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Connecting the worlds of learning and work

Prioritising school-industry partnerships in Australia's education system

JULY 2018

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The opinions in this report are those of the Mitchell Institute and do not necessarily represent the views of the project funders, participants at the roundtable or reviewers.

About the Mitchell Institute

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Executive summary

A collective challenge

Globalisation and advances in smart technology are transforming jobs, workplaces and careers at an unprecedented rate. More is being demanded of schools to prepare young people for an unpredictable and uncertain future, but there are limits to what schools can achieve in isolation from the wider community.

Both schools and industry play a role in ensuring that all children and young people are given learning opportunities that enable them to reach their full potential and develop the skills and capabilities that are needed in future jobs.

The project

Renewed policy focus on school-industry partnerships

In June 2018, Mitchell Institute brought together a group of leaders for a policy roundtable – to build greater understanding of the roles industry can play in education, and address how Australia's education system can better support partnerships between schools and industry that equip all young people for their futures.

This policy report brings together views from the expert stakeholder roundtable and analysis of current policies and research.

Key findings

There are a broad range of approaches to school-industry partnerships

School-industry partnerships offer a range of activities to students from primary school to secondary school, including real world learning projects, mentoring programs, career-taster days, competitions and events, and teacher professional development workshops. Partnerships can range from individual schools working with a local employer, to regional economic development ecosystems involving multiple schools and industry partners. Intermediaries that facilitate partnerships play an important role in the education ecosystem, and include organisations like industry associations, universities, not-for-profit organisations and government departments. The flexibility of approaches mean that partnerships can be tailored to local contexts and learners' needs.

School-industry partnerships can contribute to a wide range of student outcomes

Partnership activities provide rich real world learning opportunities that spark students' curiosity, and open students to a range of new and emerging professions. Activities are linked to improved engagement in learning and support the development of capabilities critical to the future of work, including problem solving, collaboration, enhanced STEM skills, digital literacy skills, and entrepreneurial mindsets. Benefits can be amplified for students from disadvantaged backgrounds that may lack the networks that facilitate access to a broad set of employment opportunities. The knowledge-sharing that occurs between teachers and industry professionals also supports teachers to provide more innovative and enriched learning.

School-industry partnerships have been on the policy agenda for several years, but have not yet been implemented in all schools

Not all students in Australian schools have opportunities to engage with industry across their years of schooling. The recent *Gonski 2.0 Review* found that partnerships are still "not common practice and implementation can be ad hoc" (Gonski et al., 2018). There are gaps in understanding at the system level regarding where school-industry partnerships are happening, and where students are missing out.

Many schools engage with industry partners, but there are persistent barriers

There are a number of blockers at the system level that prevent school-industry partnerships from flourishing in all schools. Barriers include the lack of time to prioritise school-industry partnerships amongst other priorities in schools (such as delivering the national curriculum and lifting literacy and numeracy), as well as structural barriers that add a layer of complexity to establishing partnerships (such as procurement policies and child safety requirements). Teachers play a central role in school-industry partnerships, yet many lack the time and expertise to form partnerships with industry, and integrate partnership activities with teaching the school curriculum.

What needs to change to make school-industry partnerships a priority?

The report recommends three key priorities for change:

1. **School-industry partnerships need to be valued and measured at the system level**

   For school-industry partnerships to count, they need to be measured and reported at the system level, recognised in schools and communicated to parents. More work needs to be done to understand the variety of partnership activities and develop ways to measure the range of outcomes they contribute to across the system.

2. **School-industry partnerships need to be a priority in all schools**

   There needs to be recognition at the system level that partnerships require time and resources. Many schools are overwhelmed with the range of demands by policy-makers – so determining trade-offs within the curriculum will be necessary. Release time for teachers to engage in partnerships, and/or additional resources to facilitate school-industry partnerships are key considerations.

3. **Governments need to make it easier for all parties to engage in school-industry partnerships**

   For school-industry partnerships to happen at scale, governments have a clear role to play in addressing the systemic structural barriers (regulatory and governance issues), information barriers (finding partners to connect with and understanding how to engage effectively to meet both school and industry needs), as well as equity barriers (ensuring the schools that benefit the most are connected to suitable industry partners).

Introduction

This report addresses a collective challenge for education and employers: ensuring that all young people in Australia develop the skills and capabilities that will enable them to succeed in the future of work.

In recent years, there has been a growing consensus that partnerships between schools and industry are a highly effective way to connect young people to the world of work, and support the development of skills valued in current and future workplaces.

Many schools across the country have been building partnerships with industry, but progress has been ad hoc and partnerships are not yet common practice in all schools (Gonski et al., 2018). Disadvantaged learners have the most to gain from industry exposure, yet, too often, school-industry partnerships rely on the social and professional connections that exist within the school community – which risks leaving many disadvantaged students even further behind.

What are school-industry partnerships?

School-industry partnerships provide a range of activities that enable students to engage with the world of work as part of school learning. Generally, partnership activities aim to broaden students' understanding of the world of work and enrich school learning through providing a variety opportunities to meet and learn from industry professionals, solve real world problems and learn to use state-of-the-art technology. Partnership activities can commence as early as primary school, and are valuable through to the final years of secondary school.

Vocational education and training (VET) and careers education have been the traditional spaces in education where students gain industry exposure – for instance through structured workplace learning, work experience, and careers fairs. Traditionally, VET and careers education feature in the later years of secondary school.

However, the reality is that for all young people to understand the range of new and emerging careers and to develop the skills, knowledge and capabilities valued in the workplace – opportunities to engage with industry can't be a one-off experience. Every school student in Australia can benefit from regular opportunities to engage meaningfully with the world of work across their years of schooling.

What are the knowledge, skills and capabilities needed in the future of work?

New technologies are driving changes to occupations – across all industries. Building young people's capacity to work and create value alongside new technologies is critical to driving innovation and productivity.

Science, Technology, Engineering and Mathematics (STEM) skills are fundamental to current and future jobs. STEM skills are not limited to the knowledge generated by the individual disciplines of science, technology, engineering and mathematics, but relate also to the integrated and interdisciplinary critical thinking, design processes and digital skills that enable young people to understand and solve complex real world problems (Siekmann, 2016).

