There are five steps that are critical to successfully bringing about constructive, concrete reform in Australia's education system

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Education will be the engine room of Australia's future prosperity

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Why education matters to Australia

Australia's education system – from early childhood learning to post-secondary education and lifelong learning – has long been a pillar of this country's economic growth and social advancement. Education leads to innovation, increases productivity and has a direct impact on an individual's health, wellbeing and social mobility.

The school education system plays a vital role in equipping students with the skills and knowledge they will need for their working life.

A smart move – future-proofing Australia's workforce by growing skills in STEM

Australia needs to better position itself to compete in the global economy of the future.

Businesses have to come to terms with the monumental impact that digitisation and technology is having on business models, supply chains and customer behaviour.

- 4% (or 5.1 million) jobs are at risk from digital disruption.
- Innovation and STEM education are key to future growth.
- $57.4 billion increase in GDP if we shift just 1% of our workforce into STEM roles.

In this report, we argue the case for growing the STEM workforce and identify the benefits and impacts on businesses and the Australian economy more broadly.

See www.pwc.com.au/stem for further details.

Workforce demands are changing

The requirements for the workforce of the future are changing, and so our approach to education must adapt accordingly. Demographer Bernard Salt believes that the average 20-year-old of today will have 20 jobs in 15 different organisations over a 45-year career.[1]

Research undertaken by PwC suggests that 44 per cent of current Australian jobs are at high risk of being disrupted by computerisation and technology over the next 20 years, while a further 18.4 per cent of the workforce has a medium probability of having their roles eliminated.[2]

Seventy-five per cent of the fastest growing occupations now require STEM skills[3] and all require ICT skills. In this changing environment, education has never been more important in ensuring students have the skill set needed to succeed. Where the school curriculum once focused on providing students with basic facts, laws and theories, with a small percentage going on to be scientists or engineers, it is now necessary for all students to be able to find solutions to complex social and environmental problems. This will require students to develop higher-order thinking skills, social intelligence, the ability to work with diverse groups of people and a commitment to lifelong learning. Australia's National School Curriculum is now shifting to try and adapt to these changing needs and give students the skills they will need to succeed in the future.[4]

Education underpins social mobility and equity

Education is not just important for Australia's economic wellbeing, it is also critical to the promotion of social mobility. Research indicates that there is a strong correlation between high levels of income inequality and low levels of social mobility.[5] In other words, children of parents with high-paying jobs are likely to also become high earners, while children whose parents work in low-paid jobs are likely to end up in lo- paying jobs themselves. Or, as the OECD observed in their 2016 *Education at a glance* report, 'parents' educational attainment plays some role in perpetuating similar educational attainment among their children'.[6]

The statistics are even more stark when assessing the results for minorities or any group that has suffered some form of societal or structural dislocation or disadvantage (eg women, immigrants, Indigenous Australians), a fact borne out by current results. For example, Indigenous students are performing at a significantly lower level than their non-Indigenous peers across science, reading and mathematics. Around 40 per cent of Indigenous students are classed as low performers compared to 17 per cent of non-Indigenous students, in both scientific and reading literacy.[7] The score differences in all subject areas between the two groups puts Indigenous students more than two years behind their non-Indigenous counterparts.[8]

Students outside of metropolitan areas are similarly performing at a lower level than those in the city. The difference between students in metropolitan schools and those in remote schools is around a year and a half of schooling.[9] Overall, the score differences shown in the Programme for International Student Assessment (PISA) results put the most disadvantaged students three years behind their advantaged peers.[10]

Student socioeconomic background remains one of the biggest predictors of success at school, however it is not the only factor. About one third of variation in student achievement is due to school factors, with other factors including raw aptitude and prior knowledge. [11] Similarly, someone's educational background does not necessarily determine their future socioeconomic status.

However, *Educational Opportunity in Australia*, a report released by The Mitchell Institute, noted that for students who were not up to standard when starting school, socioeconomic background 'was the most powerful factor in determining their chances of getting back on track.' Almost three quarters of students that come from the top socioeconomic quartile and that started school below the benchmark were on track by Year 7, in comparison to only one third of learners from the lowest socioeconomic quartile.[12] Therefore, increasing the amount and quality of education that people receive can change their life outcome.

