classroom, and that knowledge and skills acquired outside of school are worth sharing.

What teachers and school leaders can do

- **Tune in to student voice to inform pedagogical decisions,** and view all students as capable of exercising choice and leading their learning.

- **Use an adaptive, evidence-based toolkit of teaching strategies** to respond to student needs. Even when teachers primarily use tried-and-true approaches, awareness of alternatives helps to stretch their thinking and to develop a breadth of strategies.

- **Plan for learning that is relevant and authentic** to connect school to the outside world and provide opportunities for students to develop future-ready knowledge and skills.

- **Practise responsive policy-making**, using tools like human-centred design, behavioural insights and place-based approaches to integrate diverse perspectives into the policy process.

- **Support teachers' pedagogical decision-making,** by not only promoting specific practices, but also helping teachers appraise their relevance to their context, consider diverse perspectives and share ideas with other professionals.

- **Learn from responsive practices in other sectors** to benefit from their insights and explore how responsive practices can be further developed within education.

Practice 3: Generative assessment

Generative assessment involves the purposeful use of assessment to build an education system for the future. It encompasses different assessment purposes (assessment *of*, *for* and *as* learning) but goes further – using assessment to create change within classrooms, schools and systems.

Generative assessment is especially relevant to the assessment of general capabilities (or '21st century skills'). These skills demand new and innovative assessment methods, and themselves are key ingredients in generating innovation for Australia's future.

Australia has a strong assessment architecture around literacy and numeracy focused on the National Assessment Program – Literacy and Numeracy (NAPLAN). The strong emphasis on NAPLAN, combined with a weaker focus on assessing and fostering general capabilities, has arguably led to an education system that is oriented towards a relatively narrow set of measurable outcomes. A shift towards generative assessment – using novel methods to assess a broader range of skills, and using the results of all assessments for creative rather than restrictive purposes – could open up space for innovation to flourish.

Realising the generative potential of assessment in Australian education will involve changing *what* is assessed, *why* assessment happens, and *how* it is done. Like adaptive leadership and responsive teaching, a generative approach to assessment will require shared effort from teachers, school leaders, policy-makers and students.

What students can do

- **Be creative, curious investigators of their own learning**, using the assessment process as a way of building skills in collecting and interpreting data, and deciding what to do next.

- **Collaborate with teachers and fellow students as partners in assessment** by actively contributing to elements of the assessment process, such as learning goals and feedback.

- **Recognise assessment as part of everyday life** by connecting practices between home and school to help create new ways to demonstrate and describe success and to reflect on their progress.

What teachers and school leaders can do

- **Make purposeful assessment decisions to create change**, recognising the many ways that assessment can be used to build collaboration (by generating dialogue); equity (by being deliberately inclusive of all students); and innovation (by developing new practices and skills).

- **Create generative feedback loops to drive school improvement** by using assessment as a catalyst for conversations in the school community about improvement and innovation.

- **Use authentic assessment tasks** that enable students to demonstrate their skills in context.

- **Treat assessment with curiosity** by recognising that the most important aspects of learning may not be easily measurable, and supporting multiple approaches to system monitoring.

- **Build an adaptive architecture for assessment,** including structural tools (such as learning progressions) that can be adapted across contexts; and professional networks to support assessment practices within and between schools, and across the broader education system.

- **Measure what matters to Australian communities** by connecting learning that occurs in schools with the needs, values and expectations of the wider community.

Keeping the conversation going

This paper shows how students, teachers, school leaders and policy-makers can work together to navigate a complex world. It identifies three areas of practice essential to a better future:

- **Adaptive capacity** to navigate the immediate disruptions facing schools – and to raise the ambition of change in the longer term and reach new heights of innovation and discovery.

- **Responsive teaching** designed for student needs, encouraging them to be engaged, active learners – and to be acknowledged, included and elevated to partners in learning.

- **Generative assessment** that drives a sustained process of collaborative learning, for students, teachers and policy-makers alike – informing ongoing research, experimentation, dialogue and reflection.

This discussion will equip schools for the future more effectively than specific procedures and practices. Education for the future is not a 'quick fix' or a formula, but will require all levels of Australian education to cultivate creativity, collaboration and innovative capacity. If Australian schools want their students to emerge as creative, adaptive problem-solvers who challenge the *status quo* and meet the future head-on, then they must also be prepared to be likewise.

The ideas in this paper are not only relevant to the current crisis in Australian schools. While the upheavals of the COVID-19 pandemic may be once-in-a-lifetime events, change in the education system is continual and inevitable. While change is stressful, failure to adapt can have disastrous consequences for schools and students now, and society in the future. The next generation of change-makers – students, teachers, leaders and policy-makers – must be ready.

Our future: Equity, innovation and collaboration

The future of Australian education must move beyond post-COVID recovery to reinvigoration. It must take the best of what was learned during the COVID-19 crisis and build on it to tackle systemic challenges that pre-dated the pandemic. It means reconceptualising Australian schools to be stronger, smarter, and more relevant and resilient than they have ever been.

Australian education faces many enduring 'wicked problems'[1] (Alford & Head, 2017; Bore & Wright, 2009; Jordan, Kleinsasser & Roe, 2014), including closing equity gaps in student achievement and ensuring that all schools deliver future-ready learning (Australian Council for Educational Research, 2021). The emerging practices and mindsets that have helped schools tackle complexity in the pandemic can also be applied to longer-term, system-wide challenges.

This paper explores three of these practices: **adaptive leadership**, **responsive teaching** and **generative assessment**. None of these practices are new, but their importance has perhaps been undervalued in the past, when the need for them was less immediately apparent. Now that the pandemic has brought their value into sharper focus, it is time to prioritise them as the education system rebuilds. This paper shows how each practice can be cultivated.

Embedding these practices would amount to a paradigm shift in Australian school education, accelerating a shift towards a future-ready system that has been brewing over the last decade. Lasting paradigm shifts can only be achieved with collaboration from the many stakeholders in the education system. It requires both 'top-down' guidance from policy makers, and a 'bottom-up' push from teachers and school leaders to challenge the *status quo* and show how education can be delivered in more innovative, equitable and collaborative ways. Critically, it also requires extending power to students as agents in their learning, to embrace change in what and how they learn.

Many of the tools for building the future of Australian education already exist. They are evident in innovative approaches emerging in Australian schools, especially those that focus on Science, Technology, Engineering, the Arts and Mathematics (STEAM). Just as these disciplines are at the vanguard of innovation in Australia's economy, an interdisciplinary 'STEAM mindset' – focus on creative problem solving and collaboration – can drive innovation in teaching and learning. This report shows how the three key practices are closely aligned with high-quality STEAM programs.

Glimpses of the practices described in this report can be found throughout Australian education, and have already been amplified by the need for new approaches to learning and inclusion throughout the pandemic. This report aims to highlight the 'green shoots' that are emerging in policy and practice towards a future-ready system, so that they can be nurtured and given the space to grow. In doing so, it hopes to shift attention to what will matter most for Australia's future and to ensure that the education agenda is not dominated by distractions (Hattie, 2015). It aims to recognise the collective expertise of teachers and honour their voice to create space for them to use their skill and judgement, where policy-makers enable the conditions to support them.

It is students who hold the future of Australian education in their hands. More and more, young people are not willing to wait for adults to adopt the practices and mindsets that matter for the future but are showing readiness to adopt and model these behaviours themselves. Young people have a clear stake in building an education system that will prepare them for their own futures, and that they will be proud to pass on to the next generation. This report therefore includes recommendations for students too, to better equip them for this task.

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[1] A wicked problem is a unique, complex and complicated problem that is difficult or impossible to solve because of incomplete, opposing, and shifting requirements that are often difficult to recognise.

Building equity

In the Australian education system of the future, all learners must be supported to succeed. Our future prosperity depends on closing social and economic gaps, and increasing opportunities for all Australians to live meaningful, productive lives. This cannot be achieved with one of the most inequitable school systems in the developed world (Bonnor et al., 2021). Achievement gaps that arise at school entrench social and economic inequalities into adulthood (Lamb et al. 2020).

The three practices in this paper contribute to building equity in the following ways:

- **Adaptive leadership** embraces diversity by recognising the value of multiple perspectives, creating space for minority voices, and exploring many possible paths to reach a goal.

- **Responsive teaching** builds equity by sharing power between teachers and students and ensuring that each students gets what they need to succeed in their learning.

- **Generative assessment** builds equity by capturing the strengths of all students in meaningful ways, and helping students to monitor and take ownership of their own learning.

Building innovation

The Australian education system of the future needs the capacity to continue innovating, to prepare students to meet new challenges in a world where change is certain. In this context, 'innovation' does not only mean adopting practices that appear new and future-focused now, but equipping schools to continue evolving as the next new wave of practices emerge to respond to new imperatives. Schools must be future-focused and ready to adapt.

The three practices in this paper contribute to building innovation in the following ways:

- **Adaptive leadership** is a force for innovation, exploring new solutions to 'wicked' problems, and using insights to identify how capacity can be used in new ways.

- **Responsive teaching** builds innovation by encouraging teachers to experiment and reflect on the pedagogical strategies that achieve results for each of their students.

- **Generative assessment** enables schools to monitor the effects of innovations in teaching and learning and to measure the capacity for innovation that they are developing in their students, including their agency and broader capabilities.

Building collaboration

The Australian education system of the future will make better use of collaborative effort, and harness contributions from stakeholders inside and outside of schools. When boundaries are permeable between schools, and between schools and communities then ideas can flow and resources can be shared for the benefit of the entire system. The collaborative responses of Australian communities to the pandemic demonstrate the power of working together.

The three practices in this paper contribute to building collaboration in the following ways:

- **Adaptive leadership** harnesses the power of networks and collaboration, recognising that leaders cannot navigate complex challenges alone (Heifetz, 1994).