Capabilities such as collaboration, resilience and creativity and skill sets in communication, lifelong learning and entrepreneurial skills have always been integral to success in STEM occupations. However, there is a growing evidence base for the power of these capabilities in all occupations – and employers are increasingly seeking them in young people (Duckworth & Seligman, 2005; Gray, 2016; Heckman, Stixrud, & Urzua, 2006; Schleicher, 2016; The Foundation for Young Australians, 2016).

Schools should play a major role in equipping young people with these skills and capabilities, however, to do so, diversifying opportunities for learning beyond traditional approaches to schooling is critical. Closer engagement with industry partners who can provide the expertise, resources and real world contexts to support students' learning is a key way for education systems to address this issue.

This report

The focus of this report is on the critical role that school-industry partnerships play in cultivating the knowledge, skills and capabilities, including STEM skills, that current generations of school students will need to thrive in their futures.

The recent **Report of the Review to Achieve Educational Excellence in Australian Schools** chaired by David Gonski (*Gonski 2.0 Review)* reiterated the need to strengthen partnerships across the system as a way to achieve educational excellence in Australia. This report seeks to unpack school-industry partnerships, and further advance the policy goal set by the Gonski 2.0 Review.

> "Strengthen school-community engagement to enrich student learning through the establishment of mechanisms to facilitate quality partnerships, including engagement in mentoring, volunteering and extra-curricular activities, between schools, employers, members of the community, community organisations and tertiary institutions."
>
> **GONSKI 2.0 REVIEW, RECOMMENDATION 8**

This report includes analysis of the available evidence on school-industry partnerships, both locally and internationally, and draws from the views of experts at the policy roundtable held in June 2018. The term 'industry' encompasses all employers across the private, public and not-for-profit sectors.

The report will:

1. Highlight the global and national economic shifts that underscore why Australia needs to accelerate the pace of change in education;
2. Demonstrate the ways industry partnerships can be used to enrich student learning and lift outcomes;
3. Assess the current landscape of policies addressing school-industry partnerships in Australia;
4. Bring to light views from the roundtable on what works, and what's not working on the ground; and
5. Provide recommendations for a way forward – signalling how the education system must shift to ensure all students have opportunities to engage with industry across their years of schooling.

1. Why we need to shift our approach to schooling now

The World Economic Forum has identified we are entering the 'Fourth Industrial Revolution' – one in which advances in technology are bringing about unprecedented changes to the nature of work, occupations and industries (World Economic Forum, 2016).

This section analyses key labour market shifts in Australia, considers what it means for work and learning, and provides a snapshot of approaches to upskilling future generations in education systems around the world.

1.1 Technology is rapidly disrupting how we live and work

In the 'Fourth Industrial Revolution' emerging smart technologies such as artificial intelligence, robotics, Internet of Things (IoT) and big data analytics are disrupting many industries.

While only a small proportion of jobs are likely to be fully automated, many existing jobs are going through a change in the skill sets required to do them, and new jobs that didn't exist a decade ago are being created (World Economic Forum, 2016).

The implications for working in digitally enabled industries is that there will be a higher share of jobs requiring abstract thinking, non-routine work and more complex tasks that cannot be easily codified or sequenced (OECD, 2017). Typically, jobs where tasks can be performed by computer learning systems or robotics are more susceptible to automation, including data entry, operating checkouts, book-keeping, office administration and operating machinery (PwC, 2015).

In the digital economy, digital skills alone are not enough, and higher levels of cognitive skills (e.g. literacy, numeracy and problem solving), along with non-cognitive and social skills (e.g. communication) are considered necessary to thrive (OECD, 2017).

The World Economic Forum urges that reskilling and upskilling today's workers is critical for economies to bypass skills' shortages, mass unemployment and growing inequality (World Economic Forum, 2016).

> "The speed, scope and scale of new technologies as they spread in an inter-connected world mean they are affecting a greater number and variety of organisations, industries and people than in previous periods of change."
>
> **DAVIS (2018)**

1.2 Australia's workforce needs different sets of skills and capabilities to drive future growth

With an ageing population and easing of the resources boom, future prosperity in Australia depends to a large extent on finding new ways to create value and drive growth (Innovation and Science Australia, 2017). One way to drive substantial gains in productivity is by fully embracing what digital technologies can offer businesses and the broader economy – an approach that has the potential to add $140 billion to $250 billion to GDP in Australia by 2025 (Blackburn, Gartner, & Freeland, 2017).

While it is difficult to predict patterns of job displacement and creation in the context of disruptive technological change, there are some broad observations about the types of knowledge, skills and capabilities that will be critical to enabling a new era of economic growth in Australia (Innovation and Science Australia, 2017).

The critical knowledge, skills and capabilities in the 'future of work' include:

- **STEM skills:** modelling by PwC estimates that shifting 1 per cent of the workforce in Australia into STEM roles will add $57.4 billion to GDP over 20 years (PwC, 2015). STEM jobs encompass a range of fields and occupations, including natural and physical sciences, information technology, engineering and architecture and building, agriculture, environmental studies and health (PwC, 2015).

- **Digital skills:** 92 per cent of future jobs in Australia will need digital skills – including using technology to communicate, do transactions and find information, but also more advanced digital skills such as designing and building digital platforms, and developing software and algorithms will be required in more occupations (Innovation and Science Australia, 2017).

- **Transferable skills and capabilities:** advanced technologies that enable many of the routine tasks to be automated put a greater premium on workers using critical thinking, problem solving, analytic and judgement capabilities to undertake non-routine tasks (Innovation and Science Australia, 2017). Workplaces are shifting away from traditional team models based on expertise in specific areas, to flexible teams that enable businesses to react quickly to new developments (Deloitte Access Economics, 2017). In these environments, the abilities to communicate, empathise, and collaborate, as well as work flexibly, and take entrepreneurial approaches are considered critical for success.

In all of this, there are important equity considerations. Traditionally, shifts in skills demands have disproportionately affected workers with lower levels of skills and education. As there will be different capacities to adopt new technologies across the workforce, this may have the potential to skew the rewards unevenly (Davis, 2018).