Education leads to a just, enriched and fair society

Level of education attainment has also been shown to have a direct impact on an individual's health. Adults who score lower proficiency in literacy are more likely than those with high proficiency to report poor health.[13] Conversely, better educated people have lower morbidity rates and longer life expectancy.[14]

The goal of the school education system is not simply to impart learning. It seeks also to build the qualities that will enable students to contribute to the overall wellbeing of our society – skills and attributes such as confidence, teamwork, problem-solving, aspiration and a love of learning.

Education is rightly seen as a foundation of a good society. There is sound evidence that education creates positive physical and mental health, increases social cohesion[15], reduces crime and lowers welfare needs[16] thereby strengthening civil society and saving society and government resources, which can be directed elsewhere. Research by the OECD has demonstrated a link between higher literacy and social outcomes, such as trust in others, participation in volunteer and associative activities, belief that an individual can have an impact on the political process, and better health.[17]

Australia's investment in education

In 2014–15, government spending on primary and secondary school education in Australia was approximately $43.27 billion. The overall figure for all public education spending (including early childhood education and development, tertiary education and other associated costs) was $84.57 billion.[18]

Australia's total (public and private) expenditure on primary to tertiary education as a percentage of GDP was 5.6 per cent, slightly higher than the OECD average of 5.2 per cent. Annual expenditure per student for 2013 was in line with the OECD average for primary education and slightly higher than the average for secondary education.[19] Between 2008 and 2013, total spending on primary, secondary and post-secondary non-tertiary education in Australia increased faster than the rate of growth in student numbers, with the spend per student increasing by 11 per cent.[20]

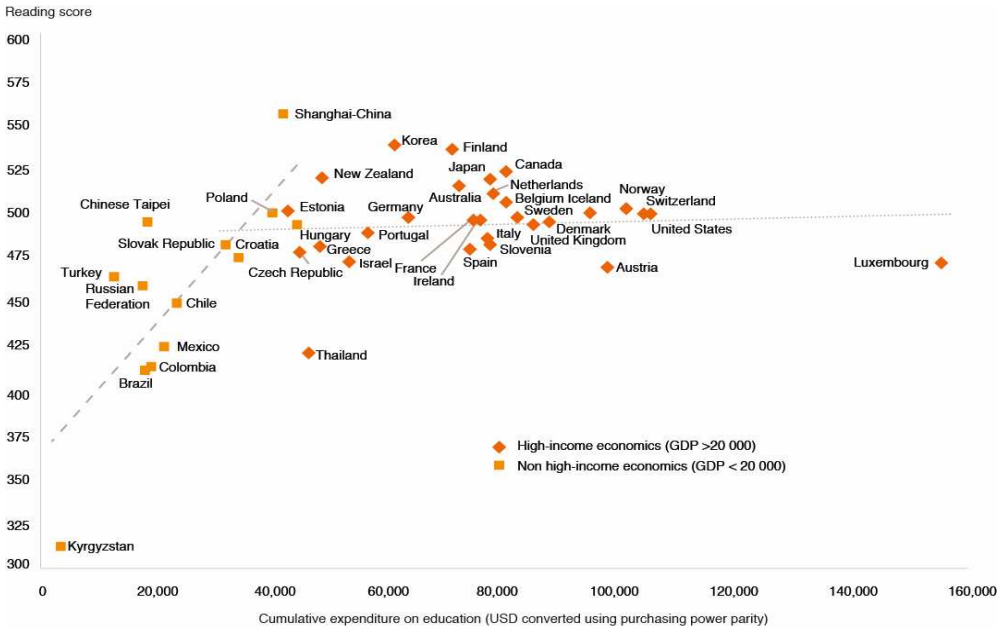
As a nation, we are making a significant investment in education, and it continues to provide returns in terms of productivity, social wellbeing and our overall standard of living.

Federally, the National Innovation and Science Agenda (NISA) places a strong emphasis on the role of education in developing the skilled workforce of the future, particularly in the STEM disciplines of science, technology, engineering and mathematics.

