

Bringing schools into the 21st century through flexible, innovative spaces

April 2017

Breaking down the walls



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Introduction

Education is universally recognised as a pillar for both economic and social growth in any society. Government spending on education in Australia reflects our priority of investing in the future of this country, allowing for economic advancement as well as productivity and social wellbeing for the individual and society as a whole. Given the importance of education in social and economic advancement, the student learning environment has become increasingly significant.

In an age where teaching practice and technology have changed and developed faster than ever before, the question of whether or not our learning environments are supporting or hindering our educational processes has never been more pertinent. While there have been changes to learning outcomes through updates to the syllabuses, technology has been driving more significant changes at a high rate.

The changes in technology have allowed for increased collaboration, personalised learning,

immediate feedback, teacher professional development, ease in communication and real time responses to local and systemic issues. These developments in technology not only broaden the scope of teaching methods in the classroom, but are also essential in preparing Australian youth for the jobs of the future. We are in a time where it is more important than ever to be equipping children with the technological abilities and higher-order thinking that will be essential for future occupations, keeping Australia economically competitive in the global market.



Is Australia's investment in education yielding results?

In 2014-2015, government spending on primary and secondary school education in Australia was approximately \$43.27 billion. The overall expenditure for all public education (including early childhood education, tertiary education and other associated costs) was \$84.57 billion.¹

With such a substantial financial commitment to education, it is imperative that we ask whether this investment is yielding real results in terms of improvement in student learning outcomes. By looking at other developed nations, it becomes apparent that the amount spent on education is less important than how these funds are used for the advancement of education.² Poland, for example, had an education budget a quarter of the size of Australia, yet was able to improve its student learning outcomes by almost three-quarters of a school year between 2000 and 2006.³ Australia, on the other hand, has not seen such improvement.

On an international scale, Australia's education system is considered high quality and high equity. A high quality education system is a system that retains students and ensures students gain high level skills.⁴ High equity in education means that personal or social circumstances – such as gender, ethnic origin or family background – are not obstacles to achieving educational potential (fairness) and that all individuals reach at least a basic minimum level of skills (inclusion).⁵ The Australian average shows Year 4 and Year 8 students performing above the OECD average for reading, science and maths.⁶ Despite the positive standing in results, Australia has not been seeing the same level of educational improvement in comparison to other OECD countries. Australia must reconsider our investment in teacher recruitment, training and professional development if we want to remain competitive and on par with high-performing OECD countries such as Poland⁷, Estonia⁸ and Finland⁹ whose exceptional results were reflected in the 2015 Programme for International Student Assessment (PISA) study.¹⁰



Where does Australia stand compared to other OECD countries?

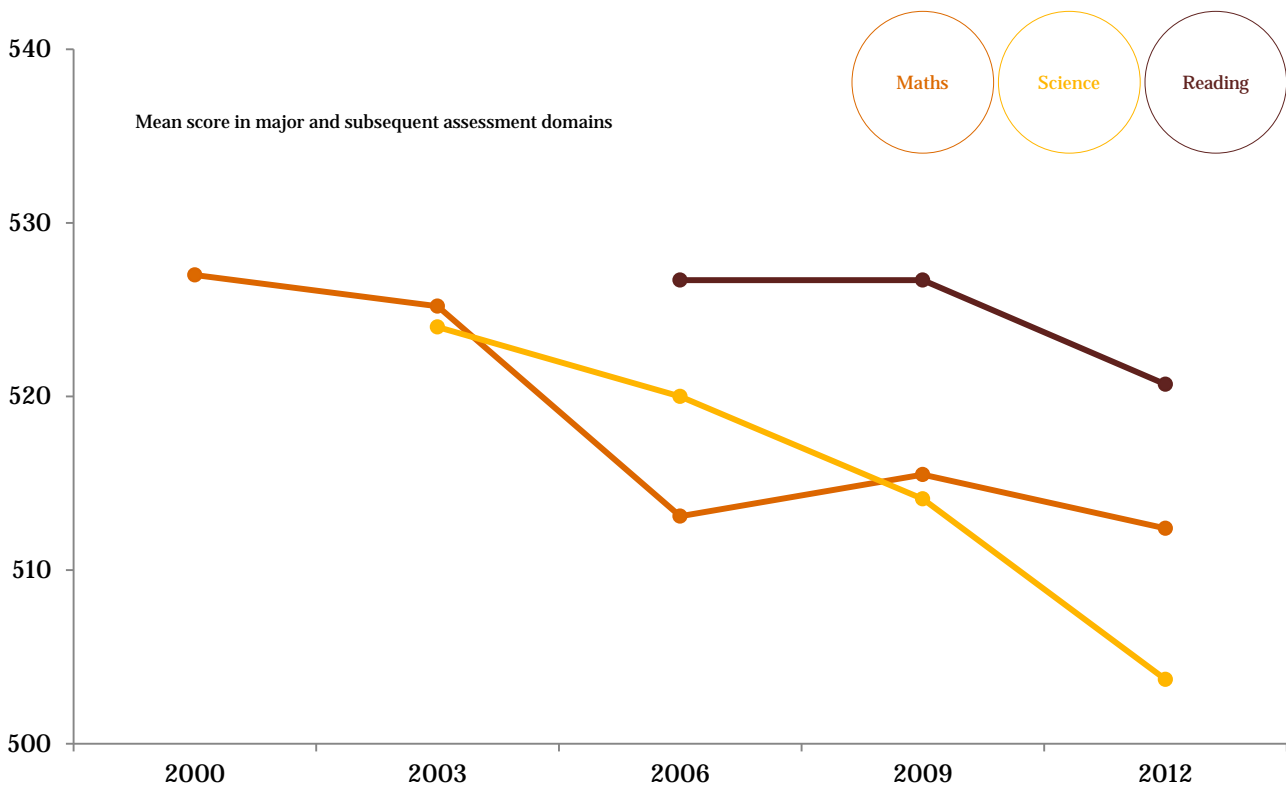
The *2015 Trends in International Mathematics and Science Study* report revealed that Australian students are showing the same level of competency in these areas as 20 years ago.¹¹ The Program for International Student Assessment (PISA) results showed that while Australian students have a grasp of basic concepts, they were less adept at applying their knowledge to higher order thinking. PISA also revealed that the reading and mathematical skills of Australian 15 year olds are slipping backwards relative to their peers in other nations.¹²

Between PISA 2000 and 2012, there has been a sharp decline in both the mathematical literacy and reading literacy performance of Australian students. Science results show a stagnation in performance. This alarming pattern is in comparison to many other countries who are showing improvement in these areas.