Already in Australia, there are concerning disparities in educational attainment and skill levels across the population, with poorer educational and employment outcomes for people from low socioeconomic status (SES) families, Indigenous backgrounds, and people with disabilities and in non-metropolitan areas (Lamb, Jackson, Walstab, & Huo, 2015). In terms of access to and use of technology, the gap between metropolitan and regional cities grows the more remote an areas is (Regional Australia Institute, 2016).

> "If automation in Australia proceeds at its historical pace, it will deliver a significant economic dividend of around $1.2 trillion over the next 15 years, but this gain is entirely predicated on our ability to redeploy the workers that are displaced by machines into new forms of work."
>
> **ALPHABETA (2017)**

1.3 These trends are already impacting young people's transitions to employment

Recent analyses show the impact of these broader economic changes is already being felt by young people. For many twenty-first century school leavers the journey from school to the workforce is taking longer, and becoming more precarious. There are a number of factors at play for today's young people:

- **Young people in Australia are spending longer in formal education**: in 2016, Year 12 school retention was at 83 per cent (ABS, 2017). This is up nearly 10 per cent from 2000 (ABS, 2000). This means a larger proportion of students will spend more of their formative years in educational institutions with limited exposure to the world of work.

- **This generation of young people will have multiple careers**: it is estimated that today's school leavers will have 17 different employers over a lifetime and five separate careers (McCrindle Research, 2014). Opportunities to gain exposure to and understanding of a broad range of occupations and industries while in education is critical for supporting successful transitions post-school.

- **The 'new work reality' is that education alone is no longer enough to secure full-time work:** the Foundation for Young Australians has recently shown that the average transition time from education to full-time work is now 4.7 years, compared to one year in 1986 (Foundation for Young Australians, 2018). Models of education that offer students opportunities to gain real world skills are a key way to shorten the transition time.

- **Career aspirations are formed early on:** Most children are developing occupational aspirations well before secondary school (Gore, Holmes, Smith, Southgate, & Albright, 2015; Moulton, Flouri, Joshi, & Sullivan, 2014). Studies have found that children who are not interested in STEM at age 10 are unlikely to develop these aspirations and pursue STEM learning at age 14 (Mann et al., 2018). Despite the growth in new occupations, many school students' aspirations remain relatively narrow and consistent with their achievement in school subjects as well as gendered stereotypes (Baxter, 2017; Musset & Mytna Kurekova, 2018). Ensuring that a broad range of career awareness activities are extended to the primary and early secondary school years can help to lift aspirations and extend the range of career possibilities, particularly for students at risk of disengagement.

1.4 Education systems globally are addressing common challenges

This section looks at how Australia compares to education systems around the world in approaches to meeting the skills needs of the future and engaging industry in school education.

Skills for the future

There has been a strong trend in education systems globally towards integrating a 'breadth of skills' into school education to prepare students for work and life in the 21st Century (Australian Curriculum, 2018; Care, Anderson, & Kim, 2016). Broadly, the 'breadth of skills' movement encompasses building students' skills and capabilities such as communication, creativity, critical thinking, and problem solving, and extends school education beyond the acquisition of knowledge in traditional academic disciplines (Care et al., 2016).

In many countries, particularly in the Asia-Pacific region, these shifts in learning priorities are being driven by the need to build highly capable workforces that can drive growth and innovate in largely knowledge-based economies (Ra, Chin, & Liu, 2015). Of note is that for many of the countries that lead in international academic assessments, such as the Programme for International Student Assessment (PISA), rankings are not the endpoint, and they continue to build a strong focus on preparing students for life and work in the 21st Century.

Singapore's Framework for 21st Century Competencies integrates broader skills into the academic curriculum, co-curricular activities, and applied learning programs (Australian Curriculum, 2018). Finland has a set of seven 'transversal competences' at the core of the curriculum, including 'thinking and learning to learn', and 'entrepreneurial and work life skills' (Lamb, Maire, & Doecke, 2017).

Connecting students to the world of work

School-facilitated connections to the world of work are one approach for students to develop their future of work skills and capabilities. There is growing international evidence that links employer engagement and exposure to the world of work with improved student outcomes.

Opportunities to engage with the world of work have been found to support students' career decision-making and navigation ability, and enhances student motivation and engagement in education that ultimately leads to better educational attainment (Mann and Dawkins 2014). **Box 1** contains examples of studies that find evidence of positive outcomes, ranging from improved school performance to higher wages in the long-term.

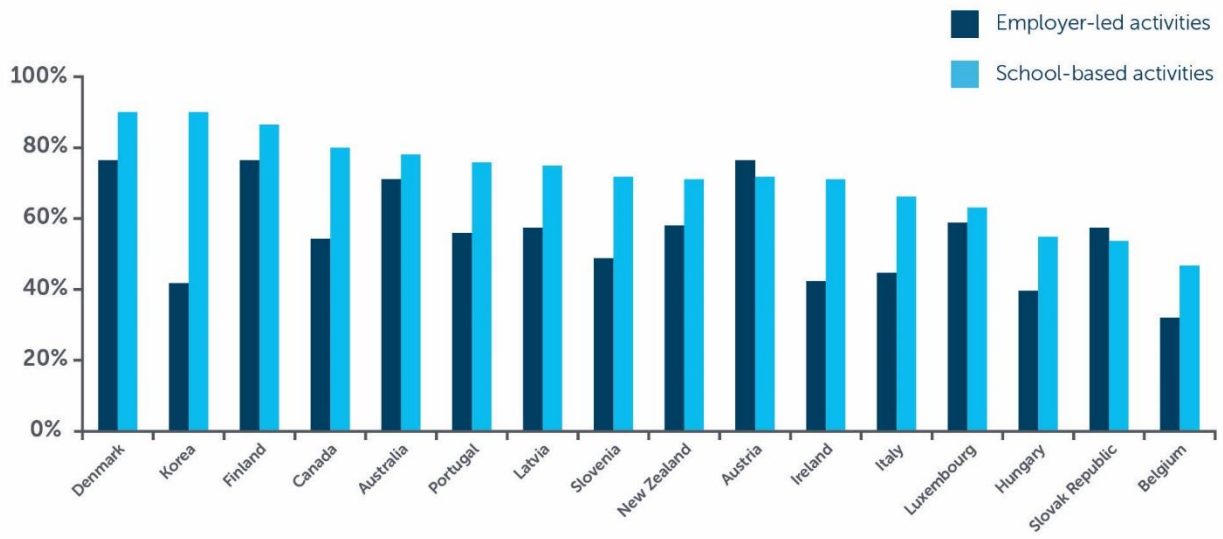
Box 1: Selected studies on the impact of school-mediated employer engagement on student outcomes

