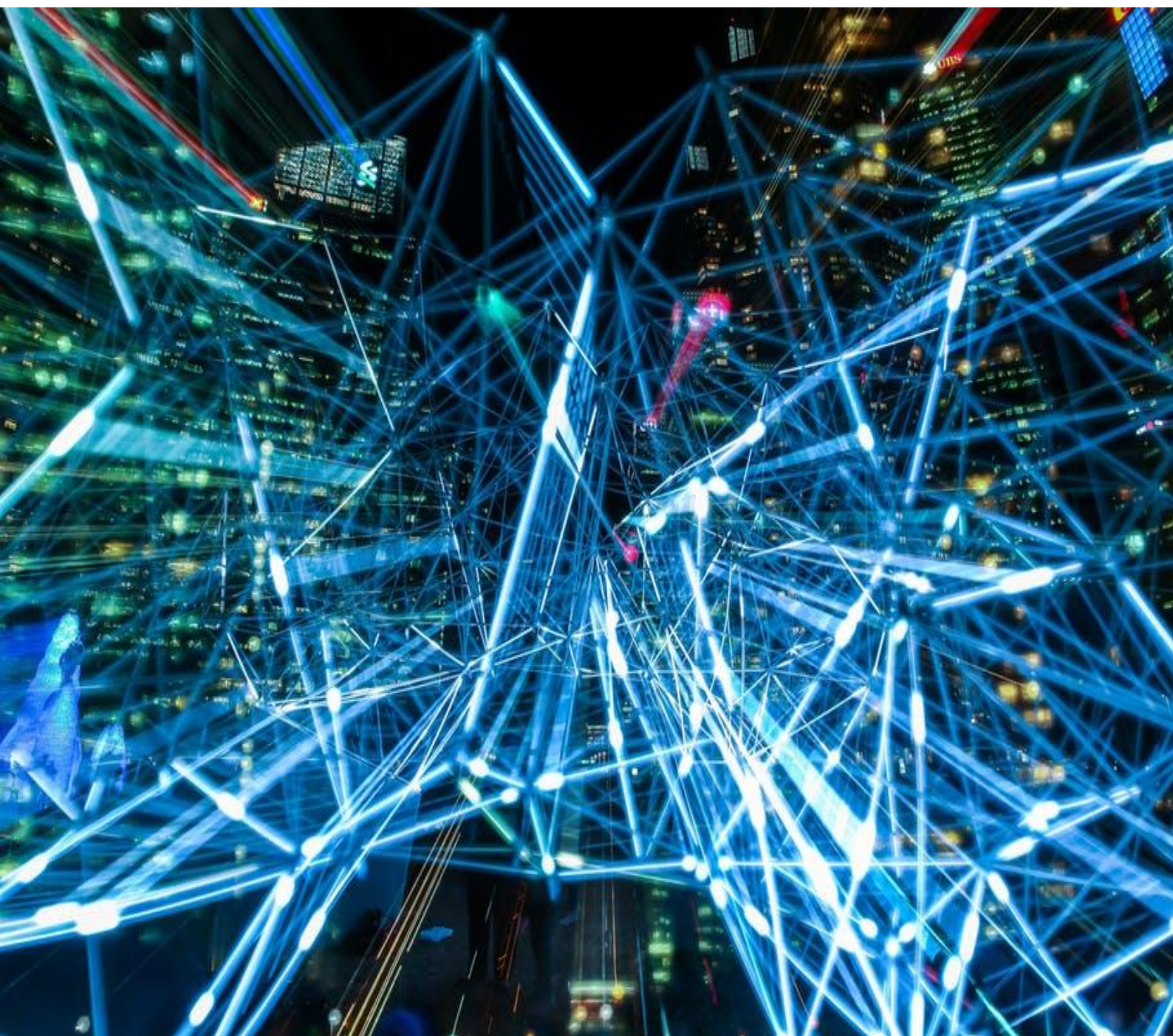


The Imperative of Higher Apprenticeships

Thought Leader Paper: **Education and Training Policy Team**

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1. Introduction

The time has arrived for serious consideration of the introduction of higher apprenticeships in Australia. This does not just mean at the Diploma and Advanced Diploma level in the Vocational Education and Training (VET) sector, but the incorporation of higher education qualifications as well. The Australian economy is not only moving to a more knowledge-based economy but one that requires a higher and more pervasive level of digital skills. Accordingly, the Australian workforce needs to be more highly skilled than ever.

The apprenticeship model is a key platform for the delivery of workforce skills. As these skills need to be at increasingly higher levels the apprenticeship model needs to move and adapt to these challenges. Employment-based learning models such as apprenticeships are the most highly valued forms of training. Not only do these modes need to be preserved but they also need to be extended.

Experience from other similar economies is demonstrating this need for change. The United Kingdom has introduced both higher and degree apprenticeships in recognition of the need to fill these skill gaps in their economy. Germany has long recognised the benefit of combining university and VET qualifications with substantial workplace learning. The European Commission has identified the benefits of blurring boundaries between vocational and professional learning. In a more piecemeal fashion, the United States has implemented some degree apprenticeships as part of its overall expansion of apprenticeship offerings.