- **Responsive teaching** builds collaboration by framing teaching and learning as a shared responsibility, where teachers and students work with each other and with their peers.

- **Generative assessment** builds collaboration by creating a shared language for understanding and describing success, and by involving multiple stakeholders in the assessment process.

Practice 1: Adaptive leadership

Adaptive leaders navigate change with purpose and agility. They skilfully balance competing agendas, and work collaboratively to engage constructively with complexity. They imagine and assess a range of options, and 'read' the context to make good decisions (Figure 3).

Figure 3: Two key traits of highly adaptive people

The ability to creatively generate many possible solutions to a given problem   **The ability to evaluate the context to select the most appropriate solutions**

Source: Fullan and Loubser, 1972 (adapted)

Adaptive leaders not only possess these qualities themselves but apply them to drive change in complex situations or contexts (Heifetz, 1994). Unlike technical leaders, who excel in their area of expertise, adaptive leaders draw on and connect diverse knowledge, skills and ideas.

Adaptive leaders are resilient and can thrive – not just survive – in periods of change:

> [Adaptive capacity] is, in essence, applied creativity – an almost magical ability to transcend adversity, with all its attendant stresses, and to emerge stronger than before (Bennis & Thomas, 2002, p. 45).

Adaptive capacity helps leaders to regulate stress and maintain optimism while working through challenges without easy answers. It is an antidote to both overwhelm (attempting too much) and passivity (looking to others to prescribe solutions) (KPMG Australia, 2020).

Adaptive leadership also involves engaging constructively with competing priorities or ideas. Polarities – or equally desirable opposites – are a key idea in adaptive leadership theory:

> A polarity is the possession or manifestation of two opposing attributes, tendencies or principles that are interdependent. They identify a relationship that is ongoing and raise issues that do not go away (Johnson, cited in Ulstad, 2015, p. 62).

Adaptive leaders manage polarities by embracing tension between competing ideas, seeing their pros and cons, and working with others to determine the best way to navigate them. This means moving beyond false dichotomies to creating balanced solutions. It includes:

- mapping 'poles', or the ideas at each end of a polarity affecting their context
- inviting their team to express both possibilities and fears in relation to each pole
- deciding which direction to move, to maximise gains and mitigate losses
- identifying any possible warning signs that you are tipping too far (Holland, 2018).

Adaptive leadership is not limited to those in formal leadership roles to exercise. Teachers, students and families can all show adaptive capacity in the way that they engage with others and respond to change. While individuals without adaptive capacity can feel 'adrift' in a world in which they cannot find a foothold (Fullan & Loubser, 1972, p. 272), adaptive individuals work constructively with change, rather than feeling like its victims (Didham & Ofei-Manu, 2020).

Where are we now?

The COVID-19 crisis has increased interest in adaptive leadership in Australian education. In 2020, the Australian Institute for Teaching and School Leadership (AITSL) emphasised the need for adaptive leadership in its guidance for school leaders navigating the pandemic (AITSL, 2020). Yet its importance was already becoming apparent before the pandemic struck:

- In 2019, Australia committed to developing young people's adaptive capacity for the first time. The *Alice Springs (Mparntwe) Education Declaration* explicitly refers to developing young Australians who 'are able to recognise, adapt to, and manage change' (Education Council, 2019, p. 6). Although related concepts are also present in earlier education Declarations, such as resilience and optimism, none has mentioned adaptive capacity.

- The *Australian Professional Standard for Principals* also suggests the need for adaptive leadership in driving innovation and improvement in schools. Proficient leaders 'maintain their values whilst adapting flexibly and strategically to changes in the environment, in order to secure the ongoing improvement of the school' (AITSL, 2014, p. 16).

- The *Australian Professional Standards for Teachers* encourage teachers to demonstrate adaptive behaviours, by requiring them to evaluate and continuously improve their practice and use a repertoire of teaching strategies to meet the needs of their students. Teachers are also expected to show adaptive thinking when they draw on research and actively participate in professional learning, including discussions with colleagues to improve student outcomes (AITSL, 2011).

- In 2019, the *Independent Review of the Australian Public Service* called for increased adaptive capacity in Australian bureaucracies to tackle complex challenges. This includes repositioning government as a 'partner rather than a commander' and making better use of evidence and data (Department of the Prime Minister and Cabinet, 2019, p. 116).

Growth in adaptive capacity for students, school leaders, teachers and policy makers can help to build the adaptive capacity of the education system as a whole. A 2017 Grattan Institute report set out a vision for an 'adaptive education system' that would enable diversity and innovation to flourish, and ensure that the best ideas and practices were shared (Goss, 2017). The report also called for governments to not only 'build adaptive capacity at multiple levels' but to deliberately design an adaptive education system for Australia (Goss, 2017, p. 27).

Where to next?

Australia must continue to develop adaptive leadership at all levels of education, to ensure that our schools and society are well-prepared to cope with change. Gardner (1963) saw a comprehensive education as essential for growing adaptive leaders of the future:

> A broad and firm base for a lifetime of learning and growth will equip man [sic] to cope with unforeseen challenges and to survive as a versatile individual in an unpredictable world. Individuals so educated will keep the society itself flexible, adaptive and innovative (Gardner, 1963, p. 26)

Fullan and Loubser (1972) agreed that education could increase adaptive capacity, as more knowledge would result in a wider repertoire of solutions and deeper understanding of context. However, they also cautioned that education could *constrain* the development of adaptive capacity, by encouraging learners to avoid uncertainty and seek the safety of what is known. To grow adaptive leaders, teachers must empower students to explore ambiguity and risk.

Adaptive leadership can also be applied to the unhelpful dichotomies that bedevil education policy and practice. Adaptive leaders can reframe dichotomies as *polarities,* recognising the need to hold competing ideas in tension while charting a course between them. Holland (2018) sees polarities as a valuable tool for cutting through any 'exhausting either/or debate' in education, whether at classroom, school or whole-of-system level.

Polarity thinking is beginning to be applied to some of the 'wicked' problems in education where multiple perspectives co-exist, such as tackling racism (Blackwell & Johnson, 2021). Recent capstone dissertations from Harvard's Doctor of Educational Leadership program show how school leaders have applied adaptive leadership to complex challenges. These include delivering a dual-language program (Huffman, 2021); operationalising racial equity (Dolly, 2021); and prioritising family engagement in a large urban school district (Rowland, 2016).

Gradually, the search for 'silver bullets' in education is being replaced by thoughtful attention to complexity, and how adaptive systems can deliver better results. Figure 2 shows examples of complex polarities in Australian education that adaptive leadership may help to navigate.

Figure 2: Examples of 'polarities' in education that adaptive leadership may help to navigate

Equity ←——————————→	**Excellence**
General capabilities ←——————————→	**Core curriculum**
Inquiry learning ←——————————→	**Explicit instruction**
Transformational leadership ←——————————→	**Instructional leadership**
Student agency ←——————————→	**Orderly classrooms**
Teacher/student judgement ←——————————→	**Standardised assessment**
'What matters' ←——————————→	**'What works'**

Adaptive capacity can help teachers, school leaders and policy-makers to engage with these competing yet interrelated ideas more constructively. This will create a more inclusive system, where multiple voices are heard; as well as a more effective system, where teachers and leaders use their professional judgement to find the approaches suitable for their context. It will also equip Australian education to continue innovating, by shifting the mindset from finding 'what works' to an ongoing process of knowledge-sharing, experimentation and discovery.

This does not equate to an unstructured system in a perpetual state of flux. Instead, as the Grattan Institute report described, an adaptive system can contain standardised approaches, where there is a strong knowledge base about effective practice. For example, there is strong evidence to support particular approaches to teaching reading, so uncertainty and diversity of practice may be minimal; whereas there may be greater uncertainty and diversity of practice in building resilience, because the evidence base is still emerging (Goss, 2017). Adaptive leaders nurture both established and emerging areas of practice, not limiting themselves to what is well-known but rather focusing on what works best. This report itself attempts to model this balanced, exploratory approach.

Adaptive capacity in STEAM

STEAM (Science, Technology, Engineering, Arts and Mathematics) learning is a promising example of Australia's capacity to adapt to a complex, uncertain future. STEAM enables 'new ways of doing and knowing' and blurs the boundaries of traditional subject-based teaching and learning (Mejias et al., 2021, p. 210). STEAM also disrupts barriers between arts and sciences, recognising that the arts can strengthen scientific learning (Braund & Reiss, 2019).

STEAM knowledge and skills are at the frontline of global responses to climate change; the evolution of digital technology and artificial intelligence; and the health, social and economic consequences of COVID-19. Confronting these global STEAM challenges will require adaptive capacity, to explore how complex systems work and mobilise networks to achieve change. Key STEAM skills and dispositions – including creativity, problem-solving and collaboration – are the building-blocks from which this adaptive capacity can be created (KPMG Australia, 2020).

The interdisciplinary nature of STEAM learning also contributes to the development of adaptive capacity, as students and their teachers learn to apply ideas across disciplines and contexts.

> By engaging in art education, students learn how to become better listeners and communicators while also developing an appreciation for adaptive thinking (Educating Engineers, 2017).

STEAM learning occurs not only through *what* is taught, but also *how.* Adaptive pedagogies take the concept of adaptive capacity and apply it to how learning is designed and experienced. When teachers embrace uncertainty and learn alongside their students, they model the adaptive capacity that students will need to embark on their own discoveries and innovations.

STEAM learning for an adaptive world

Adaptive capacity is crucial for education for sustainable development (Didham & Ofei-Manu, 2020). Increasing the adaptive capacity of individuals increases the resilience of our planet:

> Sustainability science increasingly recognizes the importance of adaptive capacity for maintaining the resilience of social-ecological systems (Fazey et al., 2007, p. 375).