- A sample of 1,916 year 9 students in the US were given brief careers-related tasks in their mathematics class that required them to reflect on the personal relevance of mathematics to their future careers. The study showed that a low cost, short-term intervention that aimed to lift the relevance of mathematics, was able to improve students' test scores in mathematics in the five months after (Brisson et al., 2017);
- An analysis of six countries' PISA data (Australia, Belgium, Canada, Denmark, Finland, and Ireland) found a statistically significant relationship between direct exposure to the contemporary working world and higher student scores in the PISA mathematics assessments (Kashefpakdel & Schleicher);
- In a study of 169 full-time working 19-24 year olds in the UK, those who reported four or more employer contacts while in school were found to be earning annual salaries of 18 per cent higher than their peers who didn't engage with employers while at school – controlling for SES and background factors (Mann & Percy, 2014);
- A study of Career Academies programs, a combined academic and vocational high school pathway in US schools with strong industry links and workplace learning, found that Career Academies program students had earnings up to 11 per cent higher than their peers eight years after high school (Kemple & Willner, 2008).

Education systems around the world approach employer engagement in different ways. Countries like Germany, Austria, Netherlands and Switzerland, have 'dual systems' where students are separated into vocational and academic streams in secondary school. In these countries, employer engagement is deeply embedded in school vocational pathways, where secondary school students undertake industry-based apprenticeships in the final years of secondary school.

For comprehensive education systems that don't offer the 'dual tracks', such as in Australia, employer engagement is most commonly positioned within careers education. The chart below compares school engagement with employers in OECD countries based on student report in PISA 2012.

Figure 2: Percentage of students participating in employer-engaged careers activities across the OECD



Source: Musset and Mytna Kurekova (2018)

In Australia, a relatively high percentage of students report employer-led careers activities including internships, job shadowing and careers fairs, as well as school-based activities such as speaking to a careers adviser in school, indicating there is strong potential for partnerships to play a broader role in schools beyond careers activities.

Examples of different types of employer engagement activities in these two countries are provided below.

Meister Schools, South Korea

Meister schools are an innovative new model of vocational secondary school in South Korea – introduced in 2010 in response to high levels of youth unemployment and an overemphasis on academic degrees. Meister Schools are strongly industry focussed, and are able to develop their own curricula in line with industry needs (OECD, 2016). The learning focuses on building competencies including soft skills and digital literacy, with significant workplace-based learning components (World Economic Forum, 2014).

Meister Schools offer pathways to work and to higher education, and high rates of employment among Meister School students is a key indicator of their success. In 2015, there were 17,500 students enrolled in 40 Meister Schools, and of the 2013 class – 92 per cent of graduates were employed the following year (OECD, 2016). This stands in stark contrast to the employment rate of university graduates in South Korea, which in 2013 was 56 per cent (OECD, 2015).

Connected North, Canada

Connected North is a virtual education program that connects schools in remote Indigenous communities in the north of Canada to classrooms, teachers, mentors and services in the rest of the country. Indigenous students in Canada experience high rates of disengagement from school, gaps in literacy and numeracy levels and lower school completion rates compared with the broader population, as well as higher rates of mental health issues.

The program aims to improve learning outcomes for students through activities that connect students to content experts, facilitate virtual field trips to museums, galleries, science centres and careers fairs; enables group projects with other school classrooms through video sharing; and provides professional development for teachers through teacher-to-teacher and expert-to-teacher mentoring. The program has been running since 2013, and has had a strong, positive impact on student engagement in learning and student self-confidence in 33 schools (Cisco).

The program was founded by Cisco and brings together a wide range of partners, including governments, businesses, not-for-profit organisations and research institutes. It demonstrates the role partnerships can play in providing innovative and inclusive approaches to solve educational challenges. The provision of collaborative technologies is central to the program design.

2. The roles industry partnerships can play in school education

In the digital age, there are many skills and capabilities that industry partners can foster that schools struggle to do alone.

This section considers the variety of roles that industry partnerships can play in school education. The analysis draws on reviews of the broader literature on employer engagement, as well as the perspectives from experts at the roundtable.

2.1 Approaches to school-industry partnerships offer flexibility and breadth

School-industry partnerships offer a range of activities to students at different levels of schooling. Traditionally, industry partnerships have been directed towards the senior years of secondary school, through work experience and careers-awareness related activities aimed at supporting post-school transitions.

However, increasingly, partnerships with industry are seen as a way to engage students at an earlier age, and broaden students' careers awareness and aspirations from primary school. This is particularly important in STEM learning, where patterns of engagement and participation are set as young as 10 (Mann et al., 2018).

Many schools are using industry partnerships to offer inquiry-based learning opportunities within the school curriculum – particularly to enhance STEM learning (Education Services Australia, 2018). Inquiry-based learning includes a range of approaches to teaching and learning such as project-based learning, collaborative learning, hands-on learning and design-thinking approaches that support the achievement of 'deep learning'.

> School-industry partnerships "can offer something new and different to accepted practice in teaching and learning… [and] at times, be expected to offer learning experiences that deliver outcomes more effectively than traditional approaches."
>
> **MANN, REHILL, AND KASHEFPAKDEL (2018)**

School-industry partnerships can range in scale from individual schools working with a local employer to regional economic development ecosystems. The diversity of approaches to school-industry engagement enables programs to be adapted and targeted to meet the needs of different learners and their contexts.