As the National Centre for Vocational Education Research expresses the situation:

“Imagine a species of student who has the premium benefit of employment in growth industries plus well facilitated access to a smart blend of exceptional vocational training and academic education, delivered by partnered VET and higher education institutions, fully supported by their employer, with outcomes that give excellent job outcomes and/or further study continuity.”¹

There is no more pressing arena in which to develop these new approaches than the adoption of Industry 4.0 skills. The highly advanced technological changes in the Australian economy, as in other OECD economies, provide significant challenges of response to the fourth industrial revolution. Increasingly companies need to wrestle with the technology associated with this new wave of change to remain globally competitive. The Australian workforce does not just need more skills but different skills and at a higher level to be able to meet this challenge. The Australian Industry Group-led Industry 4.0 Higher Apprenticeships Program is exactly designed to meet this challenge.

The introduction and implementation of higher apprenticeships poses significant challenges to the education and training landscape in Australia. The time is fast approaching when these challenges need to be addressed so that the workforce is able to acquire the skills necessary for a prosperous economy in the twenty-first century.

¹ Fowler C. and Stanwick J.: A chance to be bold and ambitious; make apprenticeships the lynchpin to a better integrated tertiary education sector, NCVER, 8 June 2017.

2. Rationale for Higher Apprenticeships

2.1 Changing Nature of Work and the Economy

There have been many recent reports that have highlighted the rapid and extensive change in the nature of work and the impact of this on the economy. The CSIRO report on megatrends for Australia's future workforce in the next 20 years highlights the need for a paradigm shift of mindsets for workers, employers, educators and governments to prepare for the predicted jobs of the future. While there may be a focus on the types of technology that may arise that produce jobs where specialised skills will be advantageous, an underlying message is that foundational skills as well as new capabilities will become more important than ever before in the wider workforce of the future. As the report notes, creativity, problem solving, advanced reasoning, complex judgement, social interaction and emotional intelligence will become highly important in these roles; equally, literacy, numeracy and digital literacy will be just as critical for these future jobs.²

Other reports have focused on the impacts of technology and subsequent effects on employment. CEDA has estimated that 5.1 million jobs are at risk from digital disruption over the next 10 years³, PwC has reported that 44 per cent of jobs are at risk⁴ and that 79 per cent of Chief Executive Officers are concerned by the impact of changes in core technology. The Productivity Commission has focused on what governments need to do in this area.⁵ While the extent of these impacts is contested, the reports confirm the changing nature of work.

These changes in the nature of work are associated with a significant shift in the skill composition of the workforce. The CEDA report notes that the share of high-skill jobs is significantly increasing while the share of low-skilled jobs is decreasing.⁶ Similarly the OECD has reported on the long-term movement away from low -skilled occupations to higher skilled occupations.⁷ The share of employment in the Australian economy requiring routine processes has been in decline for a number of years, particularly due to increasing automation. On the other hand, employment requiring non-routine cognitive skills, and to a lesser extent, non-routine manual skills, are on the increase.⁸

² Tomorrow's Digitally Enabled Workforce, CSIRO, January 2016.

³ Committee for Economic Development of Australia, Australia's future workforce?, 2015.

⁴ A Smart Move, PwC, April 2015.

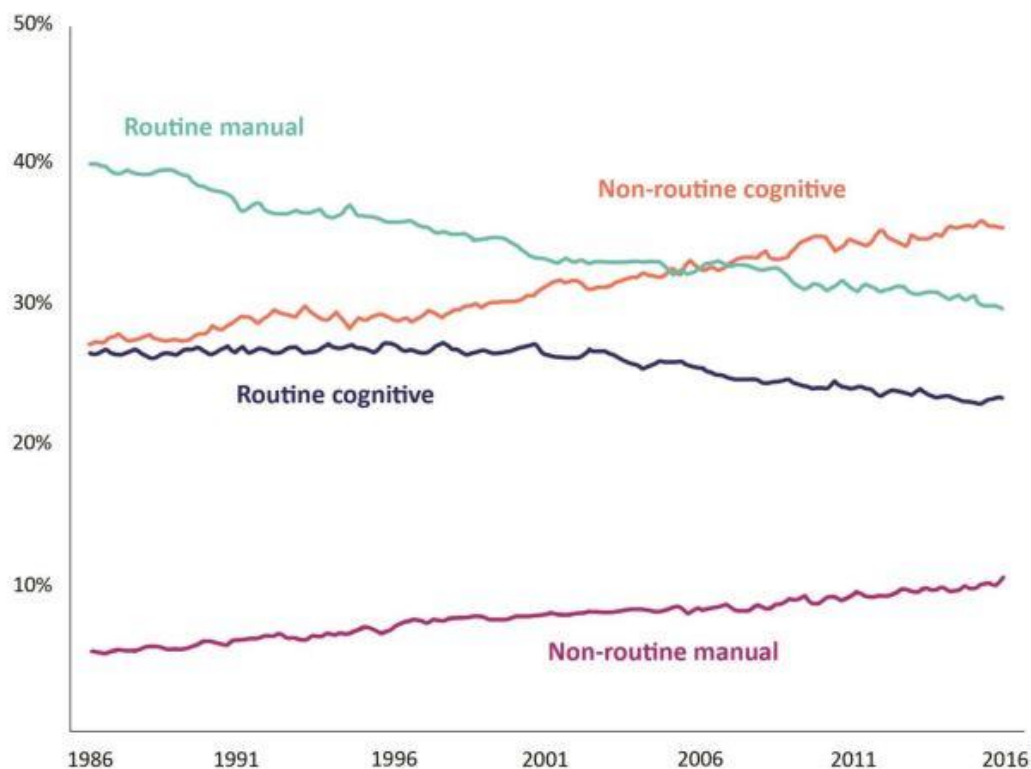
⁵ Digital Disruption: What do governments need to do?, Productivity Commission Research Paper, June 2016.