By building adaptive capacity, schools can increase student readiness to change their behaviours and outlooks for a more sustainable world, and become 'empathetic, questioning individuals with characteristics similar to those of effective sustainability scholars' (Fazey et al., 2007, p. 378). This also involves developing appreciation of what arts and culture can contribute to socio-ecological resilience, notably First Nations perspectives (Tyszczuk & Smith, 2018).
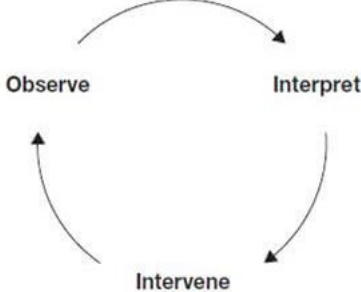
Adaptive capacity also connects STEAM learning to social and emotional development. The resilience of communities depends not only on the abilities of individuals to appraise situations and develop creative solutions, but to work with others to create change. Social connections are also crucial in a crisis (Adger, 2003), as was clear in Australia's COVID-19 response. STEAM learning that incorporates social development can build adaptive, resilient communities.

Today's students are demanding an education that will prepare them to tackle environmental challenges (School Strike 4 Climate Australia, 2022). After Australia's catastrophic bushfires of 2019–20, followed by the COVID-19 pandemic and severe floods, it is time for the education system to show students that their concerns have been heard. Building adaptive capacity through STEAM is one way to help students feel ready.

Adaptive leadership: What students can do

Self	**Explore different ways of thinking**, rather than seeking certainty from a single source. Students can get better at this when they…
	• Access and appraise diverse resources and ideas, rather than seeking certainty from a single source (such as relying on a textbook).
	• Make use of their own 'virtual school bags' (Thomson, 2001, p. 2), which contain the unique knowledge and skills that they bring to school.
	• Get outside their comfort zone, trying new things or things they are not usually good at, or experimenting with different roles or identities.
	• Cultivate interpersonal and intrapersonal skills. Knowing oneself, and how to connect with others, is the basis for effective collaboration.
School	**Learn from others, and help them learn**. The focus on individual achievement in Australian schools creates a competitive environment that limits students' propensity to learn from one another (Kohn, 1986). Yet knowledge is increasingly recognised as shared and socially produced:
	Today knowledge is free. It's like air, it's like water. It's become a commodity. There's no competitive advantage today in knowing more than the person next to you. The world doesn't care what you know. What the world cares about is what you can do with what you know (Wagner & Compton, 2015, supplementary material)
	By building helpfulness and 'acts of service' into the curriculum, students can learn to contribute to each other's lives, and to their communities (Dodge, 2019). Being part of a collaborative school community helps students become leaders for collective change.
Community	**Engage with 'problems that matter'.** Students can build their adaptive capacity by engaging with complex problems, either in school or in the wider community. Inquiry projects that address real-life issues build the ability of students to engage with challenges without easy solutions, and apply their collaboration, problem-solving and creativity skills.
	Within inquiry projects, structured learning also plays an important role in equipping students with tools and processes and expanding their repertoire of solutions. By learning the technical skills of scientists or researchers, students equip themselves to solve adaptive challenges (Berger, 2003).
	Connections to community also help students to see adaptive leadership in action, as they meet people and groups who are tackling complex challenges. Adaptive capacity can be found in Aboriginal communities (8ways, n.d.), so recognising it can help students to appreciate the strengths of these communities.

Adaptive leadership: What teachers and school leaders can do

Self	**Model reflective practice.** Personal reflexivity and insight are critical to the observe-interpret-intervene cycle of adaptive leadership (see Figure 4).

Figure 4: The adaptive leadership cycle

Source: Heifetz et al., 2009 (adapted)

As adaptive work seldom moves forward in predictable ways, this cycle also involves errors, setbacks, conflicts or roadblocks. Leaders can model open reflection on their own 'imperfect' practice (Munby 2019, p. 1), and interpret conflicts or barriers as opportunities to learn. Story telling is a powerful tool in school improvement (Connelly & Clandinin, 1990) and leaders can model positive narratives for their staff about navigating and experiencing change.

School	**Actively develop adaptive capacity within the school.** The behaviours below draw on Heifetz and Laurie's (1997) work (cited in AITSL's 2020 guide for leaders), and can also be applied by teachers in their classrooms:

- *Regulate distress.* Adaptive leaders keep the pressure on (to prevent complacency) without overwhelming their teams. They provide space for different views and assumptions to be expressed, while reiterating the school's values and goals. Adaptive leaders foster innovation, while providing enough clarity and stability to ensure staff and students can focus their energy where it counts. They create a strong organisational identity – knowing what is unique about the school and what matters for the community – to provide an anchor for change (Inflexion, 2020).

- *Maintain disciplined attention.* Keep staff focused on the problems that they are trying to solve, without sliding into blame-shifting or defensiveness. Encourage them to engage in hard conversations about issues that matter, and to collaborate with others with different views.

- *Share the work with staff.* Leaders grow adaptive teams when they expect staff to find solutions - backing them if they do not always work out, rather than offering to solve problems for them (Lumby, 2019).

- *Provide space for everyone's voices.* Diverse experiences and perspectives, and room for 'creative deviance' – whether offered by students, families or colleagues– can highlight where new thinking is most needed. Treat conflict and 'deviant' behaviour with curiosity and insight. Adaptive leaders may deliberately seed disruption by sharing

provocative resources, to harness the 'creative value of tension' and enable differences to be worked through (Uhl-Bien et al., 2007, p. 311).

By demonstrating adaptive leadership behaviours, leaders send a message that adaptive capacity is a desirable skill to be developed in their teams. School leaders are well-placed to apply the science of learning to their work in building adaptive capacity, such as managing cognitive load (Ellis, 2012).

This means that complex challenges become opportunities to build adaptive practices, rather than annoyances that 'get in the way' of good teaching. By fostering adaptive capacity, teachers and leaders can equip their schools to deal with the 'wicked' problems that technical skills alone cannot solve.

Community	**Treat external partnerships as adaptive resources.** Adaptive leaders make strategic use of networks and collaboration to build adaptive capacity within their school. Leaders can get better at this when they…

- *Invest time deepening a small number of key partnerships.* The characteristics of deep partnerships include working together to co-develop practice (not just 'share' practice); building trust and shared purpose; and making the partnership business-as-usual to build collective capacity (not just capacity in each school) (Hargreaves, 2012).

- *Develop a strong identity for the school* in consultation with its community, so a sense of shared purpose can emerge (Inflexion, 2020). A clear school identity attracts compatible partners and clarifies what the school itself can bring to the collaborative endeavour. It also helps protect the school's values, so leaders can seek dissenting partners too.

- *Use external insights to drive internal adaptive work.* External partnerships, research collaborations or professional learning activities have greatest impact when they are connected to adaptive work occurring within the school. Collegial reflections on external provocations can deepen learning and raise contextual considerations.

- *Utilise community facilities and knowledge* when resourcing their programs. The *Australian Professional Standard for Principals* requires school leaders to 'share…use of resources with other schools and education networks' (AITSL, 2014, p. 17). Sharing use of physical resources and facilities can open the way for deeper adaptive collaborations for jointly developing practice. The Standard also expects principals to 'recognise and use the rich and diverse linguistic and cultural resources in the school community' (AITSL, 2014, p. 18).

- *Share information to drive adaptive work.* Information is an invaluable resource for adaptive work and can help to focus partnerships on shared priorities. Adaptive leaders understand the information ecosystem of their school – including both school and community data – and can use patterns and insights from the data to catalyse collaboration.

Action research can be a powerful tool for building adaptive capacity and evaluating change, especially when it is supported by external partners who can help schools to collate and interpret findings (Grundy, 1995).

Adaptive leadership: What policy-makers can do

Self	**Balance standardisation and diversity.** Adaptive policy leaders balance the need for coherence and consistency with the diverse realities of practice. While all Australian schools may share the general goals of the *Alice Springs (Mparntwe) Declaration,* success can take many different forms, for both students and schools. Students themselves are adaptive in their aspirations and define success relative to their values and opportunities (Molla, 2021). Policy-makers can cultivate adaptive thinking when they… *Get comfortable working with complex or imprecise ideas* that sit outside the dominant education policy paradigm of 'prediction and control' (Radford, 2008, p. 505). Adaptive leaders create change by noticing patterns in how systems work, and deliberately disrupting their equilibrium in purposeful ways (White & Levin 2016). They listen to the 'noise' in the system, to better identify what matters (the 'signal'). • *Use evaluation models that can accommodate complexity.* Policy evaluation methods that can handle complexity are increasingly preferred over randomised controlled trials and allow for more adaptation in implementation (Barbrook-Johnson et al., 2020). Eoyang and Oakden (2016, p. 5) describe how adaptive evaluations value curiosity, shared exploration, self-reflection and questioning. Adaptive evaluations do not expect a linear trajectory between policy, implementation and outcomes. Complex adaptive systems behave in non-linear ways, with cycles of growth, collapse and renewal, punctuated by catalytic events. Education research has embraced non-linear 'habits of thought' (Kuhn 2008, 186), and policy-makers can do the same. • *Use standardised approaches as enablers, not constraints.* The tension between standardisation and diverse practice is a key polarity in education policy. An adaptive education system uses both making adjustments whenever the balance tips too far in either direction. As the Grattan Institute suggests, standardising some aspects of teaching practice can free up teachers' time to innovate in others (Goss, 2017).
Schools	**Invest in innovation and 'dynamic efficiency'.** Adaptive policy-makers are future-focused in thinking about investment. Adaptive work can require significant resources – time, energy and expenditure – but can lead to more sustainable ways of working in the longer term (Uhl-Bien & Arena, 2018). In economics, *dynamic efficiency* refers to optimal investment in innovation to improve results over time. Investing now in adaptive capacity for Australian education can increase the system's dynamic efficiency in the longer term. Policy-makers can build adaptive capacity in schools when they… • *Create safe spaces for innovation.* Adaptive leaders see trying new approaches, making mistakes and learning from them as part of the drive towards excellence. Policy-makers can help create this culture in schools, including by investing in school-based inquiry rather than just specifying

content (Darling-Hammond, 1994); and creating feedback loops so that learning can flow through the system more efficiently (Goss, 2017).