The Ai Group (2017) STEM Skills Pilot Project found a number of different models and approaches to partnerships. Drawing from this work, types of partnership models can include:

Direct partnerships between an individual school and employer

Partnership activities can range from one-off events, incursions or excursions, career taster days, school group workplace visits, job shadowing. Activities can run during school hours as part of the school curriculum, or as 'additional' activities in after school and holiday programs.

- These partnerships provide opportunities for schools and partners to design activities that meet the needs of local students, and provide opportunities to contextualise the national curriculum to the needs of specific cohorts of learners. Contextualising the curriculum to local needs is one of the key priorities for improving outcomes for regional, rural and remote students (Halsey 2018).
- These partnerships usually require more resourcing at the school level to coordinate with industry partners and may place greater reliance on individual teachers to drive the partnership.

Large scale partnerships – engaging multiple schools, industry partners and the use of intermediaries

These partnerships tend to involve multiple component activities and run over multiple years as part of broader government regional strategic plans, and include activities such as regional industry tours, careers talks and expos, industry-based competitions and events, mentoring programs, and teacher professional development workshops. Initiatives such as specialist STEM schools, Tech Schools and Pathways in Technology (P-TECHs) represent place-based approaches to school-industry partnerships.

- These types of partnerships benefit from scale – larger impact and reach and are generally part of a broader strategic approach for local, state, or national governments to meet workforce pipeline skills needs.
- The complexity of large scale partnerships often require the use of intermediary organisations to facilitate. These roles can be taken up by education system personnel, industry associations or research organisations, universities, not-for-profit organisations, industry peak bodies, and professional associations (Ai Group, 2017).

A case study of a large scale approach to school-industry partnerships in the NSW Hunter region is included in the next section.

Industry-supported teacher professional learning

This involves teachers gaining industry exposure through industry-based work placements relevant to their teaching disciplines; teachers working with industry professionals to design learning activities; teachers participating in industry supported workshops, Massive Open Online Courses (MOOCs), conferences, or gaining formal qualifications.

- The partnerships develop teacher skills to deliver the curriculum in more enriching and innovative ways, and equipping teachers with the latest research and industry relevant knowledge, and are particularly relevant to STEM fields.
- Can involve individual teachers, or a whole of school approach; can be coordinated across multiple jurisdictions – such as Google and the University of Adelaide's free online professional learning MOOC on Digital Technologies for Australian teachers (Education Services Australia, 2018).

Example of a school-industry partnership in three Perth schools

Google coding and robotics clubs at Balga Senior High School, North Balga and Warriapendi primary schools

In three Perth schools, 300 primary and secondary level students participate in a weekly STEM-themed robotics program supported by Google. The initiative aims to re-engage students and build skills in computer science, while also developing capabilities such as problem solving and resilience.

As part of the partnership, Google provides funding support, the expertise and time of its staff – including engineers to mentor students, and professional development opportunities for teachers. The partnership was facilitated by Australian Schools Plus – a not-for-profit organisation that connects donors with schools operating in traditionally low socioeconomic areas.

Provided by Australian Schools Plus

2.2 School-industry partnerships contribute to a range of outcomes

Several reviews of the evidence base underpinning school-industry partnerships have been undertaken in recent years in Australia, and internationally (ACER, 2011; Mann et al., 2018; Musset & Mytna Kurekova, 2018; PhillipsKPA, 2010). Drawing from these reviews, as well as insights from the roundtable, a summary of the key educational outcomes associated with industry partnerships is provided in the table below.

Table 1: Summary of the outcomes of school-industry partnerships

Key educational outcomes	How is this achieved?	What role does industry play?
Increasing student engagement and participation in learning linked to future careers	• Providing enriched learning opportunities that spark students' curiosity, ignite passions and give purpose and relevance to school learning by making it practical and engaging • Leads to increased student participation in school subjects linked to the partnership	• Providing industry contexts and examples that form the basis of inquiry-based and real world learning projects • Providing enriched examples and ways of understanding the school curriculum • Direct industry input into curriculum design • Knowledge sharing with teachers to support innovations in teaching and learning
Building students' awareness and aspirations for a broad range of new and emerging careers, including STEM careers	• Exposing students to new and emerging occupations that they would not have access to in the home or school environment • De-mystifying the world of work and challenging negative assumptions about particular occupations and industries • Demonstrating the links between school learning and the	• Connecting students with industry professionals as mentors • Enabling students' access to workplaces to undertake work experience, job shadowing, site visits and simulations • Providing personnel to present at careers expos and in awareness-building campaigns

	achievement of future career goals • Demonstrating the links between aptitudes and occupations	
Developing students' 'future of work' capabilities that are relevant to current and emerging occupations *(e.g.: problem solving, collaboration, STEM skills, digital literacy skills, entrepreneurial mindsets, lifelong learning skills)*	• Informing students what 'future of work' skills and capabilities are and demonstrating how they work in practice • Providing opportunities for students to test and apply technical skills and broader capabilities to real world contexts • Supporting teachers to develop these skills themselves as well as develop them in students	• Providing industry contexts and examples that form the basis of inquiry-based and real world learning projects • Enabling students access to workplaces for work integrated learning or placements • Providing industry professionals as coaches or judges in competitions, capstone projects, performances, and presentations
Supporting students to transition from school to work and develop key employability and work-readiness skills	• Building students' understanding of the current labour market • Building students' understanding of industry expectations and the skills necessary to succeed in the workplace • Guiding and supporting students to plan education and training pathways, and to apply for jobs	• Enabling students' access to workplaces for work experience or work placements • Connecting students with industry professionals as mentors or to 'job shadow' • Providing industry professionals to undertake mock interviews with students and to give advice on writing CVs and job applications
Building the capability of school leadership and teachers	• Knowledge sharing from the business world to support school leadership • Building teachers' awareness and understanding of new digital technologies and industry relevant knowledge • Supporting teachers to provide innovative and enriched learning	• Providing industry-based placements for teachers • Running professional learning workshops and courses for teachers • Connecting teachers with industry professionals as mentors
Increasing access to state-of-the-art, industry standard technology and equipment to support teaching and learning	• Providing additional infrastructure, resources that schools would not otherwise have access to • Levelling the playing field between disadvantaged schools and schools with more resources	• Direct input of technology and equipment • Enabling access to online platforms • Providing expertise to support schools to use technology to deliver the curriculum

Partnership activities impact students differently depending on the student's context, academic achievement levels, education setting, social and cultural capital, age as well as the quality of the experience (Mann et al., 2018).