Slipping between the cracks

Research by the Melbourne Graduate School of Education has concluded that 'Australia has one of the widest gaps of all developed nations between the achievements of our highest and lowest performers.'¹⁴ This indicates that those within challenging socio-economic circumstances are slipping through the cracks of our education system. With this in mind, attention should be given to where we can gain the highest socio-economic dividend from investment into improved educational spaces. Whilst assessing the effectiveness of such investment can be complex (as those with socio-economic challenges have a wide range of factors which help and hinder educational outcomes, which extend well beyond the school gates), it seems obvious that those who are not benefiting from current pedagogy due to lack of facilities, teacher training and workable space should be the priority in receiving such funding and attention. This will ensure that the gap between our highest and lowest performers can be addressed.

Figure 1: Australian achievement in PISA from 2000 to 2012¹³



Turning back to the overall decline in mathematical and reading literacy performances and the stagnation of science performance, Australia is in urgent need of a review into our educational systems and where they are failing our students. This review will be a complex process. In the past, education reviews have been largely political and have therefore presented short term metrics reflective of the nature of political cycles. To have a lasting effect, long term strategies and planning is required. A good example is Finland's education system, which was mediocre from a global testing point of view but has improved considerably over the past 30 years. The key to Finland's success was their approach to equity, teaching professionalism and sustainable leadership,¹⁵ which has resulted in positive outcomes over the long term.

It is important to note that these positive outcomes have all been context-based, long term outcomes.

To add to the complexity of education review and reform, Hattie¹⁶ cites 195 factors that influence education outcomes and argues that there are some factors that work to produce better learning outcomes than others. These 195 factors are derived from over 900 separate research articles that Hattie has analysed. He recognises that context has not been taken into account with these factors, so it is important not to take the resulting 'effect sizes' as an instruction manual for schools.¹⁷ With this in mind, Hattie found that learning environment, termed 'open versus traditional', has less influence on learning outcomes than a range of other factors including classroom discussion, teaching strategies and interactive video methods.

However, it could be argued that the learning environment influences the success of these three factors – classroom discussion requires space for the students and acoustics for the students to hear clearly and be heard by others. Similarly, interactive video methods should be integrated into and supported by the technological environment of the classroom. Finally, teaching strategies can be impacted by the learning environment – room size, acoustics, light and furnishing enable some teaching strategies over others. As a supplement to this, training teachers in how best to utilise the learning environment available to them is key. As Fisher states, it is not enough to provide new, technologically connected learning spaces without giving teachers and lecturers the time, space and guidance to build collaborative teams of students, teachers and tutors.¹⁸



Environments contributing to positive learning outcomes

“ We shape our buildings and afterwards, our buildings shape us ”
Winston Churchill

Australia’s schools, by in large, are ageing assets that do not accommodate new and evolving teaching methods. The majority of our assets were built in the middle of last century and reflect the didactic teaching pedagogy of decades past. They do not easily convert into more recent, personalised learning spaces with integrated technology. Reflecting upon current research into best teaching practice for positive learning outcomes, schools need to provide an environment which facilitates new teaching methods, enabling a positive and stimulating environment for its students. Spaces must be engaging, comfortable and, perhaps most importantly, flexible to allow for a wide range of teaching practices. For example, Wagner¹⁹ argues that the education environment is key in supporting project-based learning – the teaching practice he believes prepares students for 21st century careers. Project-based learning is a teaching method in which students gain knowledge and skills by working an extended period of time to investigate and respond to an authentic, engaging and complex question, problem or challenge.²⁰

In order to facilitate this teaching practice the ‘education environment must encourage and inspire innovation at both a pedagogical and physical level’.²¹

Offering new types of learning spaces can also challenge teachers to consider their beliefs and teaching philosophies. It is encouraging to see some universities making progress in this area, namely the Charles Perkins Centre²² at the University of Sydney and the Macquarie University Library²³, as well as schools such Northern Beaches Christian School undertaking Project Barcelona at

their Sydney Centre for Innovation in Learning.²⁴

Fisher’s 2001 report specifically examined the impact of school infrastructure on student outcomes and behaviour and indicated that student academic achievement improves with improved building conditions.²⁵ Fisher also explores other physical environmental attributes which affect the learning environment, such as:



International findings

The Royal Institute of British Architects (RIBA) commissioned two consultancy groups to explore the value of good design in both quantitative and qualitative terms across the UK. The study showed significant influence and improvement in the areas of behaviour, engagement and wellbeing.

Behaviour

'Post-occupancy evaluations (POE) evidence revealed that good design can have a positive impact on behaviour through facilitating the supervision of pupils, reducing overcrowding, and allowing staff to implement behaviour management strategies.'²⁶

Engagement

'POE evidence shows that schools with a variety of spaces and opportunities to break out from the classroom reported greater pupil engagement. Classroom design which offered interest through a well-integrated colour scheme, decoration and display also increased engagement.'²⁷

Wellbeing

'Good design was found to influence wellbeing through helping pupils and staff feel a sense of ownership and belonging to their school, prompting positive social interaction and a healthy lifestyle.'²⁸



Flexible classroom design for optimum learning

Modern teaching practice is no longer modelled on the didactic teaching methods of the past. The days of a single teacher standing at the front of a class of thirty individual desks in a rigid formation is no longer regarded as best teaching practice. Teaching methods are now personalised and student-focused, using an array of activities and modalities. Classrooms should now be flexible learning spaces, which enable multiple users to work concurrently with multiple purposes.