Permission to experiment is as important as resources, as education innovation often involves breaking established rules (Petrides, 2010). A range of models exist for policy-makers to create safe spaces for innovation, including regulatory 'sandboxes', innovation hubs, and partnerships with innovators to pilot new ideas (Lesher, 2020).

- ***Scope and sequence reform to regulate pressure on schools.*** By matching policy to what the system can absorb, policy-makers can regulate stress, show respect for the adaptive work involved in change, and increase the likelihood of policy success. Gradual improvement, where schools get better at what they are doing, often matters more in an adaptive system than major reform (Goss, 2017). Adaptive leaders allow time for issues to 'ripen' and support the system to prepare for change.

  Develop school networks, including across sectors. Strong networks already exist within school sectors in Australia, as policy-makers have recognised the value of school collaboration. Networks of government and non-government schools are less common but can be beneficial for engaging with adaptive challenges that affect whole communities (DET, n.d.). When governments act as system architects, rather than just providers of government schooling, they move from the 'dance floor' to the 'balcony' view that enables adaptive thinking (Heifetz, 1994, p. 253).

- ***Enhance diversity within schools***, as a powerful force for adaptive capacity. When schools enrol students from diverse backgrounds, they can improve achievement (especially for low-income students); increase creativity; and prepare students for ethical citizenship in a culturally and socio-economically diverse society (American University, 2019).

Communities	**Invest in 'boundary spanners'.** Boundary spanners are individuals or organisations that create connections within an adaptive system. A growing evidence base exists about the value of 'boundary work' in school improvement (Wargo et al., 2021; Starr, 2015) and the role of intermediary organisations in implementing education policy (Honig, 2004).
	Adaptive policy leaders are also boundary spanners, and public leadership role design must build in the significant time required to advance 'the collaboration agenda' (Williams, 2012, p. 96). This includes breaking down siloes within school education (see above); as well as connecting school education to early learning, post-secondary education and training, and the broader national agenda for economic, social and community development.

Methods for building adaptive capacity

There is no single tool for fostering adaptive capacity in a school or system. Experts encourage leaders to create 'adaptive space' throughout their organisation, where new ideas can emerge, and experimentation and learning can occur (Arena & Sokol, 2019, p. 72).

School leaders might use the following methods to create adaptive space in their school:

- **Leadership conversations** are crucial tools for building adaptive capacity. Leaders that ask questions using a coaching model, and who encourage staff to 'own the work' rather than providing solutions, are more likely to have adaptive teams (Hagel, 2021, January).

- **Reflective practice** benefits leaders, teachers and students. Adaptive individuals regularly step back and 'reflect on action' to gain perspective (Schön, 1983); moving from the 'dance floor' to the 'balcony', as noted above (Heifetz, 1994, p. 253). Journaling and reflective conversations can enhance 'balcony' insights. Leaders who limit scope for critical reflection 'disable some of our most important personal and collective resources for accomplishing adaptive work' (Wilson & Ortega 2013, p. 5).

- **Frameworks and policies** can enable or constrain adaptive capacity. Identify which policies can improve standardisation to free up time for innovation, and which need to allow for greater flexibility. The process of developing or reviewing policies can be useful adaptive work in its own right, so value the journey as much as the destination.

- **The timetable** is a notorious constraint on school innovation. Creating space for sustained thinking and connecting can require radical reorganisation of time. If a total overhaul is too hard, choose a specific day or week in which time is organised differently (Wragg, 1999).

- **Role design** is a powerful signal of what leaders and systems value. Ensure that job descriptions and performance conversations celebrate adaptive capacity for all staff and encourage staff to see themselves as continuous learners.

- **Professional learning** builds adaptive capacity if it encourages staff to think and take risks, or constrain adaptive capacity if it just promotes off-the-shelf models. Ensure professional learning includes space to critique, adapt and refine new ideas (Timperley, et al., 2008).

- **The physical environment** of the school is a silent partner in creating adaptive space, including connections to the local community. Permeable boundaries between classrooms, and between schools and communities, can stimulate adaptive thinking. (Mondaini & Rosciani, 2021).

- **Partnerships outside the school** are natural sources of new ideas, as well as human, physical and financial resources. Partnerships with researchers can create a 'third space' in which teachers can use evidence to reflect on their practice (Arthur & Skattebol, 2014).

Creating space for adaptive capacity does not have involve new investment and can begin with examining how existing structures and processes can be used as adaptive tools. By building adaptive space into the day-to-day operations of the school, leaders can grow and celebrate the adaptive capacity of their teams without creating an additional burden. This built-in adaptive capacity can then be activated when more substantial adaptive challenges arise.

Practice 2: Responsive teaching

Responsive teaching places students at the centre of education. Responsive teachers not only know their students well, but also respect them as agents in their learning. They have in-depth pedagogical content knowledge and skill, but remain alert, adaptive and intentional, attending both to the explicit curriculum as well as the hidden curriculum comprising the 'unspoken or implicit values, behaviors, and norms that exist' in schools (Alsubaie, 2015).

Responsive teaching transcends the false dichotomy between teacher-led instructional approaches such as explicit teaching and student-led approaches like inquiry learning (Tobias & Duffy, 2009). By shifting the focus from pedagogies to students, it empowers teachers to be reflexive in their practice, and partner with students to make decisions about the methods and modes of instruction to best support learning (Bernard et al., 2019).

Where are we now?

Around the world, the COVID-19 pandemic demanded a renewed focus on individualised learning (Arora, 2022). Leading educational journal Phi Delta Kappan describes how COVID-19 caused teachers and school leaders to refocus on students as the centre of their practice:

> [In the wake of the pandemic] the priority is to reach out to students, check in on them and their families, and support them as whole children, not as test takers (Berry, 2020).

In Australia, teachers and leaders have worked with families to keep education going in extraordinary circumstances. They have also offered unparalleled levels of support for student wellbeing, as the pandemic brings new challenges to students' lives (Biddle, et al., 2021). Moving teaching online challenged the 'unwritten rules' of education, and prompted consideration by many teachers about purpose and connection (Zhao & Watterston, 2021, p.8).

Efforts to place students at the centre of Australian education are supported by policy:

- The *Alice Springs (Mparntwe) Education Declaration* emphasises the centrality of students:

  > We will…place young Australians at the centre of our education system as they navigate their learning and set out on their own journey (Education Council, 2019, p. 3)

  The Declaration reinforces the student-centred framing by recognising that students are individuals, rather than a homogenous group who all have the same needs.

- The *Australian Professional Standards for Teachers* require teachers to 'know students and how they learn', as well as to 'know the content and how to teach it' (AITSL, 2011, p.10). The standards aim to recognise the professional autonomy and judgment of teachers, so are not prescriptive of particular pedagogical approaches. As the standards increase in proficiency, practice descriptors shift from being curriculum-based and meeting the needs of most students to being targeted and responsive to the individual needs and context for current students. This reflects the in-depth knowledge that highly skilled teachers demonstrate when adapting 'what works' to 'what works here, with these students at this time'.

At the same time, curriculum and assessment policies place constraints on the capacity of teachers to respond to the needs of their students, especially in the senior secondary years:

- For students in Years 11 and 12, the *Australian Curriculum: Senior secondary* outlines content for fifteen subject areas, with jurisdictional curriculum and assessment authorities determining how the curriculum is used in their schools (ACARA, 2022). While this suggests potential for placing students at the centre of learning, the high stakes attached to senior secondary

examinations, which are used, for university entry, means that schools are incentivised to prioritise mastery of content over responsiveness to their students.

- The *Australian Curriculum* also outlines what Foundation to Year 10 students across the country should be learning. The national curriculum is endorsed by all jurisdictions, with some developing interpretations that combine national and localised content. This has resulted in a mixed level of scope for teachers in different jurisdictions to choose their own pedagogical approaches to respond to the needs of their students (Jackson, 2019).

- The *National Assessment Program – Literacy and Numeracy (NAPLAN)* annually tests the literacy and numeracy skills of students in years 3, 5, 7 and 9. Although policy advice suggests that preparation for NAPLAN should complement normal classroom teaching and learning, many teachers feel pressure for their students to perform well, which can result in narrowing curriculum and pedagogical approaches, often encapsulated in the notion of 'teaching to the test' (Polsel, Rice & Dulfer, 2014).

This combination of student-centred goals, limited teacher autonomy and an emphasis on curriculum-centred assessment amounts to what Dargusch and Charteris (2018) refer to as a crisis of control. While Australian teachers broadly have the freedom to determine how and what they will teach, they are also held accountable for student performance in large-scale assessments, such as NAPLAN or senior secondary exams. When the emphasis falls too heavily on external accountabilities, the responsiveness of teachers to students is at risk.

Where to next?

The Australian education system must sustain and nurture its focus on students, as the country moves into the next phase of the pandemic and beyond. Teachers and school leaders must be equipped with a repertoire of tools and strategies to meet the needs of their students – including academic learning, wellbeing and broader development – as well as permission to use them.

Most teachers already use a dynamic blend of approaches in their classrooms, informed by both evidence and experience (Goss & Giles, 2021). Yet it can still be a struggle to find the right balance between teacher-led pedagogies, and pedagogies that give students agency over their learning. Responsive pedagogy involves a mixture of both, blending explicit teaching of abstract concepts with hands-on opportunities for students to discover and build their agency as learners.

In essence, responsive teaching involves applying adaptive leadership (see above) to pedagogical practice. It involves navigating polarities, collecting and interpreting evidence, and working collaboratively with others to devise solutions to complex challenges. Pedagogical decision-making is an adaptive practice by nature - no amount of technical expertise can fully prepare teachers for the complexity of student needs they encounter in the classroom.