Experts at the roundtable reiterated the key point that opportunities to engage with a range of industry partners are particularly important for children and young people from low SES backgrounds who may lack the networks that facilitate access to a broad set of employment opportunities. Exposure to a range of occupations adds more pathways and choices, and is one of the key benefits of partnerships.

School-industry partnerships are also important for challenging students' assumptions about particular occupations. This has particular relevance to many STEM fields, where gender stereotyping may deter girls from pursuing STEM career pathways.

Ensuring that students have access to multiple and varied partnership initiatives across their years of schooling is important. OECD research suggests that policy-makers should focus on lifting the quantity and quality of engagement activities, and consider targeted approaches for students who lack strong family networks (Musset & Mytna Kurekova, 2018).

> "Our students crave experiential learning opportunities and thrive when they have experiences outside the traditional educational setting."
>
> **SECONDARY SCHOOL TEACHER**

The roundtable discussion also revealed that partnerships don't just meet the needs of schools or students, but play a role in a broader ecosystem – generating value for a range of different stakeholders (Figure 3).

Figure 3: The value of school-industry partnerships beyond the classroom

2.3 Case study: how school-industry partnerships can lift outcomes

There are no shortage of exemplars of school-industry partnerships in Australian education. This section provides an example of an ecosystem approach to school-industry partnerships in New South Wales (NSW).

Regional Development Australia, Hunter Region (RDA Hunter)

The RDA Hunter approach to school-industry partnerships demonstrates the range of outcomes that can be achieved through effective partnerships. As part of a regional *STEM Workforce Initiative*, RDA Hunter coordinates multiple programs that link school students, aged 8-18, to industry. Programs have provided:

- Technology and resources to help students engage in STEM learning;
- Exposure to STEM activities via competitions, festivals, and other events;
- Resource grants, mentoring programs, entrepreneurship programs, STEM scholarships, promotion of defence industry careers, career expos, and hands-on STEM activities;
- The development of an integrated STEM curriculum, iSTEM, for years 9 and 10 students;
- STEM teacher site visits to contextualise subject materials for teachers.

Outcomes

RDA Hunter reports that in 2016-17, there were more than 16,000 students involved in their core initiative, the *ME Program*. Between 2010 and 2017, overall participation in STEM subjects for schools involved in the ME Program increased by 19 per cent, while the NSW-wide average STEM subject enrolments fell by 0.5 per cent in the same period.

The RDA Hunter approach to partnerships also facilitates students' transitions. The *STEMship* program offers students 17 week training and work placements (after year 10) focussing on the development of STEM skills at a technical level. Delivered by TAFE NSW, secondary students receive a Certificate III Engineering – Technical and an opportunity to work in local industries. The program is led by industry and allows students to move into employment, technical apprenticeships, or further education upon completion. Since 2016, the majority of participating students have commenced apprenticeships or enrolled in further VET courses.

Key factors for success

- Close links with industry – RDA Hunter initiatives are industry-led to ensure that educational activities are meeting workforce requirements.
- RDA Hunter act as an intermediary for the regional program, that is connected to a broader regional economic development strategy.

(Details provided by RDA Hunter)

3. School-industry partnerships policy in Australia

This section takes stock of the approach to school-industry partnerships in the Australian education system, looking at recent national policies that address partnerships, and considering where attention needs to be focussed to ensure continued momentum.

3.1 Australian Policy Context

Recent policy developments

Over the past 10 years, national school-industry partnerships policy has had several approaches and efforts.

In 2011, the **Business-School Connections Roundtable** process, established by the Australian Government, collated the evidence base and developed national policy directions for school-industry partnerships, as well as a raft of guides and resources (Commonwealth Department of Education & Training, 2013).

From 2014, the STEM agenda gained momentum, and the focus on school-industry partnerships became closely aligned to improving STEM outcomes. In 2017, the COAG Education Council established the **STEM Partnerships Forum** to enhance STEM education through partnerships with industry (COAG Education Council, 2015). The final report of the STEM Partnerships Forum put forward a number of recommendations to advance STEM teaching and learning – including the need to establish a national STEM toolkit to give schools guidance on how to establish a partnership.

The 2018 **Review to Achieve Educational Excellence in Australian Schools** (Gonski 2.0 Review) reaffirmed the role of school-industry collaboration as a way to improve broader education and employment outcomes. The major review includes school-community engagement as a key recommendation to improve excellence in Australian schools.

> "Strengthen school-community engagement to enrich student learning through the establishment of mechanisms to facilitate quality partnerships, including engagement in mentoring, volunteering and extra-curricular activities, between schools, employers, members of the community, community organisations and tertiary institutions."
>
> **GONSKI 2.0 REVIEW, RECOMMENDATION 8**

Current landscape, and what we still don't know

While national policy on school-industry partnerships has been developing in the past 10 years, there is still much we don't know about engagement activities in the more than 9,000 schools across Australia.

In 2009, baseline research conducted for the **Business-School Connections Roundtable** found that most schools surveyed reported having school-business relationships, however only one third of schools identified that they were involved in 'significant' partnerships (Commonwealth Department of Education & Training, 2013).

Currently, there are over 500 registered school level STEM-related educational programs on the **Starportal**, many of which are supported or delivered by Australian businesses (Education Services Australia, 2018). The **Starportal** is a recently introduced online platform that links students, teachers and parents to STEM programs available locally.

While some schools are deeply engaged in partnership activities, the approach to date has not yet enabled all students, in all schools, to benefit from meaningful and ongoing engagement with industry throughout their years of schooling. The recent **Gonski 2.0 Review** found that partnerships are still "not common practice and implementation can be ad hoc" (Gonski et al., 2018).

