Right Skills. Right Time?

The $4 billion annual cost of over-qualification affecting one in four Australian workers

SKILLSIQ

CAPABLE PEOPLE MAKE CLEVER BUSINESS

SkillsIQ is a national **not-for-profit** organisation supporting industry to **develop standards** to ensure the workforce is equipped with the **right skills** for jobs now and in the future.

SkillsIQ supports 17 Industry Reference Committees representing diverse 'people-facing' sectors. These sectors provide services to people in a variety of contexts such as customer, patient or client. The Industry Reference Committees are collectively responsible for overseeing the development and review of training products, including qualifications, serving the skills needs of almost 50 per cent of the Australian workforce.

SkillsIQ covers a number of 'people-facing' sectors in the economy

Aboriginal and Torres Strait Islander Health Worker – occupations include Aboriginal community health worker

Ambulance and Paramedic – occupations include ambulance officer, ambulance paramedic, ambulance call-taker

Children's Education and Care – occupations include early childhood educator, education assistant, outside school hours care worker

Client Services – occupations include case manager, career development advisor, counsellor

Community Sector and Development – occupations include community support worker, development worker, chaplain or pastoral worker

Complementary Health – occupations include massage therapist, reflexologist, remedial massage therapist

Dental – occupations include dental assistant, dental laboratory assistant, dental technician

Direct Client Care and Support – occupations include allied health assistant, support worker, assistant in nursing

Technicians Support Services – occupations include medical practice assistant or receptionist, practice manager, pathology collector

Public Sector and Local Government – occupations include policy and planning manager, project administrator, human resource manager, court and legal clerk

Sport and Recreation – occupations include exercise instructor, group exercise instructor, personal trainer

Wholesale, Retail and Personal Services – occupations include sales assistant, retail manager, florist, hairdresser, pharmacy assistant, funeral director, beauty therapist

Enrolled Nursing – occupations include enrolled nurse

Tourism, Travel and Hospitality – occupations include waiter, tour guide, event manager, front desk attendant, cook, housekeeper, travel consultant

Right Skills. Right Time?

Key messages

Young people need practical skills (including those which can be gained through vocational training) in order to be 'skills-ready' for work, and they need to ensure that they acquire a greater depth of knowledge (including through degrees and advanced qualifications) at the right time to support their career development, not always as a ticket of entry into their first job.

1 in 4
Australians are over-qualified for their current job

Across Australia, over-qualification costs individuals:

$3.6 billion annually in foregone income due to time spent in unnecessary study

$555 million in superfluous tuition fees

In some sectors the rate of over-qualification is high, e.g.:

RETAIL
51% over-qualified

TOURISM
34% over-qualified

SPORT
38% over-qualified

Skills mismatch and over-qualification contribute to staff turnover which is

high

in some sectors

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Foreword

Businesses in the diverse people-facing sectors supported by SkillsIQ frequently express their concern about the difficulties they face in finding staff with job-relevant skills.

Persistently high levels of skills mismatch - the gap between workers' skills and the demands or requirements of their jobs - have become a significant cost to individuals and employers. Skills mismatch can result from over-qualification, under-qualification or qualifications and skills that are possessed but are not related to, or required by, a job role.

All too often employers mistakenly request the highest level of qualification to 'filter' candidates who they think will best do the job. This is a concerning trend, as it can result in a mismatch where workers have the formal qualifications but lack the practical skills to perform on the job, leading to lower productivity and higher staff turnover. Disappointed employers may have to restart the hiring process.

On the other side of the coin, there are workers who have acquired higher qualifications that turn out to be superfluous. These workers may feel under-utilised and dissatisfied in their jobs, and are therefore more likely to leave in search of another position.

This is why SkillsIQ has investigated the extent to which skills mismatch has become an issue in the Australian labour market, and what cost it generates for businesses and individuals. The investigation has been conducted via a quantitative analysis of one aspect of skills mismatch – over-qualification.

Over-qualification occurs when a worker holds qualifications that are higher than needed to perform the tasks in a current role.

Over time, persistent levels of over-qualification can lead to 'qualification inflation' which occurs when employers continue to hire people with higher qualifications than are needed for a role, and gradually that higher qualification becomes an entry requirement for those job roles.

The cost impacts for employers, individuals and the community include the potential to squeeze out many people seeking to enter or re-enter the workforce using lower level practical vocational qualifications as an entry point and pathway, at a time when governments are seeking to extend workforce participation.

This report sheds light on this important issue. It measures the gap between the required qualification across 400 occupations in the economy and the actual qualifications held by more than 10 million Australian workers, and quantifies the extent and cost of over-qualification in a number of the people-facing sectors which SkillsIQ supports.

Staff turnover within many of SkillsIQ's sectors is high, and this may be due in part to misaligned expectations around job roles and skill requirements. With better information about the nature of the mismatch of skills, employers and individuals may be able to reduce their costs and achieve better and more productive employment outcomes.