Modelling by PwC finds that shifting just 1 per cent of the workforce into STEM roles would add $57.4 billion to Australia's GDP (net present value over 20 years).[21]

The key is how the funds can be used to achieve the most effective outcome. Greater national wealth or higher expenditure on education does not guarantee better student performance. Among high-income economies, the amount spent on education is less important than how those resources are deployed.[22] Despite having an education budget approximately four times smaller than Australia's, Poland was able to improve student learning outcomes by almost three quarters of a school year between 2000 and 2006.[23]

Average reading performance in PISA and average spending per student from the age of 6 to 15

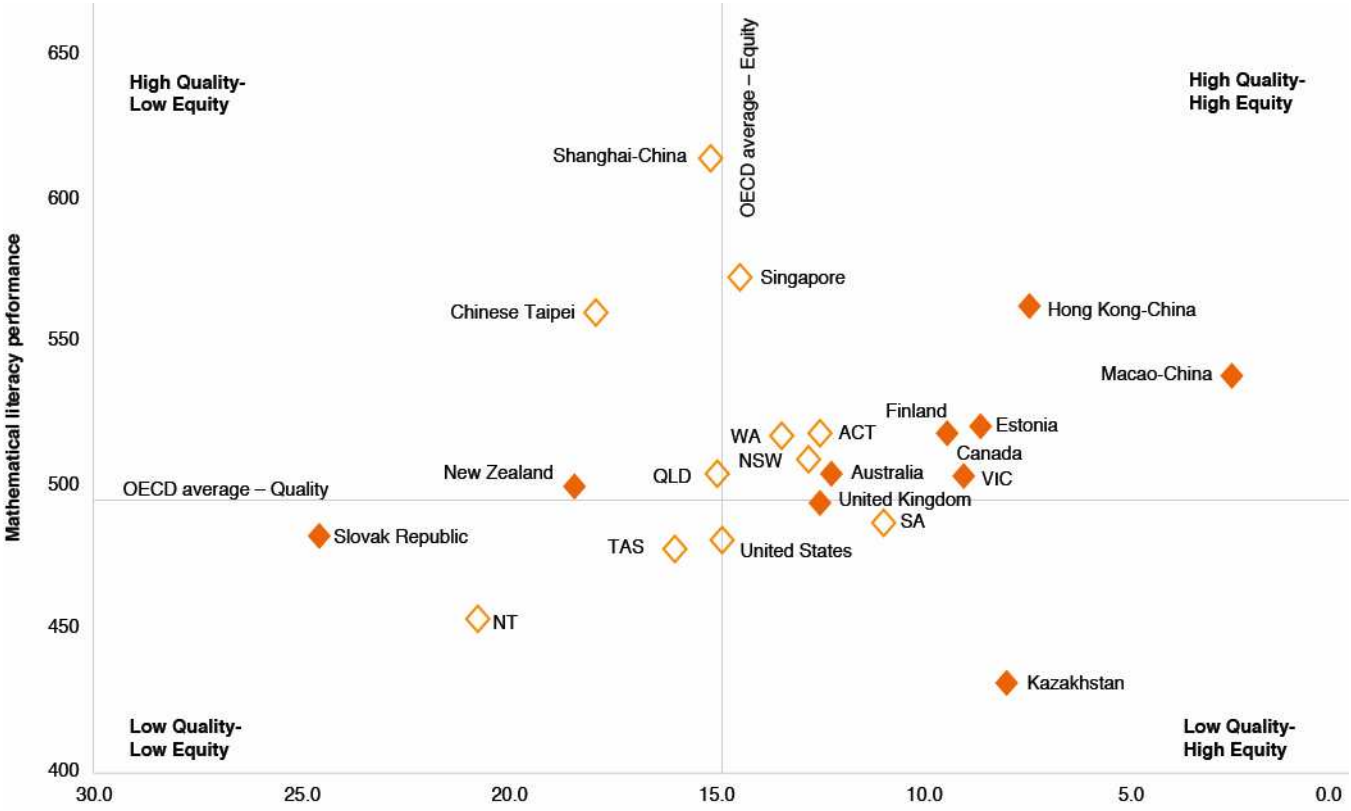


Source: *PISA 2009 Result: What Students Know and Can Do: Student Performance in Reading, Mathematics and Science,* Table 1.2.3 Statlink http://dx.doi.org/10.1787/888932381399
PSIA 2009 Result: What Makes a School Successful? Resources, Policies and practices, Table IV.3.21b. Statlink http://dx.doi.org/10.1787/888932382216
Note: Twenty-three partner countries and economics did not report data on cumulative expenditures.