⁶ Committee for Economic Development of Australia, Australia's future workforce?, 2015.

⁷ OECD Skills Outlook 2013.

⁸ Torii K. and O'Connell M.; Preparing young people for the future of work, Mitchell Institute, March 2017.

Chart 1: Employment by skill type



According to the ABS, employment is showing the greatest growth in the more highly skilled occupations, specifically skill levels 1 – 2 (Degree/Diploma qualifications). In proportional terms, Skill 1- 2 has grown to be almost 40 per cent of total employment and Skill Level 5 (Certificate 1 or less) has fallen to less than 20 per cent of employment.⁹ The Australian economy is reflecting continued growth in the demand for highly skilled workers and slower or no growth for lower-skilled workers.

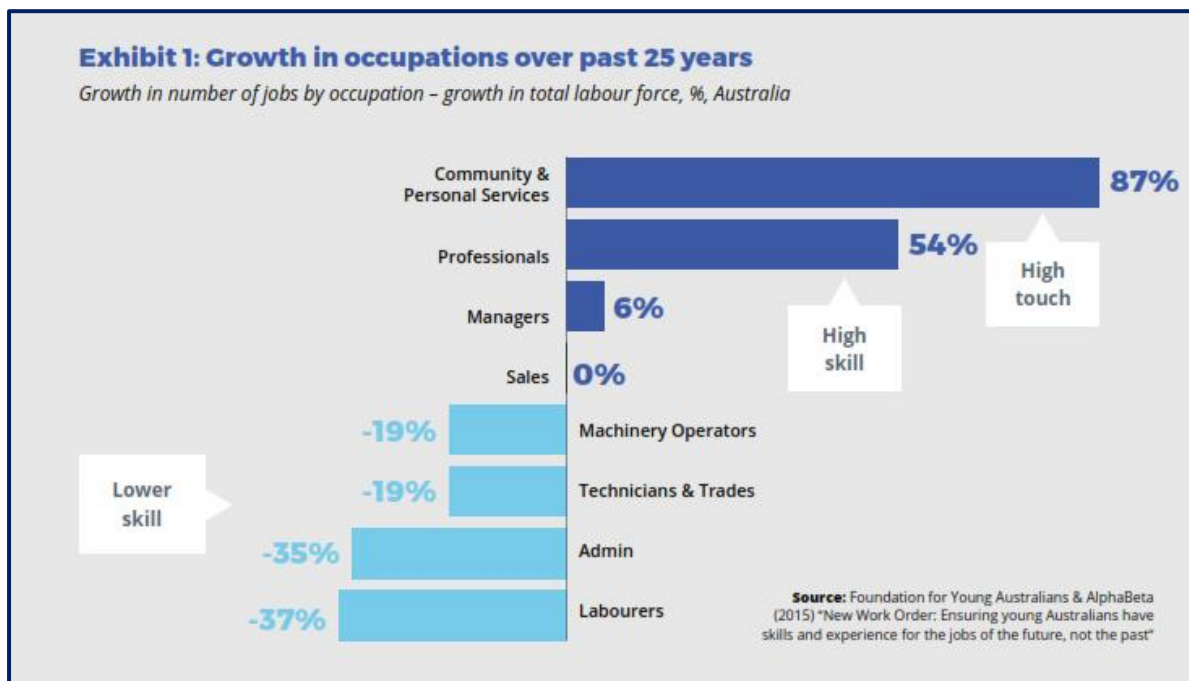
Chart 2: Employment by skill level in 1987 and 2015 (% of total)



⁹ Reeson, A. et al: The VET Era, Equipping Australia's workforce for the future digital economy, report for TAFE Queensland, June 2016, page 12.

The Foundation For Young Australians research has characterised these changing employment patterns as a growth in ‘high skill’ and ‘high touch’ occupations and a decline in lower skill occupations.¹⁰

Chart 3: Growth in occupations over the past 25 years



McKinsey's has categorised the jobs developing as a result of technology and global supply chains into Interaction jobs, Production jobs and Transaction jobs.¹¹ The Interaction jobs, involving more complex interactions and judgement, represent almost half the jobs in the economy but are the source of all employment growth. They suggest that a focus on these types of jobs will be a key to Australia's competitiveness. The ability to exercise critical thinking and contribute to society will be paramount. The jobs that experience growth will require high level thought and judgement. The concept of teamwork and social skills will be broader within a workplace and across countries.¹²

Another key component of the future workforce will be the acquisition of Science, Technology, Engineering and Mathematics (STEM) skills. A number of reports have highlighted the importance of STEM skills to the economy and that these skills are needed for the fastest growing occupations.¹³

¹⁰ The New Basics: Big data reveals the skills young people need for the New Work Order, Foundation For Young Australians, 2016.