There are gaps in understanding at the system level of where school-industry partnerships are happening, and where students are missing out. The STEM Partnerships Forum has recommended the need for a Unique Student Identifier so that policy-makers can better understand the use and impact of these programs.

There have also been policy developments at the state and territory levels – with variation between jurisdictional approaches adding a layer of complexity to school-industry partnerships in practice.

> "While many models of school-community engagement exist in Australia, school-community engagement to improve student learning is not common practice and implementation can be ad hoc."
>
> **GONSKI ET AL. (2018)**

4. Views from experts on the ground

At the roundtable, stakeholders agreed on the range of benefits that school-industry partnerships generate for students, schools and the broader economy. The value of school-industry partnerships in helping students to see beyond school and opening them up to a range of career choices was noted as an invaluable addition to school education.

All agreed that more could be done at the system level to ensure school-industry partnerships are a priority in all schools. Experts provided insights into the key barriers to school-industry partnerships in practice, to support the development of system-wide supports.

What works well?

The roundtable provided insights into some of the key factors for successful partnerships:

Need to build a culture of partnerships
Stakeholders noted the importance of building a 'culture of partnerships' with senior buy-in on both the industry and school sides. In schools, whole-of-school approaches where industry partnerships align to a school's strategic plan, and staff are supported to develop partnerships were seen as critical to success.

Works best when partnerships are mutually beneficial
One of the tensions of school-industry partnerships that the roundtable revealed is differing perspectives on who should instigate a partnership – whether it should be school-directed or industry-led. Some observed expectations around schools 'taking' what industry 'provides' – this was considered harmful to the notion of a mutual exchange. Establishing clear purpose and expectations from the outset is considered important.

> "We often refer to the idea of a shared moral purpose around the impetus to partner in the first place. This is about developing partnerships with shared intentions which moves beyond a purely transactional relationship."
>
> **EDUCATION SECTOR LEADER**

Role of intermediaries is critical
Stakeholders reported the critical role that intermediary organisations play – both in brokering large scale partnership 'ecosystems,' but also for connecting individual schools that lack the networks, connections and resources to find industry partners. Intermediaries can take many forms – including not-for-profit organisations, government agencies or locally-led networks.

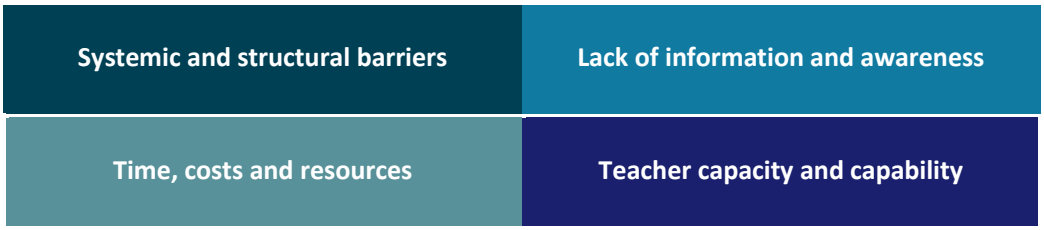
Clear impact on learning

Stakeholders emphasised that, to achieve the greatest impact, school-industry partnerships should aim to enrich school learning, align to and enhance the curriculum, and shouldn't replace a high quality teaching environment. Partnership activities often don't align neatly with the curriculum, and teachers play an important role in shaping initiatives to meet learners' needs.

What are some of the barriers?

Previous evaluations of school-industry partnerships have found that schools are more likely to pull out of partnerships than industry – suggesting that the biggest barriers to partnerships are on the schools' side (Ai Group, 2017). The roundtable attempted to gain stakeholder perspectives on the real and practical barriers – both for schools, as well as for industry partners. Stakeholders reported that for schools, often the will is there but that it takes 'courage' to make partnerships happen.

Stakeholder perspectives on barriers to partnerships include:



Systemic and structural barriers

The complexity of different administrative requirements and policies governing partnership activities were cited as a major barrier (e.g.: child safety requirements for industry professionals working with children, Occupational Health and Safety (OHS) requirements for students visiting industry sites, and complex procurement policies to get equipment and resources into schools).

Further, stakeholders noted that education systems primarily measure schools on delivery of the curriculum and National Assessment Program – Literacy and Numeracy (NAPLAN) results. Stakeholders suggest that this constrains many schools' capacity to prioritise complementary approaches to learning, such as school-industry partnerships.

Lack of information and awareness

Both schools and industry partners cited a lack of information on where to find partners, and poor understanding of how to build connections as a barrier to partnerships.

A key theme was that establishing industry partnerships too often relies on individual networks within the school and parent community, with high performing and well-connected schools well placed to benefit, and gaps in opportunity likely to be present in schools without access to a range of professional networks.

Some stakeholders stated that industry partners were over-subscribed, particularly in regional and rural areas where industry supply is finite. For willing industry partners, awareness of where to go to find schools to partner with is considered a barrier.

Time, costs and resources

One of the major barriers reported by stakeholders was that developing connections with partners, designing programs, establishing mutually beneficial agreements, managing relationships and coordinating programs is a major time investment – for schools and industry partners.

Intermediary organisations such as not-for-profits, partnership brokers, industry bodies and government departments support the delivery of some of these services and reduce the time burden on partners. However, funding for intermediaries is not always guaranteed or sustained.

Partnership activities also present additional costs – such as the costs of transporting students from school to industry sites, and backfilling teachers who are offline. These require applications for additional funding support from government or philanthropy which adds a layer of complexity and time. Time and cost challenges are amplified when partnerships fail to meet expectations or don't deliver quality experiences for partners.

> "The biggest issue in creating partnerships is often the paperwork and difficulty in finding how a partnership can be mutually beneficial."
>
> **SCHOOL LEADER PERSPECTIVE**

Teacher capacity and capability

Teachers are central to school-industry partnerships – in terms of forming partnerships with industry, and integrating partnership activities with the school curriculum. Yet, stakeholders reported that a major challenge is teachers lacking the time, confidence and understanding of how to engage with industry.