Current school education system performance

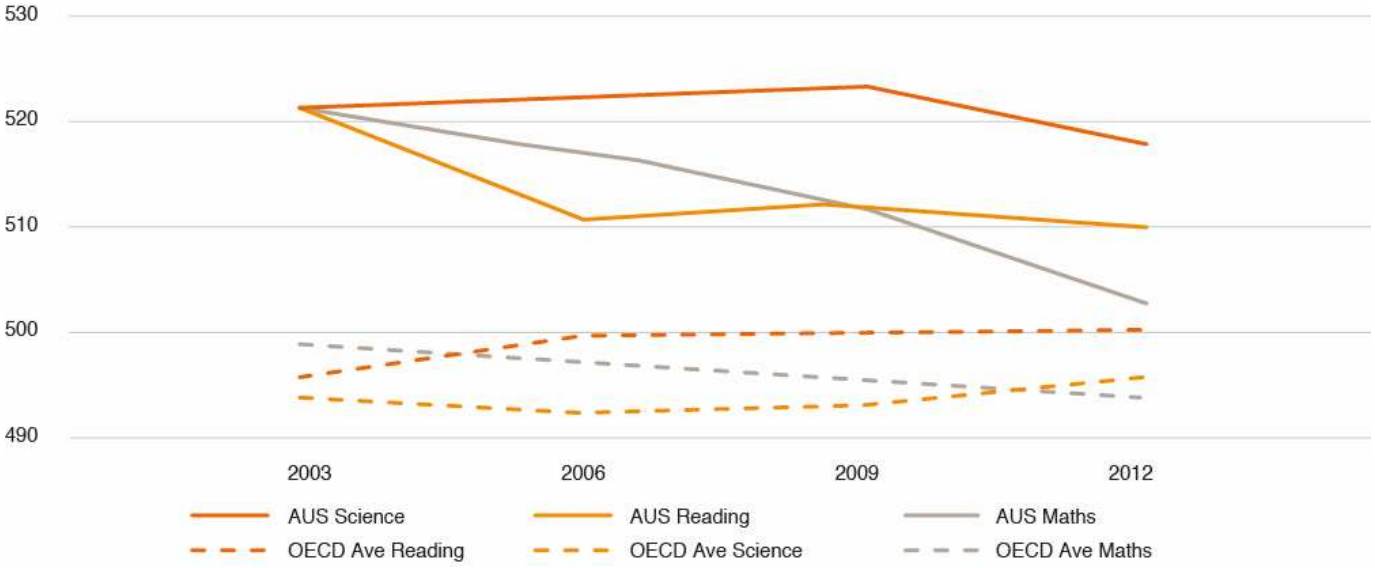
In the most recent PISA results our education system was classified as high quality and high equity. The Australian average also shows Year 4 and Year 8 students performing above the OECD average for reading, science and maths.[24] On average, Australians participate in more years of education than other OECD countries (19.2 years of education between the ages of 5 and 39, nearly two years above the OECD average of 17.5 years).[25] Australia also has one of the highest levels (43 per cent) of tertiary-educated adults among OECD countries.[26]

Percentage of variance in performance in mathematical literacy explained by the ESCS index (r-squared x 100)



Note: Shaded diamonds represent countries in which the strength of the relationships is significantly different to the OECD average.

AUS v. OECD averages (PISA)



While many aspects of the Australian school education system are strong, various measures consistently indicate that it is not operating as well as some other nations and systems. The *2015 Trends in International Mathematics and Science Study* report showed that Australian students are demonstrating about the same levels of skills in these areas as they were 20 years ago.[27]

The 2015 PISA results show that while many students have a reasonable grasp of the basics, they are less able to apply their knowledge and higher order thinking skills to meet real-life challenges.

PISA reveals that the reading and mathematics skills of Australian 15-year-olds are slipping backwards relative to their peers in other countries, and also that they are declining in absolute terms.[28] For example, Australia's mean mathematical literacy performance declined significantly between 2003 and 2012 (by 20 score points on average), as has reading literacy (by 16 score points on average), although scientific literacy has not changed for the same period.[29]

The Melbourne Graduate School of Education has found that 'Australia has one of the widest gaps of all developed nations between the achievements of our highest and lowest performers' and cites ACER's finding that 'Australia's overall ranking in 15-year-old attainment is significantly behind nations that were equivalent to us nine years ago'.[30]

Clearly, Australia is not seeing the same level of improvement in education outcomes as some comparable OECD countries. If we continue on the current trajectory, Australia will fall further behind its peers, and will struggle to remain internationally competitive. Importantly, Australia is falling behind in two critical areas that will underpin our future prosperity and social cohesion – performance and engagement in STEM, and consistent high performance from students from all backgrounds, including those that are socioeconomically disadvantaged. If unaddressed, the absence of these two elements will have significant implications for Australia. Some of these implications within the context of the broader global economy include: the potential for increased levels of unemployment; the stifling of economic growth; and a potential decline in health, wellbeing and social outcomes for our citizens.