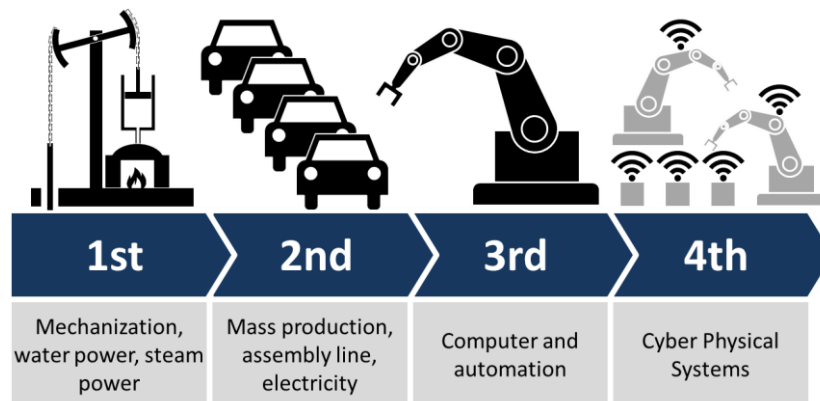
¹¹ McKinsey Australia, Compete to Prosper: Improving Australia's global competitiveness, 2014

¹² John Lydon, David Dyer, Chris Bradley, McKinseys, Compete to Prosper: Improving Australia's Global Competitiveness, 2014

¹³ See for example Strengthening School -Industry STEM Skills Partnerships, Australian Industry Group, June 2017; STEM Country Comparisons, Australian Council of Learned Academies, May 2013; The Case for STEM Education, R. Byee, NSTA Press, 2013; and Science, Technology, Engineering and Mathematics: Australia's Future, Office of the Chief Scientist, September 2014.

2.2 Emergence of the Importance of Industry 4.0

The term Industry 4.0 originates from Germany, when a project to digitalise manufacturing was launched under the name 'Industrie 4.0' at the Hannover trade fair in 2011. The term derives from the assertion that it represents the fourth industrial revolution, coming after the mechanisation made possible by steam power; the mass production made possible by electrification; and the development of automated production that followed the rise of computers and electronics.



The world of the fourth industrial revolution includes automation, machine learning and networked cognition where technologies link the physical, digital and biological spheres.¹⁴ The term Industry 4.0 encompasses the digitalisation of production processes based on devices autonomously communicating with each other along a value chain.

Automation, sensors, cloud computing, the internet of things, big data analytics and machine-to-machine communications are the tools of Industry 4.0, driving new business opportunities through integration with a global supply chain. Industry 4.0 technologies make it possible to gather and analyse data across machines enabling faster, more flexible, and more efficient processes to produce higher quality goods at reduced costs.

In effect, Industry 4.0 is the bringing together of all of these technologies.

*"Industry 4.0 is a state in which manufacturing systems and the objects they create are not simply connected, drawing physical information into the digital realm, but also communicate, analyse, and use that information to drive further intelligent action back in the physical world to execute a physical-to-digital-to-physical transition."*¹⁵



¹⁴ In the fourth industrial revolution we need an education overhaul, The Australian, March 14, 2018.

¹⁵ Deloitte Consulting LLP, 2016, Industry 4.0 and manufacturing ecosystems

A reflection of the importance of this area is the creation of the Prime Minister's Industry 4.0 Taskforce in November 2015 following the release of the report of the Australia-Germany Advisory Group. Mr Jeff Connolly, CEO of Siemens Australia and New Zealand, was appointed the first chair of this group. In April 2017 the Taskforce signed a cooperation agreement with *Plattform Industrie 4.0* to share information between the two countries. This involves working across five work streams including reference architectures, standards and norms; research and innovation; security of networked systems; work, education and training; and test laboratories.¹⁶

In Germany, there are three Industry 4.0 initiatives all working to complement one another.

- **Plattform Industrie 4.0** is a German strategic initiative, defining the cyberphysical systems that will revolutionise manufacturing industries.
- **Labs Network Industrie 4.0** supports German industry in testing the practical use of Industry 4.0, described as a “one-stop shop for the coordination of different Industry 4.0 approaches”.
- The **Standardization Council Industrie 4.0** provides access for companies to standardisation bodies on Industry 4.0.¹⁷

Recent research has indicated that Australian executives conceptually understand the changes that Industry 4.0 will cause but they are less certain about how to act to derive benefit from these changes. Executives understand they need to invest in technology but they have a hard time making the business case to fully address Industry 4.0 opportunities, because of a lack of internal strategic alignment and short-term focus.¹⁸

Industry 4.0 requires a level of digital skills from all participants. All workers will need to acquire generic digital skills to be able to use technologies in their daily work (e.g. access information online or use software). At another level, many workers will need specialist skills to program, develop applications and manage networks. Many workers will also need complementary skills, including the capability to process complex information, communicate with co-workers and clients, solve problems, plan in advance and adjust quickly. Significantly higher demands are placed on all members of the workforce in terms of managing complexity and higher levels of abstraction and problem solving.¹⁹

Given that the skills gap tends to be larger for people in low-skill occupations than for those in middle- and high-skill occupations, it is especially important to ensure that adults with weak literacy, numeracy and digital skills can easily take up opportunities to improve their skills so that they too can participate fully in society and share in the benefits that ICTs and other technologies can bring to all of society.²⁰

¹⁶ <https://industry.gov.au/industry/Industry-4-0/Pages/PMs-Industry-4-0-taskforce.aspx>

¹⁷ Swinburne University of Technology, 2017, Industry 4.0 Testlabs in Australia: Preparing for the Future