Spaces should allow for individual, small group and large group collaborations with the seamless integration of ICT into the learning environment. Large spaces for group work should have the ability to be broken down into smaller spaces for individual or small group modes of learning. Combinations of formal and informal work areas as well as indoor and outdoor learning environments enhance the student experience, which both inspires and motivates the learner.

An example of different types of learning spaces are those termed by Federation University Australia as 'campfires', 'watering holes', 'caves' and 'mountain tops'.²⁹

The University classifies types of spaces and their uses into these four groups to provide a metaphor for the type of learning spaces different activities require. Each of these learning spaces require varied physical layouts, as well as furniture and surfaces to facilitate their use.



Campfire

A structured space in which students face a teacher and listen to traditional knowledge



Watering hole

An informal space where students can discuss, create and collaborate informally



Cave

A private space for independent and reflective work



Mountain top

A space for presenting work to an audience to demonstrate understanding

Case Study: Anzac Park Public School

Anzac Park Public School is a newly constructed, future-focused school in Sydney which has been designed to utilise a variety of vibrant and well-connected learning spaces with new teaching methods. The design of the school is based on the philosophy that in order to succeed in the future, students will require research, problem-solving and critical thinking skills, and will need to be able to work independently and together with groups of other students. The environment is collaborative, reflective and flexible – a place where inquiries are shared, and students engaged in ways that reflect 21st century learning.

These innovative spaces are also capable of evolving and adapting as educational practices evolve and change – remaining future-focused. Features of the learning spaces include:

- Mobile, touch sensitive screens allowing students to engage with learning materials
- Wi-Fi and software allowing all devices in a room, including tablets and laptops, to interact
- Writable walls and surfaces encouraging students to investigate and collaborate
- Lightweight, flexible furniture that can be easily moved around by teachers and students, creating functional spaces for individual and team work.

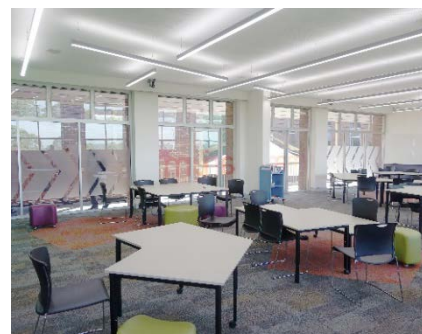
Furniture within the classroom should also feature flexibility and mobility. Furniture plays an active role in communicating the way that a space can be used. This empowers students to take an active part in their learning environment, collaborating with the educator regarding the best classroom format for a specific learning outcome. Furniture should be light, soft and mobile, enabling educators and students to easily shift the furniture in order to make new configurations. The same types of furniture should be used in staff spaces so that there is commonality in the collaboration of both staff and students.

There is also a need for effective leadership of learning spaces in order to maximise their benefits. This is achieved through planning and training of teachers and school leaders, as well as information sharing between schools. While there are some schools associated with the Association for Learning Environments³⁰, there is room for more school leaders to be involved in the conversation. Sharing ideas, challenges and successes between leaders and teachers regarding learning spaces will encourage conversation regarding effective learning spaces in the teaching environment and their impact on student outcomes.

Case study: Barker College's Imaginarium

Barker College, an independent, Pre-K to Year 12 school in NSW, recently commissioned **NBRS** Architecture to redesign two 1970s built classrooms into flexible, technologically enhanced learning spaces, known as the *Imaginarium*. Heavy internal walls were removed to open up the space, providing a new, flexible learning environment. External walls were replaced with glass, which allowed better ventilation and more natural light. It also created a more seamless flow between the indoor and outdoor spaces. The furniture within the area is moveable and flexible in nature, allowing for multipurpose teaching strategies. The varying shapes of the furniture allow for numerous configurations for large group work, small group work, presentations or individual project work.

The *Imaginarium* allows for the integration of cutting-edge technology into classroom practice. There are cameras, microphones, speakers, touch screens and a permanent green screen wall. It is an environment that takes into account the relationships between formal learning, social learning and the built environment all through the lens of rapidly evolving technology.



Photographs supplied by Barker College.

A corporate example

New ways of working

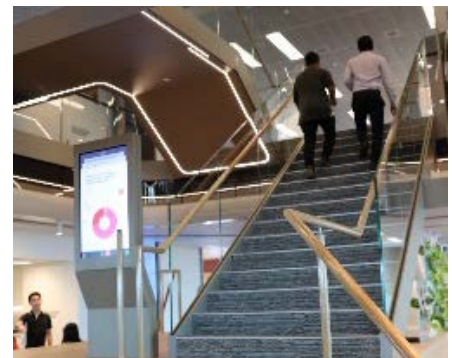
PwC has recently launched their 'New ways of working' material, in light of the radical transformation of their Sydney, Melbourne and Brisbane offices. PwC has reimagined the potential of the modern office with state of the art commercial interiors. The emphasis has been on creating spaces that are conducive to co-creation and collaboration away from 'a transactional mindset, to a far more relational approach to how we engage with our clients.' says Peter Konidaris, Market Managing Partner, Melbourne.

The purpose-built spaces allow for maximum flexibility, with specialist areas for group collaboration and creativity. This is in stark contrast with the former office model, which was a fit-for-purpose space with limited scope for future developments. The new multipurpose spaces provide contrasting aesthetics, formal and informal spaces, open plan to more intimate environments and hi-tech to hi-touch spaces. The driving vision is to create a destination: a range of spaces, settings and environments that meet the complex needs of a very disparate range of clientele, while also containing and inspiring a diverse range of collaborations and interactions. There is a real sense of breaking down the barriers – both physically and metaphorically – to allow for maximum interaction and collaboration in order to creatively think through problems.

New ways of learning

This model, although within a corporate environment, reflects the same principles that research shows applies to the 21st century classroom. PwC's focus on the environment serving the needs of the modern client is not unlike the school environment focusing on the needs of the modern student. The new offices enable maximum collaboration and creativity through flexible, multi-purpose spaces which integrate cutting edge technology. This can be used as a prototype for the enhancement and development of the learning environment, with a particular focus on the following aspects:

- vibrant, stimulating spaces with appealing aesthetic elements such as artwork and interesting design features
- open plan areas for maximum collaboration and creative problem solving
- integrated technology
- flexible spaces which allow for a variety of teaching modalities, from group work to presentations to small group work to individual spaces
- a sense of community – achieved through informal spaces, communal eating areas and open leisure spaces
- design features to allow for natural light and ventilation
- client-focused (which would equate to student-focused) elements to meet their specific needs and enrich their experience.