At present, the rate of change of workforce requirements is more rapid than the pace at which we are reforming our education system in the broadest sense. Consequently, we are producing more people with skillsets that may not be suited to the future, who will struggle to find ongoing employment and to be active contributors to society over the long term.

Critical success factors for reform

In our work across the school education systems and sectors throughout Australia, PwC are in the lucky position of being involved with and seeing much innovation and many ideas that drive improvements at the local level (see examples below).

Three innovative approaches to driving change in education

Verso learning

Verso is a global education company with a 'pedagogy first' approach to education technology and learning tools. Verso have created a digital platform that enables teachers to ask questions and students to submit their response online. Once a student has submitted their response, they can see the responses of their peers (anonymously) and engage with them.

The Verso learning tool promotes engagement of students, provides feedback for both students and teachers, and allows teachers to adapt teaching styles to cater for individual needs. Originally developed in Melbourne, the tool is now used in over 5,000 schools around the world, despite its still limited adoption within Australia.

Pivot professional learning

This Australian start-up, founded three years ago in Melbourne, is focused on improving teacher performance in the classroom. Pivot launched an online tool in 2015 that allows students to complete a short survey comprising evidence-based questions that is then used as a professional development tool for teachers.

The Pivot tool allows students to provide feedback on teachers' strengths and weaknesses, which then delivers evidence and insights about how teachers can improve, differentiated class-by-class. This teacher data is then de-identified and used to improve the teaching profession.

Pivot is used in over 10,000 classrooms and 150 schools across Australia.

Evidence for Learning

Evidence for Learning is an initiative of Social Ventures Australia, with assistance from the Commonwealth Bank of Australia and the UK's Education Endowment Foundation. Evidence for Learning is a free online toolkit that allows teachers to access an evidence base for classroom teaching methods and interventions and measure their cost and impact while giving transparency around the robustness of the evidence base. It helps teachers to understand what works and why it works.

Evidence for Learning operates right across the education system to enable and support evidence-informed education practice in Australian schools.

In addition, through conversation with educators and system architects around the country, a consistent theme emerges of multiple good ideas that will help school and school system performance, yet significant variability in the success of these ideas translating into on-the-ground changes, and relatively few initiatives being scaled nationally or even across a whole state system. One example that demonstrates the significant number of great ideas and initiatives is the STEM Programme Index 2016, released by the Office of the Chief Scientist. This index lists over 250 STEM initiatives led by business, university, government and community to engage students in studying STEM.[31]

Our research indicates that the crux of the problem is not the inherent value or number of the ideas, but rather a gap in the resources and capabilities necessary to carry out the changes ('operational capability') and the necessary support from government bodies and communities responsible for approving the change (the 'authorising environment').

Successful reform requires finding ways to implement change, including looking at where other skills and resources can be co-opted to assist, and bringing the responsible stakeholders together in a way that fosters agreement rather than exacerbating existing divisions.

We have identified the following five steps for implementing reform in the Australian school education system.

Case study

Raising teaching standards in Scotland

Former First Minister of Scotland, Lord Jack McConnell, was responsible for introducing a comprehensive package of educational reforms, including enhancing the professional status and the professional standards of teachers. To ensure that teaching was an attractive profession to talented individuals:

- the 'Senior Teacher' position was developed to ensure that good teachers were not leaving the classroom in order to be promoted
- teachers that were new to the profession were guaranteed less classroom hours so they could spend more time being mentored by senior teachers
- a jobs guarantee for probationary periods allowed new teachers to complete their qualifications before entering the profession in a reasonable time.

To increase the quality of school leadership, head teachers needed to have a leadership qualification and all teachers were required to undertake continuous professional development (CPD) at least annually.

In order to successfully implement the reform, there was broad and deep engagement across the sector, including unions, teachers and parents. The outcome was a significant improvement in the number and quality of people applying to become teachers, improved morale in classrooms across the country, and a subsequent improvement in student results due to better in-class performance by teachers.