¹⁸ <https://which-50.com/australian-execs-unprepared-industry-4-0-changes/>

¹⁹ OECD, 2017, Key Issues for Digital Transformation in the G20, G20 German Presidency/ OECD, <<https://www.oecd.org/g20/key-issues-for-digital-transformation-in-the-g20.pdf>

²⁰ *ibid*

2.3 The State of the Apprenticeship System

For some time, the participation levels in apprenticeships and traineeships in Australia have been falling. The latest available data from the National Centre for Vocational Education Research confirms the downward trend for the last decade. As at December 2017 there were 256,140 apprentices and trainees in training. This is a progressive fall from 435,115 in March 2013.²¹ In addition, the percentage of Australian workers employed as an apprentice or trainee has decreased from 3.3 per cent of the workforce in 2013 to 2.1 per cent in 2017.²²

Chart 4: In-training at the end of the quarter, March 2013 to December 2017



With such a downturn in the level of participation, all age groups are affected. Of particular concern is the evidence that the level of participation in apprenticeships and traineeships by young people is falling. Between 2013 and 2017 the number of 19 years and under participating fell by 16 per cent. For 20 to 24 year-olds the level has decreased by 16.8 per cent over the same period.²³ While these falls are less than for other age groups, the future of apprenticeships and traineeships is in jeopardy if young people do not pursue these pathways.

Table 1: In-training by age group 2013 – 2017

Age	2013	2014	2015	2016	2017	2016 to 2017 (% change)	2013 to 2017 (% change)
19 years and under	96,545	88,245	83,445	82,710	81,067	-2.0	- 16.0
20 to 24 years	106,775	96,155	91,440	90,620	88,875	-1.9	-16.8
25 to 44 years	125,570	93,885	77,030	71,355	68,955	-3.4	-45.1
45 years and over	52,060	32,240	22,855	18,765	17,240	-8.1	-66.9

²¹ Apprentices and trainees 2017, December Quarter, NCVER, Commonwealth of Australia, 2018.

²² Apprentices and trainees 2014, Annual, NCVER, Commonwealth of Australia 2015 and Apprentices and trainees 2017, December Quarter, NCVER, Commonwealth of Australia, 2018.

²³ Apprentices and trainees 2017, December Quarter, NCVER, Commonwealth of Australia, 2018.

In this context it is useful to consider notions of higher level apprenticeships to broaden the appeal of this learning method to a new cohort of young people. Higher levels of qualifications, including higher education qualifications, need to be introduced to attract a broader range of participants to this pathway.

“The tacit limitation of the apprenticeship model – the delivery of Certificate III trade skills alone – will render the apprenticeship system unable to meet many of the challenges of the digitised economy.”²⁴

Similarly, it would also be useful to extend this pathway into industry areas that have not traditionally provided apprenticeships or traineeships. Any such initiative in this regard would need to include industries within the Service sector. The pilot program being managed by PwC is designed to address this challenge.

2.4 Emergence of Higher Level Apprenticeships

In the United Kingdom over time there has been a development of a range of apprenticeship offerings. This has been in response to similar circumstances to Australia as articulated in a number of significant reports.²⁵ A key part of these circumstances was the falling level of participation in apprenticeships. The Wolf Report, for example, noted that the percentage of 16 – 18 year olds in apprenticeship arrangements declined from 60 per cent in 2004/5 to 41 per cent in 2009/10. The growth was occurring in older age groups and level 2 rather than level 3 apprenticeships.²⁶

These circumstances in part led to the introduction of Degree and Higher Apprenticeships which include higher education levels.

Table 2: UK Levels of Apprenticeship

Apprenticeship Name	Level						Equivalent Educational Level
	2	3	4	5	6	7	
Degree							Bachelors or Masters degree
Higher							Foundation degree & above
Advanced							2 A-level passes
Intermediate							5 GCSE passes grade A to C

Higher Apprenticeships offer an employment-based learning program and lead to the following nationally recognised qualifications:

- Level 4 and 5 – equivalent to a higher education certificate, higher education diploma or a foundation degree or
- Level 6 – equivalent to a bachelor degree

²⁴ Lilly, M. The Future of Australian Apprenticeships, Australian Industry Group, October 2016.