Learning environments of creativity and innovation

What is an Innovative Learning Environment?

The OECD published a paper in 2013 outlining what an Innovative Learning Environment (ILE) is, and what educational outcomes it should be achieving. The paper states that all ILE principles must be met in order for an environment to be considered effectively innovative. The principles include:

- Make learning and engagement central.
- Ensure that learning is social and often collaborative.
- Be highly attuned to learner motivations and emotions.
- Be acutely sensitive to individual differences.
- Be demanding of each learner but without excess overload.
- Use assessments consistent with learning aims, with strong emphasis on formative feedback.
- Promote horizontal connectedness across activities and subjects, in and out of school.³¹

ILE is a personalised, student-focused learning experience. These principles do not only apply to a 'school' or 'classroom' (in the traditional, rigid sense) but are relevant to any environment in which learning is taking place. This can be inside a classroom, in a more flexible and open collaborative working space, outside or in a virtual environment. It requires a great shift in thinking – that education should be meeting the needs of a vast range of individuals,

which requires a vast range of learning methods and environments in which the individual can flourish. Social interaction is key, with spaces that enable seamless interaction between educators and learners. Being highly attuned to the emotional state of the learner and being open to the differences between the individual learners safeguards educators from creating a 'one size fits all' approach to classroom teaching. This, in turn, increases learner motivation and guards against disengagement.

Shifting the dial from a disengaged classroom to inspired students

A 2009 study in Western Australia involving 1,300 students, found that about 40% of students displayed unproductive behaviours in any given year.³² The main cause of unproductive behaviour, on the whole, was not violent or anti-social behaviour, but disengagement. The exact source of disengagement is hard to pinpoint, as few studies have been able to make quantifiable conclusions in this area. However, it is clear that boredom is a factor as well as lack of motivation. This prevalence of disengagement was also higher in low socio-economic areas. Factors relating to disengagement can come from a wide range of sources – from poor quality teaching to an unsettled home life. Research has shown, however, that the physical attributes of a learning environment can also have a direct impact on the students' attention span, creativity, engagement and mood.

In Fisher's paper on the impact of infrastructure on student outcomes and behaviour, he states that 'colour is believed to influence student attitudes, behaviours and learning, particularly student attention span and sense of time.

It is also believed that carefully planned colour schemes can influence absenteeism, promote positive feelings about the school and, if students like the colours, can also influence muscular tension and motor control.'³³ Fisher's findings show that certain colours can even have a negative impact on a student's engagement and creativity by causing detachment or sleepiness, whereas other colours can increase alertness or activity (see following page).

Colors and their Impact on Students (adapted from Gimbel 199712 and Pile 199713)

	Activity areas	Passages	Dining areas	Entertainment areas	Study areas	Stress areas	Kitchen areas	Bathroom areas	Offices	Play areas	Entrances	Lecture rooms
Red	Yes	Yes			No	No			No			
Orange	Yes		Yes	Yes	No	No						
Yellow	Do not use											
Green	No				Yes							
Torquoise	No								Yes	No		
Blue			No	No					Yes			
Violet												Yes
Magenta			No								Yes	Yes
Black	Do not use											
White	Do not use											

Lighting can have an effect on student outcomes, notes Fisher. Good lighting contributes positively to the psychological character of a learning space:

- studies confirm that appropriately designed and well-maintained lighting improves students' achievement scores for fifth and sixth grade students
- poor lighting has a negative effect on students' neuron functions, hyperactivity, health and task behavior
- ultra-violet enhanced broad-spectrum fluorescent lighting can result in better attendance, growth and development.³⁴

Case study: A flexible, imaginative space for learning – Maldon Primary School

Maldon Primary School is located 136km out of Melbourne's CBD. In 2008 the school received a Better Schools Today grant of \$280,000 to upgrade the school into a 21st century learning environment. Significant research was undertaken in order to create a plan for the school to grow its existing facilities into flexible, technologically-rich, engaging spaces for the students. Special attention was given to creating flexible spaces, allowing for collaborative work, comfort for the students, inspiring colour and increased storage for growing amount of ICT equipment.

Student-centred spaces were created, including flexible items of furniture for multiple uses. Soft furnishings and curved designs created a place of comfort and warmth for the students. Students were able to reconfigure the classroom using the multimodal furniture, creating collaborative work areas or using the soft furnishings and cushions for individual and reflective processes. The whole classroom was used to its maximum potential, with formal classroom configurations transforming into new areas for exploration and play. A significant advantage to light, moveable furniture is in the way the children can take control of their space and contribute to their own learning environment. It makes collaboration more effective, inviting the learner into the learning process and engaging them with their teacher.

Orange became a feature colour of the school, with furniture and walls painted to add a feeling of vibrancy to the school. Around the grounds of the school, there are areas for active and reflective play, as well as sculptures and feature gardens. All these aesthetic elements add to the imaginative tone of the school – that the school is clearly a place inspiring creativity and wonder.

Innovative learning environments using outdoor space

Outdoor spaces are immensely important as we move school environments into the 21st century. With a focus on ecologically sustainable architecture in wider society, schools need to be modelling these energy efficient principles to students. The benefit is two-fold, with energy costs reducing, alongside a ripe learning environment for students as they explore what it means to live in a sustainable environment.

Green roofs have become increasingly popular around Europe and Asia.

Green roofs are partly or completely covered in vegetation or growing medium, their benefits ranging from conservation to aesthetic. Plant material acts as a natural layer of insulation, reducing the energy outgoings of the school from heating and cooling. It also serves to regulate storm-water runoff, provides sound insulation and increased shaded area options around the building.