1. Identify what reforms are required and establish common ground

In order to implement reform, it's necessary to first identify and agree on what needs to change. Historically, divisions between states, and between state and federal governments, have stifled education reform in Australia. Rather than focus on differences, all parties involved need to identify areas of agreement and build from there. This could mean working with traditional antagonists and engaging them to help find a solution.

The engagement needs to be both broad and deep. It must go beyond government to include parents and carers, school communities and employers. The requirements for the workforce of the future are changing, and so our approach to education must adapt accordingly.

The skills that will be needed to perform the jobs of the future will be very different, so employers effectively have 'skin in the game' when it comes to our education system. Not only is their input vital, but they also have a responsibility to help shape the education system.

The discussion around which reforms to implement must also take into account the cohorts that will be affected by the reforms. Focusing on particular cohorts is necessary in some cases; however a broader, whole-of-system view should also be taken to identify those reforms that will have the greatest impact across the system. A 'scan, focus, act' approach can be taken to hone in on a small number of reforms that will generate the greatest positive outcomes for students.

Case study

Getting help from people with expertise in reform

The Principals Management Development Programme (PMDP) in the KwaZulu-Natal region of South Africa is an example of successfully drawing on specialised skills from outside the education sector to improve educational outcomes for students. The program is centred on the concept of co-ownership between government, the private sector and service providers who work as co-managers and partners. PwC South Africa is one of the private sector partners supporting this program.

The PMDP was modelled on corporate sector development training for basic management competencies. The results speak for themselves. In 2010, the first year of full rollout for the program, of the 197 schools that offered Year 12 there was an average improvement of 15.8 per cent in their pass rates. Of the principals that completed the survey, 87 per cent said they had experienced positive changes to their management practices that could be strongly linked to the quality and effectiveness of the coaches and mentors. Using coaches with specialised management skillsets proved a successful model to uplift capability within the schools and achieve better outcomes for students.

2. Make better use of standards to improve student learning

It is critical that the focus of any education reform is the impact on student learning. As Professor John Hattie has (very reasonably) said, 'no matter where they start, every kid deserves that year of growth [for every year of education]'.[32] This requires better measurement and an approach that is standards based and prioritises student learning outcomes above all else, including the views of vested interests and lobby groups.

Ensuring that teachers are aware of the impact that they are having on the student, and taking a student-centric approach to teaching, is critical. The ultimate goal is to give students the skills to become a well-rounded, resilient member of society capable of making a positive contribution to the social and economic goals of the community.

Standards provide a baseline for measuring the success of any reform, which is vital to deciding what is working and what isn't. They are also important when it comes to embedding equity and access – important principles of our school education system – by ensuring that those students who are under-supported or under-performing can be brought up to standard.

3. Get help from people with expertise in reform

Implementing change is a distinct and unique skill set. Writing in Harvard Business Review, Ron Ashkenas has observed 'most studies show a 60–70 per cent failure rate for organisational change projects – a statistic that has stayed constant from the 1970s to present'.[33] It is therefore important to seek the assistance of people who have this expertise, wherever they may be. For education reform, this means looking beyond the education system where necessary to draw on skills from the community, from industry, or from other repositories of knowledge. We should not be afraid to seek assistance from different players and bring different capabilities to bear in making change.

Making change at a system level requires a different skill set to running a school system. There is a vast body of knowledge around the development of the teaching profession, but to drive change at a broader level it is important to look beyond the sector and get help from people with the specific skills and experience required to implement widespread reform. As our work with KwaZulu-Natal province in South Africa shows (see case study below), there is a largely untapped wealth of experience from other professions or industries that can be drawn on to improve education outcomes.

4. Plan to scale up the best ideas and industrialise them

Many exciting and potentially game-changing initiatives are not being fully realised, not due to the value of the ideas, but rather either the capability to scale up doesn't exist, or the authorising environment is preventing them from being further expanded.

Australia can learn from other countries and jurisdictions that have implemented large, broad reforms to their education systems, particularly from how they were able to get alignment in the authorising environment, and how they were able to identify the capabilities required and then drew on those capabilities to drive change. This includes drawing on the wider community, including private organisations and NGOs, rather than looking solely to education departments and expecting them to provide all the answers.

One lesson that stands out is that when government tackles education reform alone it only gets so far, but when governments, business, corporate and communities tackle it together they get a lot further. We need pathways to scale up successful models such as those cited previously to ensure there is more richness and diversity in the tapestry of school education in Australia.