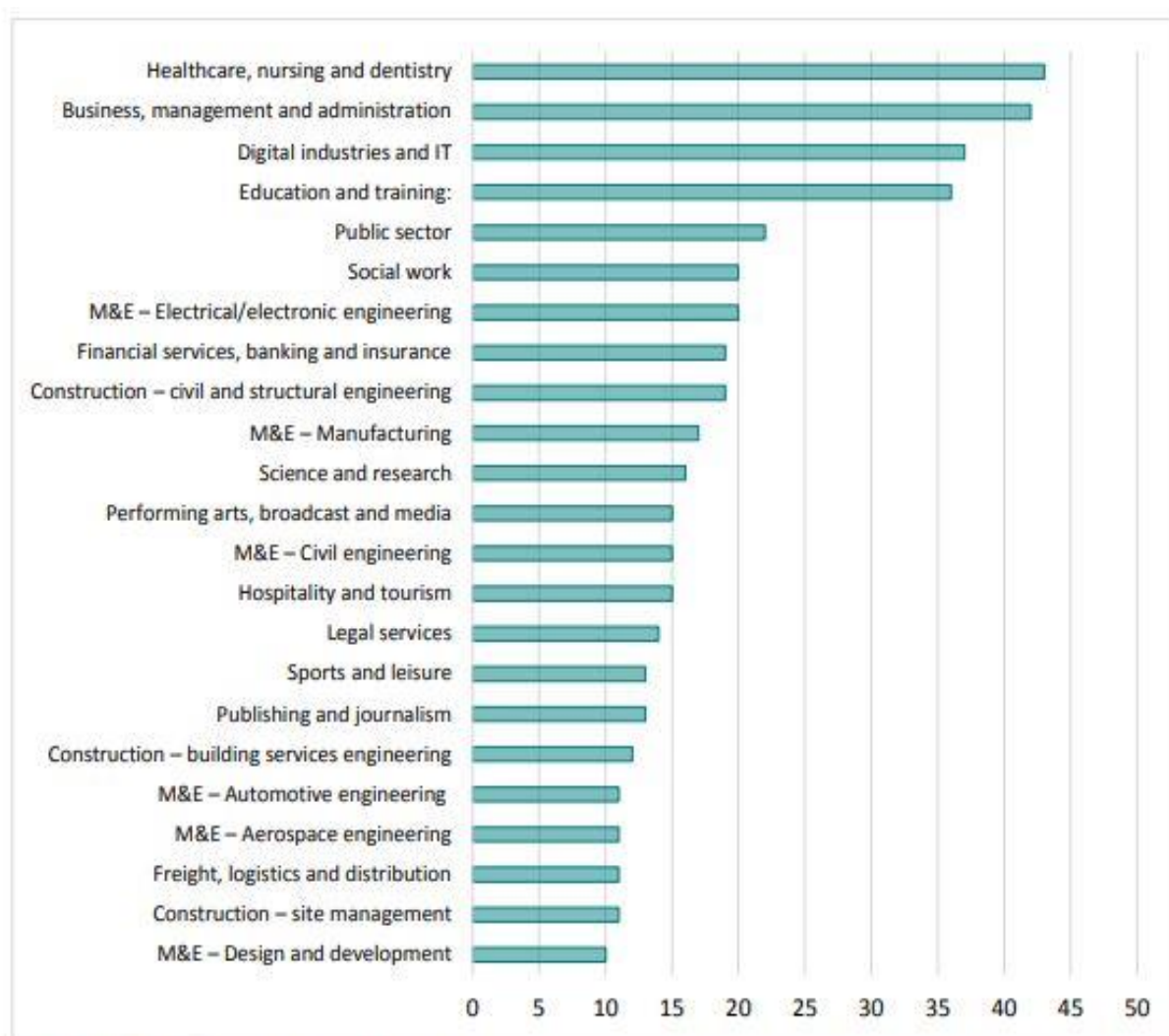
²⁵ These include the Wolf Review of Vocational Education in 2011 and the Richard Review of Apprenticeships in 2012.

²⁶ Review of Vocation Education, The Wolf Report.

Higher Apprenticeships are currently available in over 40 areas across many industry sectors.²⁷ In the UK degree apprenticeships were launched in 2015 with a government pledge to create three million apprenticeships by 2020.²⁸ They were designed to bridge the gap between technical skills, employment and higher education as well as reinvigorate the ailing apprenticeship system. They operate in a similar manner to trade apprenticeships with students working in a job related to their educational provision. Participants typically work for four days a week and study for one day.

Initially from September 2015 places became available in four key industries: digital, automotive engineering, banking relationship manager and construction. Provision of degree apprenticeships is now spread across a number of industry sectors including those not traditionally associated with apprenticeship systems.²⁹

Chart 5: Sector categories of interest for the development of degree apprenticeships



Note: M&E = Manufacturing & engineering

²⁷ <http://www.apprenticeshipguide.co.uk/higher-apprenticeships/>

²⁸ The Future Growth of degree Apprenticeships, Universities UK,

²⁹ Degree Apprenticeships: Realising Opportunities, Universities UK, March 2017.

The European Commission in The European Alliance For Apprenticeships has noted the issue as a principle for high-performance apprenticeships and work-based learning. Principle 11 refers to promoting the permeability between VET and other educational and career pathways. Specifically,

“The horizontal and vertical permeability between VET and other parts of the educational system can make IVET an attractive alternative for young people – both for those who want to go directly from school to work as well as those who want to go into higher-level education.”³⁰

Germany has operated dual study programs for some time. These programs combine university study with a vocational qualification and significant periods of workplace learning in companies. These are offered generally through a network of Universities of Applied Science.³¹

Across the Atlantic in America there has also been some experimentation in this area. Within this context apprenticeships are often seen as a means to bridge the so-called middle skills gap between secondary education and a four-year degree. There is increasing interest in expanding them into other non-traditional fields like advanced manufacturing, information technology and health care. The Bank of America Merrill Lynch, for example, provides a degree apprenticeship program.

Models vary, but generally speaking they include a company training component and a formal educational program offered in partnership with a community college, four-year university, technical school or unaccredited educational provider.³²

The American Institute for Innovative Apprenticeship references an expansion into new fields previously thought to require a college degree such as IT, healthcare, energy, business, advanced manufacturing, culinary arts, customer service, hotel and restaurant management and sales. These include the option of degree apprenticeships.³³

There is growing international recognition of the need for higher apprenticeships including degree apprenticeships.