A recurring theme reported by stakeholders is the challenge of aligning complex real world problems with the school curriculum that is primarily structured to deliver content in single subject areas. For teachers, the time constraints of delivering a crowded curriculum, in addition to the skill required to scaffold student learning and embed it in the curriculum is considered a barrier.

Stakeholders discussed that careers advisors are ideally placed at the interface between schools and the world of work to facilitate partnerships with industry, however, are generally not used effectively in that way.

Reflections on the roundtable

The roundtable provided some important insights for further consideration, and highlighted key areas where education systems are not yet sufficiently prioritising and supporting school-industry partnerships.

The structural blockers that stakeholders reported – such as OHS requirements, procurement policies and child safety requirements that differ across jurisdictions – serve very clear purposes in protecting the safety and wellbeing of students. Yet, given the administrative burden these place on schools and industry partners, as well as the time and cost barriers associated with establishing and maintaining partnerships, it may be worthwhile for governments to consider if any processes can be centralised or streamlined across jurisdictions.

Further, in many of the exemplar school-industry partnerships provided by our experts, as well as across the literature, it is clear that intermediaries play a critical role in streamlining some of the administrative and time burdens on schools and industry partners, as well as finding and matching partners. Intermediaries are connected to both worlds and understand the challenges for both sides. As we have seen, there is significant variation in the types of organisations that play an intermediary role in school-industry partnerships across Australia.

There is a clear and growing need for intermediaries to play a role in systems change – both in terms of sharing knowledge with policy-makers, as well as connecting with each other to build awareness and understanding of how schools or industry partners can connect.

5. A way forward

This report has sought to unpack the role of school-industry partnerships in the education system, and build a better understanding of how industry partnerships can be supported in all schools.

Lessons going forward

One of the key themes at the roundtable, which has been extensively reported on in the literature (Ai Group, 2017), relates to the challenges schools and teachers have in prioritising industry partnerships in busy school environments. The demands that education systems place on schools – in terms of the national curriculum, NAPLAN results and Australian Tertiary Admissions ATARs – are considered to be at odds with investing the time and resources in building partnerships with industry.

If school-industry partnerships are to be a priority in all schools – then industry engagement needs to first be prioritised at the system level. Rather than adding on more requirements for schools to deliver, this would mean education systems recognising the broader outcomes that industry partnerships contribute to, such as lifting career aspirations and increasing engagement in learning. These outcomes are not easy to define and measure at a systemic level, but are achievable and worthwhile investments. There is a strong role for governments, practitioners and researchers to work together to develop more flexible approaches to measuring school and student achievement across the system.

The report has highlighted several key findings:

- **There are many and varied approaches to school-industry partnerships,** from individual schools working with a local employer to regional economic development ecosystems – and activities can range from coding clubs, STEM industry mentors, industry-run professional development workshops for teachers, to real world learning projects embedded in the school curriculum. The flexibility of approaches mean that partnerships can be tailored to local contexts and learners' needs.

- **School-industry partnerships contribute to a wide range of outcomes,** including increasing student engagement in STEM learning and building students' awareness and aspirations of new and emerging careers. Engagement with industry has been found to provide additional benefits for disadvantaged learners. Nonetheless, with the extensive range of partnership activities overlapping, outcomes are often difficult to define, measure and attribute at a systemic level.

- **School-industry partnerships have been on the policy agenda for a number of years, but have not yet been implemented in all schools,** not all students in Australian schools have opportunities to engage with industry across their years of schooling – and there are gaps in understanding at the system level of where school-industry partnerships are happening, and where students are missing out.

- **Many schools are engaging with industry, but there are persistent barriers that serve as a deterrent,** for instance, there are many procedural and administrative blockers across in education systems, school-industry partnerships require time and resources, many teachers lack the time and expertise to engage effectively with industry, some schools don't know how to find industry partners that are suited to their needs, and there is a lack of understanding about what works and how to engage effectively.

More work can be done to strengthen school-industry partnerships across the system

To give all students varied exposure to the world of work across their years of schooling, and opportunities to build the skills and capabilities that have currency in the workplace, more needs to be done to strengthen and support school-industry partnerships across the system.

All partners across education and industry play an important role, and national, state and territory governments are critical for implementing system-wide reform. Based on the analysis in this report, **there are three key policy priorities to accelerate the pace of change in education systems across Australia:**

Priorities for a way forward

1. School-industry partnerships need to be valued and measured at the system level

For school-industry partnerships to count, they need to be measured and reported at the system level, recognised in schools and communicated to parents. Schools and industry need to work with governments to build understanding of:

- Which schools, and industry sectors and organisations are engaging in partnership activities, and where there are gaps in the system
- What outcomes partnerships contribute to across the system
- What roles are being played by the various actors that facilitate partnerships between schools and industry – and how the knowledge of these actors can be leveraged for effective systems change.

2. School-industry partnerships need to be a priority in all schools

There needs to be recognition at the system level that partnerships require time and resources. More work needs to be done to ensure schools can prioritise industry partnerships, including by:

- Determining what the trade-offs are within the curriculum – given that schools have time limitations on what they can prioritise and teach
- Ensuring release time, support and recognition for teachers – to learn how to make industry partnerships work in their school contexts, to trial different types of partnership initiatives and to collaborate with other teachers
- Making additional resources available to facilitate school-industry partnerships – this could be funding additional staff within schools, using departmental staff to coordinate across regions or supporting external intermediaries, where appropriate.

3. Governments need to make it easier for all parties to engage in school-industry partnerships

For school-industry partnerships to happen at scale, governments have a clear role to play in addressing the systemic barriers, including:

- Structural and procedural barriers: finding ways to make sure governance and regulatory policies (such as OHS, procurement, and child safety) protect school students while also facilitating seamless partnerships
- Information barriers: investing in resources to help schools to connect with suitable and willing industry partners, and showing how to engage effectively to meet both school and industry needs
- Equity barriers: targeted efforts to support schools and students that lack existing networks, to connect with industry partners.

Industry plays a critical role as partners in the education community. Further work is needed to build greater understanding of the benefits and drivers for industry, as well as the resourcing and supports needed for industry partners to engage effectively with schools.

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