This paper focuses on a key polarity in Australian teaching: between teacher-led and student-led learning. Other polarities are also wrapped into this debate, such as the balance between academic learning and wellbeing; or between inquiry-based learning and explicit teaching. Responsive teachers navigate these polarities in a variety of context-specific ways.

This report draws on research about effective teaching from a wide range of perspectives and synthesises it into a balanced view of pedagogy with the student at the centre. Its goal is to reaffirm the value of teacher professional judgement in choosing which teaching strategies will work for their students, while also elevating the importance of student voice and agency as partners in the learning process. Pedagogies that empower both teachers and students create adaptive, dynamic, resilient schools where effective learning is a shared responsibility.

Responsive teaching in STEAM

STEAM learning is an ideal space for placing students at the centre of the learning process. Contemporary STEAM learning is built around tapping into the interests of students for real world problems and issues (things they care about and relate to), using technologies and working with peers to exchange solutions to difficult problems (Quigley, Herro, King, & Plank, 2020). STEAM therefore provides a 'framework for growth, passion, and action' (Smith, 2018, p.1) involving a shift towards fostering student agency, engagement and a growth mindset (Dweck, 2009).

Effective STEAM learning fosters students' development of disciplinary language, as well as providing the explicit instruction and scaffolds that equip students for more self-directed learning (Israel, Maynard, & Williamson, 2013). It therefore bridges pedagogical practices:

> As a transdisciplinary approach…STEAM requires teachers to have a deep knowledge of each discipline and how best to teach it. It also requires teachers to adopt strategies that foster interdisciplinary thinking, such as project-based learning; seen as an 'ideal' way to connect school science disciplines with the real world (Escobar & Qazi 2020, p.36).

Methods for incorporating more responsive teaching into STEAM programs include:

- **Problem based learning** where students respond to a problem by doing complex, collaborative real-world tasks and producing a product or performance in response (Quigley, Harrington & Herro, 2017). Highly effective problem-based learning includes explicit teaching of key content to support student-led investigation (for example, Berger, 2003). Skills such as collaboration can also be taught through targeted activities that include reflection and discussion to surface relevant behaviours (Quigley & Herro, 2016).

- **Makerspaces** generate experiential 'learning through making' (Lock, Gill, Kennedy, Piper, & Powell, 2020, p. 6). They develop real-world, authentic creativity through the design process, integration of STEM and use of technology (Stevenson, Bower, Falloon, Forbes, & Hatzigianni, 2019). Technology can include easily accessible materials such as paint, fabric and building blocks, through to 3D printers or virtual reality headsets.

- **School-community STEAM partnerships** support authentic learning, and can benefit all involved (Watters & Diezmann, 2013). Developing strong relationships with local community, philanthropy, business and industry, and higher education can strengthen the engagement of students with STEAM by providing opportunities to create real solutions to real problems, that have the potential to be implemented, as well as developing their social capital (Lynch et al., 2018; Watters & Diezmann, 2013). Student learning data in conjunction with feedback from students and the broader school community can help teachers to plan for STEAM learning to meet the specific needs of their students (Lynch et al., 2018).

- **Exploring diverse bodies of knowledge** can make STEAM learning more inclusive, by surfacing assumptions about what counts as knowledge, and helping students to understand their own ways of thinking (Braaten & Sheth, 2017). This kind of STEAM learning can provide space for multiple knowledges, including those of First Nations peoples, to be recognised and valued (Bang & Medin, 2010). Helping schools to establish connections to local Elders, community and relevant resources can help teachers to build cultural competency and include multiple perspectives to enhance their students' learning.

Responsive teaching: What students can do

Self	**Take ownership of the learning process.** Students are important partners in responsive teaching, as they work with teachers to drive their own learning. Students can be active participants in responsive teaching when they… • *Set relevant, challenging learning goals* and work with their teachers to decide how to get there (Black & Wiliam, 1998; Panadero et al., 2018). • *Cultivate a growth mindset*, recognising that skills and knowledge are not fixed and can be learnt (with effort and practice) (Dweck, 2009). • *Treat mistakes as learning opportunities* (their own and others') and learn specific ways to describe the gaps in their understanding. • *'Learn how to learn'* and to develop skills and strategies for getting the best out of whatever teaching occurs in the classroom.
School	**Positively contribute to the learning climate in class.** When students see themselves as contributors to everyone's learning, they are more likely to demonstrate positive behaviour in the classroom. Rather than focusing on managing low-level disruptive behaviours, teachers can reinforce positive behaviours that contribute to a climate of shared responsibility for learning (Goss & Sonnemann, 2017). Focusing on supportive behaviours can also enable teachers and students to help each other to create more inclusive classrooms. When students support their peers to engage in learning – not just follow teacher directions – their own sense of belonging at school can increase at the same time. Belonging at school promotes wellbeing and academic success, as well as effort and motivation (Centre for Education, Statistics and Evaluation, 2020).
Community	**Connect learning inside and outside of school.** Students learn in many different contexts, not only in the classroom. Students can be active partners in learning by contributing knowledge from outside of school, including from: • *Families*, where most students first develop their cultural and language skills, values, routines, and awareness of their role within a social group. • *Social interactions*, both online and face-to-face, develop interpersonal, intrapersonal, leadership, followership and communication skills. • *Part-time jobs* (for older students) can develop technical skills, as well as work ethics, problem-solving, collaboration and responsibility. • *Extra-curricular activities*, including sports, arts or special interests, involve a wealth of learning that can be applied within the classroom. • *Self-directed leisure activities*, including reading (or web browsing) enable students to explore and discover their talents and interests. Teachers can encourage students to see themselves as learners in these contexts by valuing the community knowledge and skills that students choose to share in the classroom.

Responsive teaching: What teachers and school leaders can do

Self	**Tune in to student voice to inform pedagogical decisions**. Responsive teaching begins by listening to students and being attuned to the many ways in which they express their interests, abilities, preferences and needs. Teachers and leaders become more attuned to students' voices when they…

Tune in to student voice to inform pedagogical decisions. Responsive teaching begins by listening to students and being attuned to the many ways in which they express their interests, abilities, preferences and needs. Teachers and leaders become more attuned to students' voices when they…

- *Prioritise opportunities for students to exercise choice.* These can be large or small, and related to content or process. For example, students may co-design parts of the curriculum (Zhao & Watterston, 2021), select a topic to investigate, a project design or a mode of presentation; or may begin a unit of designated curriculum by researching a relevant example of their own choosing (Quigley & Herro, 2016).

- *See all students as capable of leading their learning.* When teachers hold low expectations for students, they can slow the pace of learning or select lower-order tasks (Katsh-Singer, McNeill & Loper, 2016). Critical reflection on their own expectations can help teachers to see all students as capable of exercising higher-order skills, with appropriate support.

- *Get comfortable being a facilitator of learning.* Letting go of the role of 'expert' can be challenging for many teachers but can create space for students to become partners in their learning. As facilitators of learning, teachers use questioning to tease out problem-solving, analytical and creative thinking in response to a given problem (Hall & Miro, 2018).

School

Use an adaptive, evidence-based toolkit of teaching strategies. The breadth of strategies available to teachers determines their ability to respond to the needs of their students. Even when teachers primarily use tried-and-true approaches, awareness of alternatives helps to stretch their thinking.

Teachers can build a more adaptive toolkit of strategies when they…

- *Move beyond polarity thinking* by drawing on different approaches to support overall outcomes for student learning, such as explicit instruction and project-based learning. Explicit instruction involves clear, structured explanations and demonstrations of new concepts, led by the teacher with gradual release of responsibility to students (Archer & Hughes, 2011). Explicit instruction can form a solid foundation of student knowledge, so that when fluency and automation are achieved, independent learning can occur (Martin & Evans, 2018).

  Project-based learning promotes active, self-directed student learning, with teachers acting as facilitators. Working in small groups, students engage in collaborative planning and investigations, asking questions, collecting evidence and communicating ideas and results (Chen & Yang, 2019). Problem-based learning is associated with improvements to higher order thinking, motivation, problem solving, application of knowledge and self-regulation (Huei-Chen & Blanchard, 2019; Hall & Miro, 2018).

  Using both of these approaches help students to develop their knowledge and higher-order skills in tandem. For teachers, there is no single way to implement complementary pedagogies Working with students to set clear goals and expectations can help them engage in both kinds of learning.

- *Apply interdisciplinary and pedagogical content knowledge.* A broad base of pedagogical content knowledge can equip teachers with a repertoire of strategies to teach different types of content. Interdisciplinary teaching expands this repertoire further to include strategies that bring diverse content areas together. Even in the senior years, when curriculum is most segregated, the creation of 'micro-units' can give students opportunities to learn in interdisciplinary ways (Even & Race, 2021).

- *Gather feedback from colleagues and students.* Abundant evidence exists on the benefits of teachers providing feedback on each other's practice, to develop 'adaptive expertise' (DET, 2018, p. 10). Feedback from students, whether through focus groups or anonymous surveys, is another valuable tool for practice improvement (Davis, 2015). Feedback can generate new ideas and strategies, and give teachers a clearer sense of how well they are implementing pedagogies, and the effects on student learning and engagement. This is particularly important for project-based or inquiry learning, which can lift student test scores if done well, but can be detrimental if implemented poorly (Capraro et al, 2016).

- *Pay attention to cognitive load and sequencing.* Determining a logical sequence for curriculum delivery involves consider the most important content for students to know; building on complexity as students progress (Archer & Hughes, 2011); and reducing the cognitive burden on students' working memory by teaching in small, manageable steps while their knowledge is developing (Martin & Evans, 2018). Leaping too soon into inquiry-based learning may fail if students lack the skills and confidence to succeed, while continuing explicit teaching for too long may disengage students once they are ready to apply their learning and attain mastery.