³⁰ High-performance apprenticeships and work-based learning: 20 guiding principles, The European Commission, December 2015.

³¹ <https://www.daad.de/deutschland/nach-deutschland/angebote/en/57321-dual-study-programmes>

³² <https://www.insidehighered.com/news/2017/08/08/interest-grows-us-germanswiss-model-apprenticeships>

³³ <https://innovativeapprenticeship.org/>

3. Policy Implications for Apprenticeships

The development of Industry 4.0, the current challenges for apprenticeships and industry demand for higher skill levels have many implications for apprenticeships and beyond to the education and training policy landscape in Australia. The experience of Ai Group's Industry 4.0 Higher Apprenticeships project has assisted in the identification of policy imperatives. These include:

3.1 Apprenticeship Programs Spanning Twin Sectors

Higher Apprenticeships, especially where they include higher education components, challenge the operation of both the VET and Higher Education sectors. In Ai Group's pilot program this involves the combination of a VET Diploma with an Associate Degree with both delivered in a work-based learning mode (apprenticeship-traineeship). This involves the combination of competency-based learning provided through a VET Diploma with a curriculum-based model of an Associate Degree. Further, the Associate Degree component of the program is delivered in 'apprenticeship' mode. This is a truly unique situation for Australia.

In the pilot program it is important to note that Swinburne University of Technology is a provider from a dual-sector institution. There are only a small number of these and they are currently restricted to Victoria and the Northern Territory. Wider implementation of these program models will require, at the very least, a significant partnership between a VET and higher education provider to deliver both components of the program. Such programs have the potential to lead to qualification and institutional reforms across the sectoral boundaries of VET and Higher Education.³⁴

3.2 Lack of Funding Parity Across Sectors

A related issue is the lack of funding parity across the two sectors. In the higher education sector diplomas, advanced diplomas and associate degrees are known as 'designated' courses of study. Funding for these courses are for an agreed number of Commonwealth Supported Places (CSPs) in a given year. In the VET sector there is a different arrangement. In Victoria for example, a qualification must be placed on the 'funded course list' to attract government subsidies. The key difference is that the education and training provider receives much more from the government through the Commonwealth Supported Places allocation than they do through the VET Funded Course List. It is difficult in these circumstances to make the VET offering financially attractive to a provider. As the NCVER have commented:

*"policy and incentives need to ensure the equitable funding of mid-level professionals, including, for example, Associate Degrees and the newly emerging higher apprenticeships."*³⁵

³⁴ Fowler C. and Stanwick J.: A chance to be bold and ambitious; make apprenticeships the lynchpin to a better integrated tertiary education sector, NCVER, 8 June 2017.

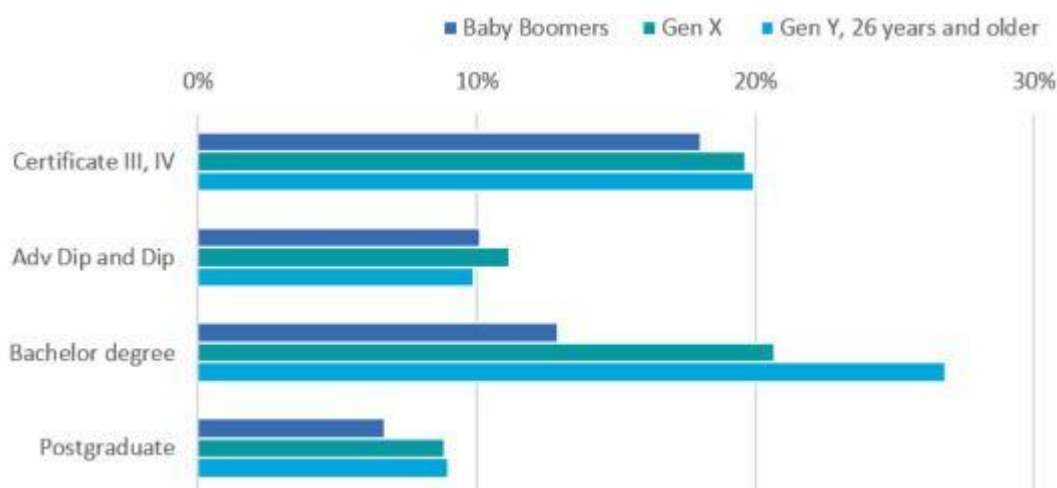
³⁵ Fowler C: Submission by NCVER to the Business Council of Australia re Future proof: protecting Australians through education and skills, 19 January 2018.

3.3 Addressing Skills Gaps

A key issue to address is the gap in skills provision for mid-level professional occupations. As Australia moves more towards a knowledge-based economy the proportion of the population undertaking university degrees has significantly increased. Indeed, the Bradley Review established a target of 40 per cent of 25 to 34 year-olds to have a degree by 2020.³⁶ In addition to this the level of participation in Certificate III qualifications, and to a lesser extent, Certificate IV qualifications has also remained high and continues to grow.

What appears to be an anomaly is the middle order skills addressed at the boundaries of the VET and Higher Education sectors, notably Diplomas (AQF5) and Advanced Diplomas and Associate Degrees (AQF6). Participation in qualifications at these levels is lower than the others and is not growing.³⁷

Chart 6: Tertiary qualification attainment



There is a need to support initiatives that develop skills at these levels. Further, qualifications at these levels require work-based pathways such as those being trialled through higher apprenticeships initiatives.