The benefits of green roofs are not limited to energy conservation. They also serve aesthetic functions, better blending the built and natural environments. This is a particularly important element in places of urban density. City schools can reintroduce natural elements in lieu of significant amounts of surrounding bushland. It also increases the biodiversity of the area.



Case study: The natural environment inspiring creativity – The Lok Sin Tong Leung Wong Wai Fong Memorial School, Hong Kong

This primary school in Hong Kong uses the natural environment to inspire creativity in its students. To improve literacy and story writing in its curriculum, the school created the 'Story Garden' – a particularly calm and inviting space for student to reflect, write and share their creations with other students. There is also a wall where laminated stories the students have written are put on display for the enjoyment of other students.

ICT in the classroom and future-proofing our schools

“ A fundamental reason to pursue technology-rich learning environments is that we live in a digital world.³⁵ ”

With the rapid advancement of technology over the last few decades, jobs of the present and future are also changing at a rapid rate. Research undertaken by PwC has indicated that 44% of current jobs in Australia are at risk of being disrupted by computerisation and technology over the next 20 years, and a further 18.4% of the workforce has a medium probability of having their roles eliminated.³⁶ Modelling by PwC has found that by shifting just 1% of the workforce

into STEM roles would add \$57.4 billion to GDP (net present value over 20 years).³⁷ Contrast this with the declining results in Australian students' mathematics and the stagnation in science results, and it becomes clear that the school system is not adequately preparing students for the future workforce. It also presents a concerning prediction of the state of Australia's future workforce and economy as a whole. Since conducting this research PwC has engaged in two

strategic partnerships with Teach for Australia and Little Scientists to ensure we are not just articulating the problem in the job market, but also contributing to the solution. In its report on future-proofing our workforce by investing in STEM, PwC modelled the occupations which are most likely to endure the technological advances of the future.

Australian jobs least at risk from computerization and technology over the next 20 years³⁸

Occupation	Probability of being automated	Number of workers affected
Medical practitioners	0.4%	89,754
Education, health and welfare managers	0.7%	75,082
Midwives and nurses	0.9%	301,762
Advertising, Public Relations and sales managers	1.5%	126,616
Database and systems administrators, and ICT Security Specialists	3.0%	34,764
Education professionals	3.3%	56,264
ICT managers	3.5%	57,184
Tertiary-level teachers	3.6%	116,001
School teachers	4.0%	407,693
Engineering professionals	4.2%	132,736
Legal professionals	6.5%	82,552
Social and welfare workers	6.8%	123,933
Accommodation and hospitality managers	7.2%	100,765
Construction, distribution and production managers	8.2%	258,794
Child carers	8.4%	130,510
ICT network and support professionals	9.7%	49,688

As the world becomes more interconnected and global markets for skills and innovation develop even further, it will be crucial for Australia to have enough highly skilled people able to adapt to the uncertainties of a rapidly changing future.³⁹

These professions, on the whole, are highly technical fields requiring higher level thinking and creative intelligence. Roles such as nurses, doctors, IT professionals, teachers, engineers and managers all sit highly on the list of occupations most likely to flourish through times of technological change. And all these professions require a commitment to STEM education and innovative learning.

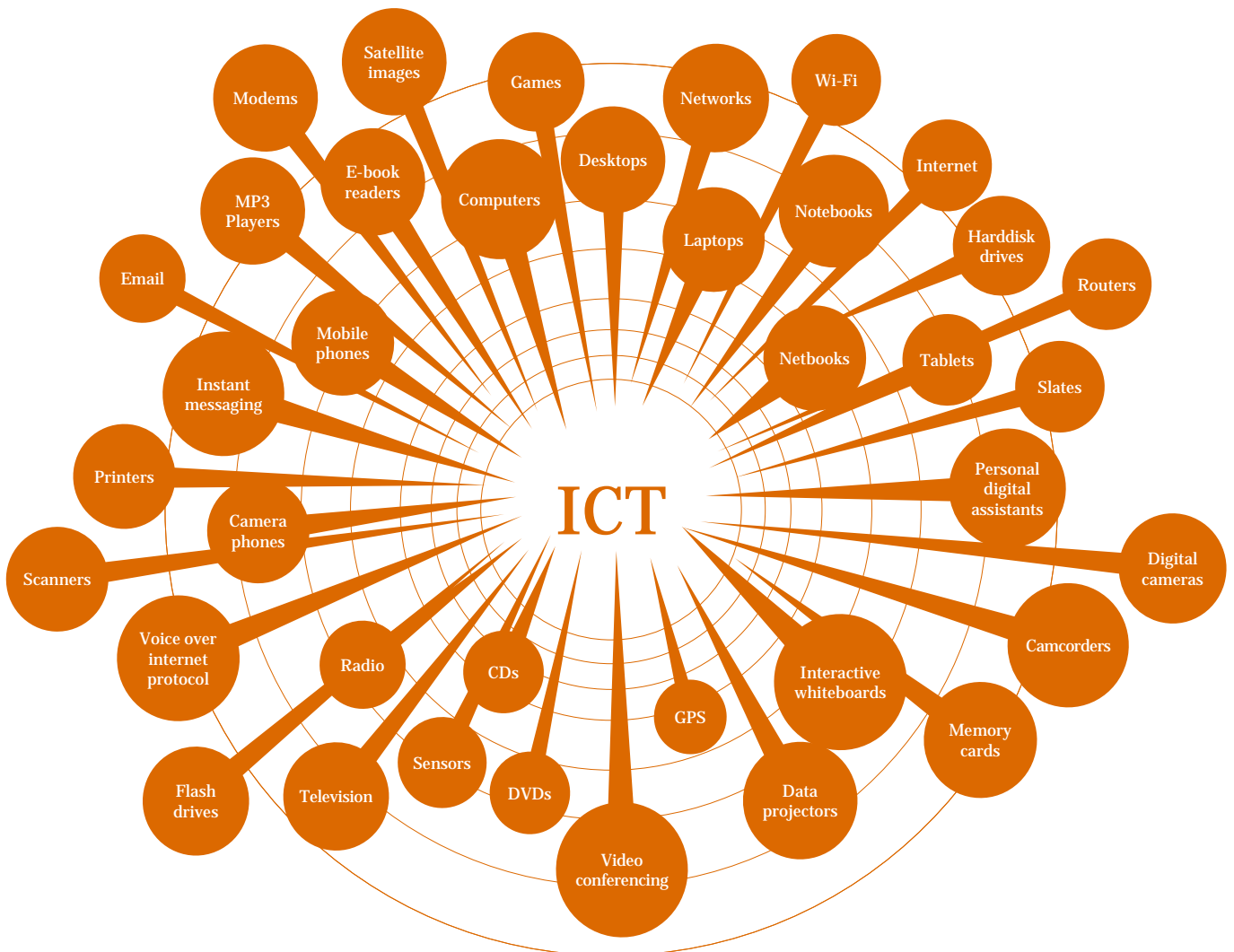
While it is beneficial to model the future resilience of existing professions, these studies do not take into account the future professions of which we are not yet aware. The rapidly changing nature of technology makes these future needs difficult to predict. We do know, however, that technology and innovation are driving these changes to the workforce, and that the best investment in the unknown jobs of the future is to commit to STEM education.