- *Share leadership of whole-school approaches to learning.* Shared pedagogical decision-making at the whole-school level can support consistency, relevance and contextualisation of learning approaches. Shared decision-making may include student representatives helping to identify what will best engage students (Mitra, 2007); or experienced teachers engaging their colleagues in shared professional learning, critical reflection and problem-solving (Hui-Chen & Blanchard, 2019).

Community	**Plan for learning that is relevant and authentic** connecting school to the outside world and providing opportunities to develop skills and knowledge.

The broader community is an invaluable resource for authentic learning for students of all ages. Community members can support explicit teaching by sharing their expertise; or project-based learning by helping students to explore and discover solutions to challenges faced in the community.

Work-based learning with professionals from the community also helps students combine disciplinary and applied learning (Bopardikar et al, 2020). Applied learning is increasingly recognised as important for all secondary students, not only those pursuing vocational pathways (Firth, 2020). Even primary school students benefit from learning about the world of work, to help them link learning to 'real world' contexts (Kashefpakdel, 2018). |

Responsive teaching: What policy-makers can do

Self	**Practise responsive policy-making.** While education departments have invested heavily in consultations with teachers and even students, these can have little impact if policy-makers do not have the tools and strategies to integrate diverse perspectives into the policy process. A range of contemporary policy approaches can increase responsiveness, including: • *Vertical integration* whereby policy-makers and those tasked with implementation work together on all stages of the policy process, to align policy ambition with reality (Knill, Steinbacher & Steinebach, 2020). • *Behavioural science* where evidence about human motivation and behaviour is used to identify barriers and enablers to changes in practice. • *Human-centred design* to engage communities affected by change in designing and testing solutions (Dalberg Design, 2020). • *Place-based approaches* that focus on change in a specific community, enabling practices to be tailored to context (Gamble et al, 2019). When education policy-makers are responsive in their own practice, they are more likely to develop policies that support teachers to work responsively.
Schools	**Strengthen pedagogical decision-making, not only specific practices**. While policy-makers can support teachers by promoting evidence-based practices, it is even more important to support teachers to make decisions about when to use them. Policy-makers support teachers' decision-making when they… • *Share evidence along with strategies for evidence use* to encourage teachers to engage critically with research, considering its relevance to their context, rather than seeking 'silver bullet' approaches. • *Reduce constraints on teachers from curriculum and assessment*, by ensuring that mandated content and processes do not impact the time available to teachers to choose their own responsive approaches. • *Prioritise relationships at all levels of the system.* Strong, supportive relationships not only contribute to wellbeing, but also facilitate sharing of ideas and constructive critiques of policy and practice. When teachers are given time and incentives to build relationships with their colleagues and their students, this expands the resources available to them for adaptive thinking, and ongoing improvement in all aspects of their practice. The ability to listen to colleagues and students with diverse perspectives and experiences also requires teachers to be skilled in inclusive practice. While teachers may value and affirm inclusion, they may need additional support and professional learning to feel confident translating these values into practice (Carrington et al, 2016). Policy-makers can collate and share examples of inclusive practice to inspire teachers and leaders.

Communities	***Learn from responsive practices in other sectors.*** Like leaders in schools, policy-makers can benefit from insights from outside the education sector, to explore how responsive practice can be developed. Examples include…

- ***Health***, which has demonstrated an increase in responsive, person-centred practice during COVID-19 despite facing resource constraints that would usually place responsive practice at risk (Stacey, 2020).

- ***Environmental sustainability***, which is increasingly combining the use of scientific evidence with responsiveness to communities affected by environmental change (Persson, Johansson & Olsson, 2018).

- ***Indigenous services*** where responsiveness to individuals, families and communities is deeply embedded in all aspects of service design and delivery (for example, Indigenous Allied Health Australia, 2019).

- ***Early childhood education and care***, which prioritises responsive relationships, child-centred curriculum and family-centred practice in both the Early Years Learning Framework and National Quality Standard.

Understanding how responsive practice has been fostered in these contexts, and the role of governments in supporting this, can extend policy-makers' imaginations about how to build responsive teaching in Australian schools.

Practice 3: Generative assessment

Generative assessment involves the purposeful use of assessment to build an education system for the future. It extends on the three purposes for which assessment is currently used:

- **Assessment *of* learning** measures students' knowledge and skill in a learning domain, often against standardised scales, outcomes or benchmarks. It can be diagnostic (such as pre-tests), but is most often summative (such as post-tests, exams or exit surveys).

- **Assessment *for* learning** provides 'point-in-time' information to guide teachers' instructional strategies and give feedback to students on their progress. It is often called formative assessment as its purpose is to inform next steps, not just summarise learning.

- **Assessment *as* learning** occurs when students take responsibility for the assessment process, so the process itself helps to develop their agency and learning (NESA, 2019).

Generative assessment encompasses these approaches but goes further using assessment to create change within classrooms, schools and systems. This definition of generative assessment is derived from adaptive thinking, which recognises 'generative feedback loops' (sharing information to drive change) as an essential component of complex adaptive systems (Eoyang, Yellowthunder & Ward, 1998, p. 7) – in policy as well as practice. Generative assessment is especially relevant to the assessment of general capabilities (or '21st century skills'). These skills demand new and innovative assessment methods to be generated; and themselves are key ingredients in generating innovation for Australia's future.

Generative assessment is an emerging concept in educational research. It is evident when teachers' feedback to students has 'an exploratory stance', inviting discussion and thinking rather than closing off dialogue through evaluative statements (Truxaw, 2020, p. 125). One study of generative assessment in mathematics describes its invigorating qualities:

> Not only was what was learned by students revealed, but it enlivened the learning of the teacher and students (McFeetors, Marynowski & Candler, 2021, p. 8).

This enlivening effect resulted from teachers and students having the sense of creating something together through the assessment process, 'making themselves' and 'becoming' as they monitored their learning (McFeetors, Marynowski & Candler, 2021, p. 8). This report broadens this idea to position generative assessment as the connective tissue that will enable the Australian education to become what it needs to be: revitalised and ready for the future.

Where are we now?

To understand how generative assessment can revitalise Australian education, it is helpful to examine how assessment is currently shaping education policy and practice.

Over recent decades, the Australian education system has created a strong assessment architecture around literacy and numeracy. This reflects the three key components of assessment architecture described in research (Pellegrino & Hilton, 2012; Masters, 2013):

1. **The National Literacy and Numeracy Learning Progressions** define each domain and create a shared understanding of how students typically progress in each domain (ACARA, 2020).

2. **The National Assessment Program – Literacy and Numeracy (NAPLAN)** provides common tasks and methods for assessing student progress in each domain at a point in time.

3. **Reporting on NAPLAN** occurs at system, state/territory, region, school and classroom level, providing a common approach for interpreting NAPLAN results.

This robust assessment architecture for literacy and numeracy has yielded valuable insights into student learning. Comparable data across systems and schools has highlighted equity gaps in student achievement and helped policy-makers and practitioners to focus their efforts on those who require the most support (Adams, Jackson & Turner, 2018). It has also enabled schools to compare their results to other like schools serving similar students, allowing greater recognition for those who exceed expectations and to support vulnerable students to succeed.

At the same time, the generative potential of this assessment architecture remains under-utilised. While NAPLAN highlights inequality, enduring and expanding equity gaps suggest that it has not led to effective responses to address it. The use of NAPLAN data to drive competition between schools (notably through the MySchool website) has also constrained the free flow of resources and ideas across the system, limiting the potential for collaboration. Questions also continue to be raised about the relevance of NAPLAN across all communities and contexts, and its usefulness in informing teaching and learning (Wilson & Piccoli, 2021).

NAPLAN is also insufficient for measuring progress towards nurturing the well-rounded, adaptive individuals envisaged by the *Alice Springs (Mparntwe) Education Declaration*:

> All young Australians become confident and creative individuals, successful lifelong learners, and active and informed members of the community (Education Council, 2019, p.4).

To achieve this aim, the Australian Curriculum identifies five further general capabilities for all students to develop, in addition to the literacy and numeracy assessed through NAPLAN:

- Information and Communication Technology (ICT) Capability
- Critical and Creative Thinking
- Ethical Understanding
- Intercultural Understanding
- Personal and Social Capability

The inclusion of these broad capabilities in the Australian Curriculum is a positive step towards an adaptive education system, as most countries who commit to such capabilities in their national policies do not translate this commitment into curriculum (Roth et al., 2017). Yet understandings of these skills remain variable among Australian schools (Milligan et al., 2020), and many reviews signal a need for change in Australian assessment practice to adequately monitor the development of general capabilities (Lucas, 2021; Milligan et al., 2020; Lamb et al., 2017; Care et al., 2018; Care & Luo, 2016; Masters, 2013; Soland et al., 2013).

The strong emphasis on NAPLAN, combined with a weaker focus on assessing and fostering general capabilities, has led to an education system that is oriented towards a relatively narrow set of measurable outcomes. This is reinforced in the senior secondary years by the focus on the assessment of academic subjects, as preparation for entry into tertiary education. As schools feel pressure to lift test results, there is a risk that assessment constrains innovation in the system, rather than unleashing it. A shift towards generative assessment – using novel methods to assess a broader range of skills and using the results of all assessments for creative rather than punitive purposes – could open up space for innovation to flourish.

Where to next?

Realising the generative potential of assessment in Australian education will involve changing *what* is assessed, *why* assessment happens, and *how* it is done.

- Generative assessment *of* learning measures the skills that matter most for building the future, to foster creative, collaborative problem-solvers and ethical citizens.

- Generative assessment *for* learning uses assessment to drive innovation in teaching and learning, as well as cutting-edge approaches to policy-making and system reform.

- Generative assessment *as* learning occurs when the assessment process itself is collaborative and innovative, and creates new knowledge and validates existing knowledge for teachers and students.