More planning is required in the implementation phase to understand what will work practically within a school environment. In many instances the pilot already exists, but it may require ongoing adjustment to successfully scale up. A successful pilot in one school has the potential to be successful in another – however, adopting an iterative approach rather than taking a view to simply 'lift and shift' is critical to ensuring its success across the broader system.

5. Make better use of data and technology

We need to bring more science to pedagogical practice. Decision-makers need to be able to make better use of available data that shows which reforms are making a difference to student outcomes, and therefore should be pursued. A solid evidence base is vital to overcoming traditional sector and system boundaries and allowing innovations to be promulgated across the entire education system.

Data is not only vital in building a compelling case for change, it is necessary to measure the success of any reform. It must be used to review progress and determine what is working and what is not working, and adjust accordingly.

We also need to make better use of technology to improve learning outcomes. This means identifying and trialling new tools and new methodologies as they evolve and using data to measure their effectiveness. The tools and methodologies that are shown to deliver results should be promulgated throughout the school education system. This requires addressing the current restrictions imposed by the authoring environment and operational capabilities that are stifling innovation.

Case study

21st Century Minds accelerator program – successfully growing STEM initiatives[34]

STEM skills are recognised as a critical driver of economic growth and global competitiveness. Both the public and private sector are investing heavily in ensuring Australia's workforce is adequately skilled to meet future demand. However, despite significant effort and investment, Australia's STEM performance has been trailing many other OECD countries.

Wishing to play a role in helping realise Australia's potential as an innovation nation, PwC launched the 21st Century Minds (21CM) accelerator program in response. Our research suggested that the issue was not the number or merit of the ideas, but the limited scale and resultant reduced impact on the system.

This collaborative program sought to grow and scale STEM initiatives through mentoring, coaching and access to subject matter expertise. The success of the 21CM program can be largely attributed to the collaborative efforts of like-minded organisations and individuals using a coordinated approach to achieve the same goal.

What can be achieved

We believe that the five items listed above are all critical success factors in bringing about constructive, concrete reform in Australia's education system. If implemented, the potential returns are significant, and include:

- a more effective education system
- better student outcomes for our nation (for example, economic growth, increased international competitiveness)
- better student outcomes for individuals (for example, well-rounded, critical thinkers who enjoy better health and socially mobility).

While education alone cannot – and will not – solve the many problems facing Australia, PwC strongly believes that further strengthening our education system through successful reform is a goal worth pursuing.

Education will be the engine room of Australia's future prosperity. For the sake of tomorrow's generation of Australian students we need to act today.

Endnotes

1. SEEK, '5 ways the Australian workforce has to change, according to Bernard Salt', *Future of Work Event*, SEEK Limited, June 2016. http://insightsresources.seek.com.au/5-ways-australian-workforce-change-according-bernard-salt
2. PwC, *A smart move – future-proofing Australia's workforce by growing skills in STEM*, PwC, 2015.
3. Becker, K and Park, K, 'Effects of integrative approaches among STEM subjects on students' learning', *Journal of STEM Education*, Volume 12 – Issue 5 & 6, July-September 2011.
4. D'Cruz, Marieke, *No Mind Left Behind: Building an education system for a Modern Australia,* The McKell Institute, October 2016
5. Corak, M, 'Inequality from generation to generation: the United States in comparison', *Discussion Paper No. 9929*, IZA, 2016. http://ftp.iza.org/dp9929.pdf
6. OECD, *Education at a Glance 2016: OECD Indicators*, Organisation for Economic Co-operation and Development, 2016.
7. Thomson, S; De Bortoli, L and Underwood, C, *PISA 2015: A first look at Australian student's performance*, Australian Council for Educational Research, 2016.
8. Ibid.
9. Ibid.
10. Ibid.
11. Goss, P and Hunter, J, *Targeted teaching: How better use of data can improve student learning*, Grattan Institute, July 2015. https://grattan.edu.au/report/targeted-teaching-how-better-use-of-data-can-improve-student-learning/
12. Lamb, S; Jackson, J; Walstab, A and Huo, S, *Educational opportunity in Australia 2015: Who succeeds and who misses out*, Mitchell Institute, October 2015. http://www.mitchellinstitute.org.au/wp-content/uploads/2015/11/Educational-opportunity-in-Australia-2015-Who-succeeds-and-who-misses-out-19Nov15.pdf
13. OECD, *The 2013 OECD Survey of Adult Skills (PIAAC)*, Organisation for Economic Co-operation and Development, 2013. http://hdl.voced.edu.au/10707/271578
14. Cutler, DM and Lleras-Muney, A, 'Education and Health: Evaluating Theories and Evidence', *NBER Working Paper No. 12352*, National Bureau of Economic Research, July 2006. http://www.nber.org/papers/w12352
15. OECD, *Education at a Glance 2010: OECD Indicators*, Organisation for Economic Co-operation and Development, 2010.
16. Wolfe, B and Haveman, R, 'Social and nonmarket benefits from education in an advanced economy' in Kodrzycki, Y (Ed.), *Education in the 21st Century: Meeting the Challenges of a Changing World*, Federal Reserve Bank of Boston, 2002.
17. OECD, *The 2013 OECD Survey of Adult Skills (PIAAC)*, Organisation for Economic Co-operation and Development, 2013. http://hdl.voced.edu.au/10707/271578
18. ABS, Government Finance Statistics, Education, Australia, 2014-2015, Australian Bureau of Statistics, 2016. http://www.abs.gov.au/ausstats/abs@.nsf/mf/5518.0.55.001
19. OECD, *Education at a Glance 2016: OECD Indicators*, Organisation for Economic Co-operation and Development, 2016
20. OECD, *Education at a Glance 2016: OECD Indicators – Australia*, Organisation for Economic Co-operation and Development, 2016. http://www.keepeek.com/Digital-Asset-Management/oecd/education/education-at-a-glance-2016/australia_eag-2016-41-en#.WK5MY1WGOpo#page2