Technology needs to be integrated into the classroom to enable teachers to effectively teach STEM subjects. This requires two essential ingredients: teacher competency in technology and access to technological hardware and software.

In their paper on mobile-intensive pedagogies in schools, UTS researchers found that in order to ensure learning technologies are used in pedagogically sound ways, teachers need greater professional support.⁴⁰ Teachers need to feel that their skills are developing alongside technological advances in order to confidently integrate these technologies into classroom practice.

Teachers also need to have the physical hardware and software programs in order to implement these pedagogies. Hardware ranges from computers, printers, cameras, interactive whiteboards to mobile-intensive styles of teaching, also known as *Third space learning*.

Figure 2: Common and emerging innovations of technology in learning environments



Adapted from UNESCO (2010), *ICT Transforming education: Regional Guide*, UNESCO Publishing, Bangkok.

Third space learning

Third space learning is the ability to teach anywhere without being tethered to a classroom. Learning can take place outside, in different classrooms and in other parts of the school, according to the lesson requirements. In mobile-intensive pedagogy, learning is facilitated through mobile devices which act as a resource for learning. These devices may include a tablet⁴¹, a smartphone, a laptop or a 2-in-1 device that functions as a laptop and tablet. These types of technologies break down the physical walls of the classroom and allow for flexible, collaborative

learning across unlimited areas of the school.

Large groups can be broken down into smaller working groups spread across a larger area than a restrictive computer lab. UTS researchers also found that mobile-intensive practices changed the role of the teacher within the classroom. Teachers became more mobile in their engagement with their students, with the ability to interact with the students on a more personal level.⁴² Untethering the teacher from the front of the class allows for a more fluid learning space with a wider range of interactions between both students and teachers.

Investment in mobile-intensive learning also helps future-proof schools with regard to emerging technologies. We do not yet know what educational practice will look like in the future, however by pulling down the four walls of the classroom and opening up learning to multi-faceted spaces, we are in a better position to move with advances as they happen. Learning will not be restricted to the classroom, but can happen from the home, outdoors or on even during a daily commute.



Making funding go further

A key consideration regarding the development of innovative, creative and flexible learning spaces is the source of funding required to create these spaces. In the context of public schools, government funding is usually provided on a needs-basis, or requires a level of scalability in order to be delivered to multiple schools at the most efficient cost. As a result, these spaces may not be viewed as a core necessity and priority in the funding allocation process.

Funding can also be subject to the political cycle. Constantly changing policy and funding parameters make it more difficult for innovations to be protected and justified in light of funding allocation.⁴³ One project found that, as a result, principals ultimately lost control of their learning environments.⁴⁴ Teachers and students may desire the opportunity to work in new learning spaces, however current funding models mean they may not have the funding allocated to create them, or for the teachers to be effectively trained on how best to use these spaces.

In a capital funding constrained environment, government should focus on strategic partnerships that “make its dollar go further” and maximise a school’s ability to create innovative learning spaces, and build capacity for these schools to train teachers in how best to utilise the spaces.

Partnerships and additional funding sources

Partnerships with the community, private sector and not-for-profit organisations can assist in providing finance support, training and grants that can be used to deliver innovative learning spaces and ensure teachers are prepared to utilise the spaces to their full potential. These partnerships can lead to initiatives that have the potential to be scaled up and industrialised⁴⁷, subsequently attracting additional funding. Allowing the non-government sector opportunities in operation of non-core school services (for example, school administration, catering or canteen facilities or uniform shops), could potentially not only lead to greater efficiency and innovation, but could also generate revenue benefits to offset against recurrent costs. Further, where an education or community precinct is created via partnerships, costs may be shared or additional revenue generated.

Involving the non-government sector in the master planning of the school solution at the earliest stages may also yield value benefits - not only through identification of sites not usually available to the State, but via offsetting any value uplift within a wider development against the capital cost of the school facility and providing innovative technology solutions to future-proof the learning environment.

A clustered network of schools sharing services and functions

Kunskapsskolan is an example of a school network that has made use of learning spaces in more progressive ways⁴⁵ in order to reduce required funding and utilise other viable options to achieve the creation of more innovative learning spaces. The learning environment is key to the Kunskapsskolan model of education.

The purpose of the architecture is to create the optimal environment for learning, through purpose-designed and multi-functional facilities for lectures, group sessions and individual studies.⁴⁶ They use centralised study and lunch rooms, and use most spaces in multiple ways.

They also rent smaller inner city locations where groups of up to 150 students use the learning spaces with minimal refurbishment. They have a reputation of designing schools in the UK using more cost and space effective design techniques than traditional school design.

Schools enabling community

Schools also play an important role in encouraging and enabling positive community outcomes and contributing to the broader space they are a part of. This can happen through the innovative use of school space in partnership with other organisations.

Education precincts

For many students, their school is their own mini-city and mini-community – where they learn, create, interact, compete, relax, live, work and play. The facilities can be intentionally designed to create a sense of ‘place’, and to facilitate healthy interactions and relationships.