Like adaptive leadership and responsive teaching, a generative approach to assessment will require shared effort from teachers, school leaders, policy-makers and students.

Generative assessment in STEAM

STEAM learning is generative by nature. It involves not only transmission of knowledge, but creation of innovation and ideas. Assessment can be a powerful driver for this creative energy, fuelling STEAM programs with data about the learning that is occurring – including in academic domains and general capabilities – and provoking questions about how to extend it.

General capabilities in STEAM

General capabilities are an integral part of STEAM learning, as well as disciplinary knowledge. For example, students use critical thinking to engage with available information; creative thinking to explore complex problems; and collaboration to find solutions (Scoular et al., 2020).

The connection between STEAM and general capabilities is captured by Smith (2018), who reframed the STEAM acronym to identify key skills and dispositions in STEAM learning:

- **Self-starter** – self motivated and self driven
- **Thinker** – embrace technology
- **Energizer** – engage, energise those around you, be a positive force
- **Adventurer** – authentic and aware, explore, experience, experiment
- **Maker** – motivated, have meaningful purpose (p. 3-4).

The above dispositions are grouped using the metaphor of steam (as a source of power, as in the locomotive) and enacted as 'learning under your own steam' (Smith, 2018, p. 1).

Multiple forms of assessment can therefore be woven throughout STEAM projects creating opportunities for students to authentically apply and demonstrate their skill relating to the general capabilities (Scoular et al., 2020). These forms of embedded assessment may be more meaningful for students than structured assessment tasks, fostering engagement and learning.

Changing students' relationship with a STEAM curriculum

The use of assessment to drive innovation also aligns with a STEAM mindset. A bold vision for STEM academies describes the need for 'decidedly different minds', defined as:

> Minds that can critically discern, analyse, and integrate patterns within vast amounts of unstructured data; deftly respond and change course when hypotheses, predictions and "proven strategies" fail; ethically unravel and resolve complexity; creatively generate new knowledge, new questions, and new ideas; and globally collaborate to wisely improve the human condition (Marshall, 2010, p. 2).

According to Marshall (2010), the assessments used in traditional STEM learning reward minds that follow prescribed methods, memorise taxonomies, or focus on getting the right answer. Meanwhile, students with more creativity are turned off mathematics and science because they believe they are not good at it; and that only those who are already 'good' can succeed.

The inclusion of the Arts in STEAM (rather than STEM) creates a chance to change students' relationship with STEAM curriculum, by also valuing divergent, creative thinking. Yet it remains important to build all the self-confidence of students as mathematicians and scientists too, and their enjoyment of the exploration and discovery these subjects involve. Assessment that rewards innovation as well as precision can foster more inclusive STEAM learning experiences.

Generative assessment: What students can do

Self 	**Be creative, curious investigators of their own learning.** Student self-assessment can improve learning and increase autonomy and motivation (Sanchez et al., 2017; Wiliam, 2011). It also promotes problem-solving and adaptivity as students work towards their goals (Harris & Brown, 2018). Self-assessment can be generative when students… • *Become more reflective, adaptive thinkers* by analysing their learning and application of skills and knowledge, posing questions about their growth and systematically gathering data to explore their development. Training and guidance in self-assessment helps students build skills in evidence-gathering and analysis (Andrade, 2019). • *Create a safe, inclusive environment* by normalising mistakes, which in turn leads to more honest, accurate self-assessment (Harris & Brown, 2018; Wiliam, 2011). When students feel that their self-assessments will not be judged adversely by their peers, they are less likely to either under- or over-estimate their own abilities (Duckworth & Yeager, 2015). • *Develop capacity to talk about their learning*, including vocabulary for describing general capabilities and specific learning domains, as well as to describe progress towards their learning goals (Black & Wiliam, 1998).
School 	**Collaborate with teachers and fellow students as partners in assessment.** Students and teachers can work together on assessment by… • *constructing goals and clear success criteria* for the learning task to be assessed (Wiliam, 2011), based on curriculum and student priorities. • *discussing work samples* or modelling to understand what progress looks like and how to demonstrate it (Panadero et al., 2018). • *sharing and discussing feedback* to decide which aspect of the target skills or knowledge they will aim to develop next (Pellegrino, 2014). This collaboration may be especially generative in assessment of general capabilities, when teachers and students are both exploring new ways to assess and learn. Research has shown little difference between peer, self and teacher grading of general capabilities, but found that self-assessment improved students' trust of teachers' judgements (Sanchez et al., 2017).
Community 	**Recognise assessment as part of everyday life.** From scoring a personal best in weekend sport, through to receiving 'likes' or positive emojis in social media, students' lives are full of everyday assessment practices. Generative assessment engages these practices to support learning, such as students creating assessment games based on what they play online (Speed, 2020), using 'selfies' to respond to a piece of work (Renard, 2017), or using emojis or thumb signals to assess wellbeing (Kami, 2021). By transferring practices between home and school, students can create new ways to demonstrate and describe success, and reflect on their progress.

Generative assessment: What teachers and school leaders can do

Self	**Make purposeful assessment decisions to create change.** Teachers' choices about assessment can help to create classrooms and schools for the future. Many teachers already make assessment decisions based on the instructional value of the assessment, and how it will inform learning (Care et al., 2018). Generative assessment choices also consider the adaptive value of the assessment, and how it will contribute to positive change.

Generative assessment can create positive change by…

- *Building collaboration.* When approached in genuine partnership by teachers and students, assessment can evolve from a judgement about student ability to a learning conversation. When teachers skilfully use dialogue to 'prompt, scaffold and nudge' students' thinking about assessment, it positions students as knowledgeable people with valuable opinions about their learning (Adie, Willis & Van der Kleij, 2018, p. 6).

- *Building innovation.* Choices about what to assess, and how, contribute to the level of innovation in the school system. When teachers explore new ways to assess general capabilities or engage students in novel assessment practices that stretch their thinking, they build adaptive capacity for their students, themselves, and the future workforce.

- *Building equity.* Assessment practices can entrench inequality, when teachers harbour unconscious bias in their assessments (Goss, Sonnemann & Griffiths, 2017). When assessing general capabilities, teachers must be alert to bias arising from their relationship with the student, or the student's behaviour (Urhahne & Wijia, 2021); as well as the halo effect, where a student's proficiency in one skill makes teachers more likely to assess them positively in another (Meissel et al., 2017).

The risk of bias is lower in assessments that do not depend on teacher judgement. However, even standardised assessments carry some risk of bias if their content or process is more familiar to some students than others. A generative approach begins with awareness that no assessments have total 'cultural neutrality' (Klenowski, 2016, p. 273); and that varied assessments are needed to create equitable, responsive schools.

School	**Create generative feedback loops to drive school improvement.** 'What gets measured, matters', so assessment plays an important role in driving the culture and priorities of a school. Teachers and school leaders can use assessment to drive a more innovative, adaptive school culture by…

- *Experimenting with a range of assessments* to broaden the evidence for learning. In appraising assessment tools, teachers must be discerning about which are relevant for their school context (Urhahne & Wijia, 2021), especially in monitoring general capabilities, which may be demonstrated differently across contexts and cultures (Soland, et al., 2013).

	• **_Explaining the purpose of each assessment to students_**, and why the information from the assessment will be useful to them as well. When students understand why assessment matters, they are more likely to engage deeply, and become less susceptible to cheating or social bias (Harris & Brown, 2018). Sharing the learning benefits of self-assessment can deepen students' understanding of the process and facilitate buy-in (Andrade, 2019); while communicating clear rubrics to students for teacher-led assessment helps to build trust (Lamb et al., 2017).
	• **_Engaging in peer moderation of assessment,_** where teachers compare student assessments, can create shared understandings, enhance professional learning (Connolly et al., 2012), and can facilitate accuracy and consistency of judgments (Urhahne & Wijia, 2021). Peer moderation builds adaptive capacity by helping teachers feel comfortable that all assessments contain some level of imprecision (Pellegrino, 2014).
Community	**Use authentic assessment tasks** that enable students to demonstrate their skills in context. Authentic assessments can evaluate complex skills (Lamb et al., 2017; Scoular et al., 2020; Care et al., 2018) and enable multiple methods of assessments to be combined (Duckworth & Yeager, 2015). Authentic assessment tasks are designed to mirror real-world situations that would require students to draw on the capabilities that are being assessed. Authentic assessment contributes to generating change in schools by… • **_Creating new ways for all students to demonstrate their learning._** Students may demonstrate skills more readily outside school than in class (Lamb et al., 2017); for example, when playing sport, working at a part-time job, or otherwise contributing to their family or community. Authentic assessments can replicate these contexts and enable students to shine who might not perform as well in school-based assessments. • **_Reducing equity gaps based on out-of-school experiences_**. Exposing students to learning and assessment in authentic, non-school contexts can address gaps in their out-of-school experiences, providing students with opportunities to acquire and demonstrate skills that they might not usually have the chance to apply (Benbow & Hora, 2016). • **_Building shared language between communities and schools about what matters, and how to measure it_**. In authentic assessments, assessment criteria (what is valued) and performance level descriptors are specified (Care et al., 2018 based on Gulikers, Bastiaens & Kirschner, 2004). Teachers can work with families and communities to design assessments, and develop shared understandings of 'success'. • **_Encouraging students to use real-world assessment techniques from the workplace_**, such as prototyping, critiquing and refining their work. These collaborative, interactive processes more accurately reflect how work is evaluated in workplaces than traditional school-based assessments, and encourages students to persevere towards mastery (Berger, 2003).

Generative assessment: What policy-makers can do

Self	**Treat assessment with curiosity.** When policy-makers take a curious, collaborative approach to assessment, it is more likely to generate innovation. Conversely, punitive approaches to assessment can shut down innovation by making schools more adverse to risk.