3.4 Changing Nature of Apprenticeships

There is a need in the economy for higher skill levels while maintaining the value of work-based learning methodologies. While there is nothing new about Diplomas being provided in apprenticeship mode, there are no precedents for the provision of a higher education qualification such as an Associate Degree being provided this way. This represents a further challenge for both systems.

In the United Kingdom, Degree Apprenticeships are provided by the higher education sector. The policy emphasis is on the government encouraging an increasing number of higher education institutions to participate in the initiative. Significant change would need to be made for this to

³⁶ Review of Australian Higher Education, Final Report, Commonwealth of Australia, December 2008.

³⁷ ABS, Census 2011 cited in Future-Proof: Protecting Australians through education and skills, Business Council of Australia, October 2017.

occur in Australia. An alternative approach is for VET and higher education providers to form a delivery partnership that operates across both sectors. It is important to make breakthroughs in this area given that the purpose is to encourage young people to embrace apprenticeships that can include a higher education outcome.

There is also an issue about where higher apprenticeships, especially those containing higher education components, sit in the total apprenticeship/traineeship landscape. In Ai Group's pilot project, the participants divided their time almost equally between the workplace and the education/training provider. This is quite different from more traditional arrangements where about 80 per cent of the time is spent at work and 20 per cent at the training provider. The pilot program arrangement may not be sustainable or suitable for companies wanting to implement apprenticeship programs of this kind over a longer time period.

3.5 Implementation of Industry 4.0 Initiatives

The importance of the fourth industrial revolution is growing for many companies and industries in Australia. These new order skills with the particular focus on digitisation are increasingly required by the economy. It is no accident that Ai Group's innovative pilot program focused on this learning area. The rapid changes in technology present real challenges for learning and a blending of the best features of vocational and higher education is an important response to this challenge.

Qualifications and learning modes that straddle the sectors are required. A part of the reason for the involvement of Siemens in the pilot program is that engineers currently produced through the higher education system do not have the necessary skill set to deal with Industry 4.0 requirements. A much more innovative and flexible approach is required.

The capability of trainers and educators to teach Industry 4.0 technologies is also a challenge. Those with the most current understanding work in the industry, not the education sector, and education providers will need to consider strategies to address this.

3.6 Involvement of Industry

As the pace of industry systems and workplaces speed up, such hands-on activity by industry will become even more vital for education and training to be relevant. A key factor in the success of Ai Group's pilot program has been the strong technical input provided by Siemens staff to the design and content of the program based on leading edge new technologies and systems. Siemens also provided professional development for teachers of the program.

3.7 Industrial Issues

Given the importance of industrial awards in the provision of apprenticeships and traineeships there needs to be a process and an outcome of accommodation for programs that cross tertiary borders. Experience in Ai Group's pilot program indicates that the new higher order skills and new occupations may not be adequately covered by current awards. Provision of programs that combine VET and higher education are likely to require amendments or additions to awards. It may also be required to alter statements about the employment arrangements of professional employees through their associations as well as industrial awards.

4. Conclusions

There is a clear need to implement higher apprenticeship programs in Australia. These programs feature the best aspects of vocational and academic learning and bridge the two post-secondary education sectors in order to deliver the higher level skills increasingly required by the economy. There are many challenges in the education and training landscape to tackle in order to be able to achieve this.

The evidence to date from the Ai Group Industry 4.0 Higher Apprenticeship pilot program demonstrates that it is possible to make progress in this area. There are several important elements to achieving success in this area. High-level collaboration between VET and higher education providers is necessary to enable higher apprenticeship programs to straddle sector boundaries. Where new qualifications are required significant industry input is essential in the design and content of the program.

In addition to collaboration about qualification types and levels across the sectors, there also needs to be movement in funding arrangements. There should be no funding impediments to program implementation. The current funding arrangements make it more difficult for stakeholders to pursue the implementation of VET based programs given the higher levels of funding attracted by higher education provision.

As these higher skill level programs are delivered in apprenticeship mode it is essential for industry partners to be involved. Accordingly, the development of higher apprenticeships programs must be a direct response to industry demand for higher skills in the face of the changing economy. The Ai Group Industry 4.0 Higher Apprenticeship program was a direct response to industry need in this key area.

There are also industrial considerations to address when higher apprenticeships are implemented. What award provisions apply when apprenticeships stretch into higher education domains? This may well necessitate a consideration of altering awards to accommodate programs such as these. The level of wages for program participants is an important program implementation consideration.

All of these challenges require policy makers to view apprenticeships in a new light. It is important that employment-based programs are made available at this enhanced skill level. Higher apprenticeships have the potential to revitalise the state of apprenticeships in Australia and make appeal to a new and wider cohort. As the NCVER has commented: “Australian policy and practice appears to be lagging European educational and training practice as well as behind policy energy and ambitions in the United States.”³⁸

As already highlighted there are several challenges that need to be addressed before higher apprenticeships are firmly embedded within the Australian education and training landscape. A beginning has been made but further endeavours are necessary if Australia is to acquire the highly skilled workforce needed for the twenty-first century economy.

³⁸ Fowler C. and Stanwick J.: A chance to be bold and ambitious; make apprenticeships the lynchpin to a better integrated tertiary education sector, NCVER, 8 June 2017

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