In this vein, education precincts can be created to include schools with varying focuses (for example, Primary, Secondary, Schools for Specific Purposes), and a mix of government schools and non-government schools.

An example of this is Brookside Centre located in Caroline Springs (a master-planned community in Victoria), which features shared facilities between schools (including government, independent and Catholic), and also into the community (e.g. a leisure centre and football grounds)⁴⁸. Dalkeith Schools Community Campus in Scotland is also based on a similar concept.⁴⁹

Community precincts

Schools can partner with local councils, or even the non-government sector, to establish a community precinct – which may include shared-use sporting fields and facilities, halls, day care centres or even a cafe. An example of this is the Victoria Avenue Community Precinct in Canada Bay.⁵⁰

The Subiaco Primary School adopts a proactive approach to sharing its facilities in the form of the weekly Subiaco Farmer’s Market. The collaboration between the primary school and the farmers market is an excellent local, small-scale approach to more effectively share facilities and encourage activity and health community outcomes.⁵¹

On a larger scale, the Victorian Schools PPP⁵² is an example of government partnering with a private sector in the design, construction and maintenance of a school facility with YMCA facilities, long day care, community centres, large theatres, kitchen facilities for the “Stephanie Alexander Kitchen Garden program”, additional music facilities and multiple innovations in the school design to ensure future-focus.



Moving schools forward

Teaching pedagogy has changed at a rapid rate over the last couple of decades due to new research into personalised, student-centred learning, as well as a rapidly changing technological landscape. Unfortunately, our school infrastructure is frozen in a time of didactic teaching methods with little room for collaborative and engaging teaching methods. In order to bring our schools into this century, steps need to be taken to allow for these developing pedagogies. We suggest:

- Development of a methodology to **prioritise the upgrading and refurbishment** of our school assets. This will mean investing time into schools, studying how changing the format and furniture of a classroom can better enable flexible, engaging spaces.
- Assessment of outdoor areas to ensure there is a **seamless integration** of the natural and built environment. This includes using the natural environment to create environmentally sustainable schools for the future.
- Development of a plan for upgraded **technology for integration** into school life. This will include mobile 'third space' environments for flexible, technologically-rich lessons.
- Thinking creatively about how to **train teachers** in rapidly evolving technologies so that they are equipped and confident to use these digital assets in the classroom. This will enhance student learning in technology and ensure they are better positioned to engage with future technologies and professions. This training should align with the goals of a school's strategic plan.
- Commitment to **STEM education** through training current teachers, incorporating specialist teachers and encouraging people of STEM subject backgrounds to choose education as an occupation.
- Engaging **private sector investment** interest in schools by presenting schools as significant contributors to the future growth and economy of Australia.
- Encouraging effective evolution of learning spaces by planning for change and **involving teachers and school leaders** in new ways of teaching and learning.
- Seeking opportunities for the **creation of community** within schools or via the utilisation of schools to create positive neighbourhood and community outcomes – with schools at the heart of our cities, regions and societies.
- Actively considering **opportunities for additional funding sources** or cost sharing through the use of strategic partnerships, to enable the upgrading of school infrastructure to be innovative and future-focused.

PwC believe that education is the key to the future economic and social prosperity of this country. However, current schools are not enabling teachers to embrace new and effective teaching strategies while they are trapped in rigid and restrictive environments which do not correlate with 21st century teaching practice. By transforming schools from mere four-walled rooms into open, inspiring, flexible and collaborative spaces, rich in integrated modern technologies, we are creating an environment where our students can engage and flourish. This will equip our young people with all that they need to thrive in a future society that requires creative, critical thinkers with high-end technological abilities.

Endnotes

1. 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>
2. OECD, PISA in Focus 13: Does Money buy strong performance?, Organisation for Economic Co-operation and Development, 2012.
3. 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>
4. OECD (2012), Equity and Quality in Education: Supporting Disadvantaged Students and Schools, OECD Publishing. <http://dx.doi.org/10.1787/9789264130852-en>
5. Ibid.
6. 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
7. The World Bank. 2016. Poland's Education System: Leading in Europe. [ONLINE] Available at: <http://www.worldbank.org/en/news/opinion/2016/01/22/polands-education-system-leading-in-europe>. [Accessed 30 March 2017].
8. Estonian World. 2016. PISA study: the Estonian basic education is the best in Europe. [ONLINE] Available at: <http://estonianworld.com/knowledge/oecd-estonian-elementary-education-best-europe/>. [Accessed 20 March 2017].
9. OECD. 2016. PISA 2015: Results in Focus. [ONLINE] Available at: <https://www.oecd.org/pisa/pisa-2015-results-in-focus.pdf>. [Accessed 23 March 2017].
10. Ibid.
11. 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=227787458.95a976a11dccc1ce716807f8be65a69c7.1488225146017.1488225146017.1488225146017.1&__hssc=227787458.1.1488225146021&__hsfp=1395116972
12. 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>
13. ACER. 2013. PISA 2012: How Australia measures up. [ONLINE] Available at: <https://rd.acer.org/article/pisa-2012-how-australia-measures-up>. [Accessed 26 March 2017].
14. Melbourne Graduate School of Education, Focusing on the learner: Charting a way forward for Australian education, University of Melbourne, 2013.
15. Sahlberg, P, 2007. Education policies for raising student learning: the Finnish approach. Journal of Education Policy, [Online]. 22/2, 147-171. Available at: http://s3.amazonaws.com/academia.edu.documents/45603242/Education-policies-for-raising-learning-JEP.pdf?AWSAccessKeyId=AKIAIWOWYYGZ2Y53UL3A&Expires=1491204469&Signature=afpXsSG%2FlxP7B33m5P3Rp%2Fkccck%3D&response-content-disposition=inline%3B%20filename%3DEducation_policies_for_raising_student_l.pdf [Accessed 3 April 2017].
16. Hattie, J 2016, Hattie Ranking – Interactive Visualisation, Visible Learning, viewed 31 March 2017, <https://visible-learning.org/nvd3/visualize/hattie-ranking-interactive-2009-2011-2015.html>.
17. Hattie, J. (2012). Visible Learning for Teachers: Maximising Impact on learning. London, Routledge
18. Fisher, K. (2016). The Translational Design of Schools: An Evidence-Based Approach to Aligning Pedagogy and Learning Environments. Rotterdam: Sense.