21. PwC, *A smart move – future-proofing Australia's workforce by growing skills in STEM*, PwC, 2015.

22. OECD, *PISA in Focus 13: Does Money buy strong performance?,* Organisation for Economic Co-operation and Development, 2012.

23. Programme for International Student Assessment, *The high cost of low educational performance – The long-run economic impact of improving PISA outcomes*, Organisation for Economic Co-operation and Development, 2010. http://www.oecd.org/pisa/44417824.pdf

24. OECD, *Education at a Glance 2016: OECD Indicators – Australia*, Organisation for Economic Co-operation and Development, 2016. http://www.keepeek.com/Digital-Asset-Management/oecd/education/education-at-a-glance-2016/australia_eag-2016-41-en#.WK5MY1WGOpo#page2

25. OECD, *OECD Better Life Index*. http://www.oecdbetterlifeindex.org/topics/education/

26. OECD, *Education at a Glance 2016: OECD Indicators – Australia*, Organisation for Economic Co-operation and Development, 2016. http://www.keepeek.com/Digital-Asset-Management/oecd/education/education-at-a-glance-2016/australia_eag-2016-41-en#.WK5MY1WGOpo#page2

27. Thomson, S; Wernert, N; O'Grady, E and Rodrigues, S, *TIMSS 2015: A first look at Australia's results*, Australian Council for Educational Research, 2016. http://research.acer.edu.au/cgi/viewcontent.cgi?article=1000&context=timss_2015&__hstc=227787458.95a976a11dcc1ce716807f8be65a69c7.1488225146017.1488225146017.1488225146017.1&__hssc=227787458.1.1488225146021&__hsfp=1395116972

28. Thomson, S; De Bortoli, L and Buckley, S, *PISA in brief: highlights from the full Australian report: PISA 2012: how Australia measures up*, Australian Council for Educational Research, 2013. http://research.acer.edu.au/ozpisa/14

29. Ibid.

30. Melbourne Graduate School of Education, *Focusing on the learner: Charting a way forward for Australian education*, University of Melbourne, 2013. http://education.unimelb.edu.au/__data/assets/pdf_file/0018/804510/Green_4_0_web.pdf

31. Office of the Chief Scientist, *STEM Programme Index 2016,* Australian Government, 2016. http://www.chiefscientist.gov.au/wp-content/uploads/SPI2016_release.pdf

32. Pearson Australia, 'The Politics of Distraction (Part 1)', *Interview with Professor John Hattie*, Pearson Australia. http://www.pearson.com.au/community/in-conversation/professor-john-hattie-and-the-politics-of-distraction-part-1

33. Ashkenas, R, Change management needs to change, *Harvard Business Review*, 16 April 2013. https://hbr.org/2013/04/change-management-needs-to-cha

34. PwC, *21st Century Minds,* 2016. http://www.21stcenturyminds.com.au

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