Self

Policy-makers can become creative users of assessment by recognising that…

- *What matters is not always easily measurable*. Education policy gravitates towards what can be assessed most easily (Lingard, 2010), meaning that general capabilities – which are complex to assess – remain at the margins of the education system. Although new forms of measurement are emerging, they may never fully capture these complex skills, so policy-makers will need to cultivate comfort with uncertainty.

- *Standardised assessment is one tool among many* for understanding how well schools and education systems are performing. Leading thinkers recognise that it cannot adequately describe performance by itself:

  > The complexity of schooling makes it difficult to capture the performance of a school using simple statistics (Hill & Barber, 2014, p. 33).

  Standardised assessment data itself can be analysed in many ways to show different aspects of school performance (for example, identifying school 'value add' relative to where students started).

- *Teacher judgement and student self-assessment matter too*, by providing insight into student progress, and generating discussions about learning that standardised assessments cannot create.

Schools

Build an adaptive architecture for assessment. The design of the system architecture for assessment significantly impacts how assessment is used.

Policy-makers can create more adaptive system architecture when they…

- *Create spaces for collaborative reflection on assessment,* within and between schools. Communities of practice can share emerging assessment practices, or engage with data collaboratively (McDonald & Mercieca, 2021; Prenger, Poortman & Handelzalts, 2021). Accessible online data tools can be a focal point for shared learning and reflection.

- *Create resources to build shared language across diverse contexts* to generate a shared commitment to assessing key learning outcomes that still enables them to be demonstrated in many different ways. Examples of resources that balance consistency and flexibility include:

  o *Learning progressions* to help teachers and students to recognise stages of learning in a domain or skill and can apply across diverse contexts and year levels (Adams, Jackson & Turner, 2018). Learning progressions can be used to inform both standardised and flexible

assessments and are valuable tools for engaging teachers and students in dialogue about what progress looks like in their context.

  o The *Early Years Learning Framework* which prescribes five holistic outcomes for all young children to develop but recognises that these may be demonstrated in many different ways. Early childhood teachers and educators use their expertise to recognise the unique ways in which each child demonstrates progress in each outcome.

  o *Employability skills assessment in vocational education and training (VET)* which requires students to demonstrate capabilities in the specific contexts of real workplaces and applied tasks. While bias in the Australian education system means that VET assessment is often seen as less prestigious than university-oriented exams, quality VET practice has much to offer in informing innovation in schools in the authentic assessment of general capabilities (Clayton et al., 2003).

- ***Use assessment to identify equity gaps and catalyse action.*** Effective use of assessment data generates collective action to address equity gaps, as seen in the emergence of specific programs to respond to learning gaps in literacy and numeracy arising from COVID-19. While less is known about the effect of student characteristics on general capabilities (Harris & Brown, 2018), Mitchell Institute analysis shows that equity gaps may be even wider than for academic domains (Lamb et al., 2020).

- ***Acknowledge and mitigate the risks of assessment.*** The power of assessment to drive policy and practice brings with it a responsibility to minimise harm. Poorly designed assessment policy and practice can damage students and schools, reinforcing negative perceptions and undermining confidence and motivation (Soland et al., 2013). These risks can be mitigated by giving students, teachers, school leaders and communities an active role in shaping policies in relation to assessment; and by avoiding 'deficit' language in reporting assessment results.

Communities	**Measure what matters to Australian communities.** Assessment policy is an important point of connection between the learning that occurs in schools, and the needs, values and expectations of the wider community.

Policy-makers can use assessment to strengthen these connections by…

- ***Learning from assessments used outside of schools***, which signal what communities value. For example, looking at skills sought in job advertisements can help calibrate assessment to employer needs (Rothwell, 2014). Dialogue with different groups, especially First Nations communities, can also help schools to measure what communities value.

- ***Designing 'threshold' assessments that capture what matters*** for success beyond school. Alternative senior secondary assessments are already being explored in Australian policy, to better recognise capabilities beyond the Australian Tertiary Admissions Rank (ATAR) score (O'Connell, Milligan & Bentley, 2019). The hands-on assessment

methods used in VET also enable students to demonstrate and apply the skills that they will need for success in work and further learning.

- ***Learning from international assessments and practices*** to ensure policy in Australia reflects the latest evidence and research. For example, the Program for International Student Assessment (PISA) is using new technologies to improve assessment of general capabilities. Other systems are using portfolios and microcredentials to signal that they value general skills as well as subject-specific knowledge (Lucas, 2021).

- ***Promoting the value of all forms of learning.*** Governments can shape public perceptions about what matters in education through the choices they make in analysing and reporting on assessment data. Policy-makers can encourage adaptive, generative conversations in the wider community by sharing a range of assessment information. This includes actively challenging perceptions that general capabilities are in competition with other curriculum areas (Care & Luo, 2016), and recognising that they are both essential for Australia's future economy.

Methods for assessing general capabilities

Generative assessment will require Australian schools to develop effective strategies to assess general capabilities, alongside the well-established strategies for assessing academic domains and applied learning. Traditional forms of assessment, such as pen and paper testing, are less effective at capturing more dynamic capabilities (Lamb et al., 2017; Soland et al., 2013).

Teachers use a wide range of methods to assess students' general capabilities.

- **Teacher judgement** is often the primary method for assessing general capabilities (Meissel et al., 2017). Teachers observe, question, prompt and interact with students in a range of learning contexts to form a sense of the skills of their students across the general capabilities (Lamb et al., 2017). Used as a formative tool, teachers continually monitor cues of student understanding and engagement to modify or confirm their instruction (Urhahne & Wijia, 2021). Judgements can be summative, using teachers' skills in combining multiple sources of data (Connolly et al., 2012).

- **Observations** of student behaviour in learning tasks can enhance teacher judgement. Templates can support structured and unstructured observations by enabling teachers to capture notes quickly and assist with analysis (NSW Department of Education, 2021a).

- **Feedback to students** communicates teacher judgements and can occur in 'teachable moments' in everyday activities, or in more formal settings. For feedback to be useful, teachers should ensure students enact the feedback and meaningfully apply it to their learning (Wiliam, 2011), and follow up with students to check they have understood, especially when correcting a misconception or error (Wisniewski, Zierer & Hattie, 2020).

- **Direct assessment** of the general capabilities is still a relatively new area being explored but refers to the administration of an assessment that enables students to demonstrate their competency of the general capabilities (Lamb et al., 2017). Online assessments are now emerging, using gamification and adaptive technology to tailor assessments to students' capabilities based on the responses they provide (Masters, 2021).

A range of student-led strategies for assessing general capabilities are also available.

- **Written reflections** can capture students' own voice and views, and can be used regularly and formatively (such as daily journals), or in a more summative way (such as end-of-term self-appraisals). Multimedia reflection formats can be offered for less confident writers.

- **Peer-assessment** can complement self-assessment (NSW Department of Education, 2021b), and can help students deepen their understanding of their own learning.

- **Video** and other forms of multimedia to support self-assessment (The Learning Accelerator, 2021), but must be used sensitively and with attention to privacy concerns.

- **Student surveys** are an easily administered method for assessing general capabilities that enable students to describe their progress (Lamb et al., 2017; Soland, et al., 2013).

- **Simple and quick self-assessments** can be carried out as part of everyday classroom activities for students to reflect on, monitor and adapt their learning (Black & Wiliam, 1998).

- **Rubrics** for larger or complex self-assessments can be used to scaffold student reflection and support clarity and understanding of expectations. (Harris & Brown, 2018).

Keeping the conversation going

The COVID-19 pandemic has been a catalyst for innovation in Australian schools, as they have responded to repeated lockdowns, heightened levels of student anxiety, and unprecedented disruption to teachers' and students' lives (Biddle et al., 2021). In the face of these challenges, adaptive capacity – the ability to remain resilient and innovative in the face of disruption – has become more important than ever, to help teachers, students and communities to get through. The pandemic has also seen a renewed emphasis on the importance of students and their wellbeing; and reaffirmation that test scores are one small part of what schools deliver.

This paper shows how students, teachers, school leaders and policy-makers can work together to navigate a complex world. It identifies three areas of practice essential to a better future:

- **Adaptive capacity** to navigate the immediate disruptions facing schools – and to raise the ambition of change in the longer term and reach new heights of innovation and discovery.

- **Responsive teaching** designed around the needs of students, encouraging them to be engaged, active learners – and to be acknowledged, included and elevated to partners in learning.

- **Generative assessment** that drives a sustained process of collaborative learning, for students, teachers and policy-makers alike – informing ongoing research, experimentation, dialogue and reflection.

The paper is itself an adaptive piece of work bringing together ideas from a wide-ranging research base in new ways, to suggest new ways of thinking and working. Its goal is to catalyse discussion about how these ideas can be used to improve policy and practice, to create an education system from which all students emerge ready to thrive.

This discussion will equip schools for the future more effectively than specific procedures and practices. In disrupted times, it is tempting to seek off-the-shelf procedures and tools to lend stability and certainty to policy and practice. Yet the task of the education system has become more complex than ever, to rebuild our society and economy in more durable, equitable ways:

> [T]here are no quick fixes here; our equity policy settings need to deliver education and training as substantive social justice and mobility tools that can help rebuild a slowing economy and assure societal wellbeing for the longer term (Kift et al., 2021, p. 3).

Education for the future is not a 'quick fix' or a formula but will require all levels of Australian education to cultivate creativity, collaboration and innovative capacity. If Australian schools want their students to emerge as creative, adaptive problem-solvers who challenge the *status quo* and meet the future head on, then they must also be prepared to be likewise.

The ideas in this paper are not only relevant to the current crisis in Australian schools. While the upheavals of the COVID-19 pandemic may be once-in-a-lifetime events, change in the education system is continual and inevitable. An adaptive system grows with each change:

> 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. (Goss, 2017, p. 27).

While change is stressful, failure to adapt can have disastrous consequences for schools, students and society now and in the future. The next generation of change-makers must be ready.

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