Endnotes continued

19. Wagner, T, 2012. Calling All Innovators. Educational Leadership, [Online]. 69/7, 66-69. Available at: <http://www.tonywagner.com/1016> [Accessed 31 March 2017].
20. BIE. 2017. What is Project Based Learning (PBL)?. [ONLINE] Available at: http://www.bie.org/about/what_pbl. [Accessed 21 March 2017].
21. Wagner, T, 2012. Calling All Innovators. Educational Leadership, [Online]. 69/7, 66-69. Available at: <http://www.tonywagner.com/1016> [Accessed 31 March 2017].
22. The University of Sydney. 2017. Teaching and Learning Spaces. [ONLINE] Available at <http://sydney.edu.au/perkins/research-education-hub/teaching-learning-spaces.shtml>. [Accessed 24 March 2017].
23. Macquarie University. 2017. Presentation practice pods. [ONLINE] Available at: <http://www.mq.edu.au/about/campus-services-and-facilities/library/facilities/presentation-practice-pods>. [Accessed 20 March 2017].
24. WMK Architecture. 2017. Northern Beaches Christian School: School of the Future. [ONLINE] Available at: <http://www.wmkarchitecture.com/projects/business/education-and-training/northern-beaches-christian-school/>. [Accessed 22 March 2017].
25. Fisher, K 2001, Building better outcomes: the impact of school infrastructure on student outcomes and behaviour, Schooling Issues Digest, DETYA, Canberra, viewed 17 February 2009, http://www.dest.gov.au/sectors/school_education/publications_resources/schooling_issues_digest/
26. Royal Institute of British Architects (RIBA), Better Spaces for Learning, RIBA, 2016.
27. Ibid.
28. Ibid.
29. Federation University Australia. 2016. Creating a teaching and learning space. [ONLINE] Available at: <https://federation.edu.au/staff/learning-and-teaching/teaching-practice/what-is-effective-teaching/creating-a-teaching-and-learning-space>. [Accessed 25 March 2017].
30. Association for Learning Environments. 2016. Learning Environments Australasia. [ONLINE] Available at: <https://a4le.org.au/>. [Accessed 27 March 2017].
31. OECD (2013), Innovative Learning Environments, Educational Research and Innovation, OECD Publishing. <http://dx.doi.org/10.1787/9789264203488-en>
32. Angus, M, 2010. The Pipeline Project: Trajectories of classroom behaviour and academic progress: a study of student engagement with learning. School of Education. Mount Lawley: Edith Cowan University.
33. Fisher, K 2001, Building better outcomes: the impact of school infrastructure on student outcomes and behaviour, Schooling Issues Digest, DETYA, Canberra, viewed 17 February 2009, http://www.dest.gov.au/sectors/school_education/publications_resources/schooling_issues_digest/.
34. Ibid
35. OECD (2013), Innovative Learning Environments, Educational Research and Innovation, OECD Publishing. <http://dx.doi.org/10.1787/9789264203488-en>
36. PwC, A smart move – future-proofing Australia’s workforce by growing skills in STEM, PwC, 2015.
37. Ibid.
38. Ibid.
39. Bradley, D., Noonan, P., Nugent, H., & Scales, B. (2008). Review of Australian higher education, Final report. Canberra: Commonwealth of Australia. Accessed May 19, 2009, from http://www.deewr.gov.au/he_review_finalreport
40. Shuck, S; Maher, D; Perry, R, Moving Classrooms to Third Space Learning, University of Technology, Sydney. 2016

Endnotes continued

41. Ibid.
42. Ibid.
43. Blackmore, J., Bateman, D., Cloonan, A., Dixon, M., Loughlin, J., O'Mara, J. and Senior, K. 2011. Innovative learning environments research study. Victoria: Department of Education and Early Childhood Development, [Online]. Available at: <http://www.learningspaces.edu.au/docs/learningspaces-final-report.pdf> [Accessed 28 March 2017].
44. Ibid.
45. Kunskapsskolan. 2017. The KED Program. [ONLINE] Available at: <http://www.kunskapsskolan.com/thekedprogram.4.1d96c045153756b0c14d5798.html>. [Accessed 15 March 2017].
46. Ibid.
47. PwC, Education will be the engine room of Australia's future prosperity, PwC, 2017.
48. Victoria State Government - Education and Training. 2005. Schools As Community Facilities: Policy Framework and Guidelines. [ONLINE] Available at: <http://www.education.vic.gov.au/Documents/school/principals/infrastructure/sacfpolfworkg.pdf>. [Accessed 3 April 2017].
49. BAM PPP. 2012. Dalkeith Schools Community Campus. [ONLINE] Available at: <http://www.bamppp.com/projects/dalkeith-schools-community-campus>. [Accessed 6 April 2017].
50. Association for Learning Environments. 2015. Victoria Avenue Community Precinct Canada Bay PS. [ONLINE] Available at: <http://a4le.org.au/awards/2015-awards/2015-category-5-an-educative-initiative/-design-solution-for-an-innovative-program/victoria-avenue-community-precinct-canada-bay-ps>. [Accessed 4 April 2017].
51. Healthy Active By Design. 2017. Subiaco Primary School and Subiaco Farmers' Market. [ONLINE] Available at: <http://www.healthyactivebydesign.com.au/case-studies/subiaco-primary-school-and-subiaco-farmers-market>. [Accessed 3 April 2017].
52. Victoria State Government - Treasury and Finance. 2016. Project Summary: New Schools Public Private Partnership (PPP) Project. [ONLINE] Available at: http://www.dtf.vic.gov.au/files/d4b12ec2-ba21-4d0a-a90c-a5d2008c5d13/Project-Summary_New-Schools-PPP-Project.pdf. [Accessed 30 March 2017].

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