Our next step is to test the research findings both with the Industry Reference Committees we support and with other industry stakeholders, and to combine this qualitative evidence from industry with the quantitative analysis in this report.

This will enable us to identify the links between the current data analysis and what is occurring in the people-facing workforce on a day-to-day basis. Armed with evidence of authentic industry experience, we can open an informed debate on the issues leading to strong, actionable recommendations on ways to address the issue of skills mismatch for the future workforce.

This is not to suggest that we shouldn't strive for higher qualifications as a way to drive our innovation and productivity but, rather, from a policy perspective, we should perhaps look at when and at what stage in the work journey these should be attained and even whether higher qualifications are always needed.

Appropriate skills and their respective job matches may not necessarily be achieved with a higher-level qualification. A different qualification, or even a different perspective on how qualifications are linked to skills, may instead be necessary.

**Yasmin King,
CEO, SkillsIQ Limited**

Key terms

People-facing sectors provide services to people in a range of contexts such as customer, patient or client. SkillsIQ supports the development of training packages in some 90 people-facing sectors in Australia. These sectors include: Aboriginal and Torres Strait Islander Health; Ambulance and Paramedic; Children's Education and Care; Client Services; Community Sector and Development; Complementary Health; Dental; Direct Client Care and Support; Enrolled Nursing; Local Government; Public Sector; Sport and Recreation; Technicians Support Services; Tourism, Travel and Hospitality; Wholesale, Retail and Personal Services. Collectively, these industries represent almost 50 per cent of the Australian workforce.

Skills readiness occurs when workers have the skills that are needed to perform the tasks in a certain role. This excludes organisation-specific knowledge: for example, where stock or equipment is located.

Job readiness occurs when a worker possesses both the skills and the organisation-specific knowledge required to perform a role.

Over-qualification occurs when a worker holds qualifications that are higher than needed to perform the tasks in a current role. See Section 1.4 for the methodology used in the report to determine the required type of qualification for job roles.

Qualification inflation occurs when employers continue to hire people with higher qualifications than are needed for a role, and over time the qualification becomes a pseudo-entry requirement for those job roles.

Skills mismatch can result from over-qualification, under-qualification or qualifications and skills that are possessed but are not relevent to, or required by, a job role.

Qualifications in Australia prepare individuals for various types of job roles.

The following table outlines the relationship between qualifications and various job roles in Australia. For a more comprehensive and detailed qualifications framework, refer to the AQF.[1]

Certificate I	• preparation for work • routine and predictable tasks performed under supervision • work in highly structured and stable contexts
Certificate II	• entry-level roles • limited autonomy and judgement applied to defined and routine tasks • work in structured and stable contexts
Certificate III	• operational roles • work independently with some responsibility to shape outcomes in routine but variable tasks • work in known and stable contexts
Certificate IV	• technical and operational roles • work independently with some responsibility for own and team outcomes • work in known or changing contexts
Diploma	• applicable to a broad field of work and a diverse range of activity • focus on autonomy and judgement • work in both routine and complex, unpredictable contexts
Advanced Diploma	• applicable to a broad field of work and a diverse range of activity • focus on expertise, analysis and interpretation • work in changing contexts
Bachelor Degree	• applicable to a broad field of work and diverse range of activity • focus on specialised advice, analysis and evaluation • work in changing contexts
Higher degrees (e.g. Graduate Certificate or Master's Degree)	• specialisation for a range of professional practice • apply adaptability and judgement with advice and expert opinion • work in unpredictable contexts

1 The Australian Qualifications Framework (AQF) is the national policy for regulated qualifications in Australian education and training. It incorporates the qualifications from each education and training sector into a single comprehensive national qualifications framework with 10 levels. https://www.aqf.edu.au/sites/aqf/files/aqf-2nd-edition-january-2013.pdf

Chapter 1
Introduction

1.1 Context

Australia's workforce has witnessed a dramatic shift in the supply of, and demand for, qualifications. Students, parents and employers have begun to view university degrees as a must-have in a resume. Today, some 40 per cent of Australians aged 25 to 34 have graduated with a bachelor's or higher degree, compared with just 29 per cent a decade earlier.[2]

While education remains a key driver of opportunity, equality, social change and quality of life, the trend towards higher education qualifications is being questioned. For example, Jennifer Westacott, Chief Executive of the Business Council of Australia, recently criticised the "creeping credentialism" that makes "a degree an entry requirement for a job" and called for a cultural shift. Ms Westacott argued that, instead of valuing the qualification, "we should value the role" and "value the attributes a person needs to do the job well".[3]

Others have questioned whether higher level qualifications really equip young people with the skills needed to succeed in today's workplace. According to Australian businesswoman and former head of the Australian Chamber of Commerce and Industry, Kate Carnell, young candidates are more qualified than ever, but employers find them difficult to employ. *"Students come out of university or training programs and they might have the academic or theoretical skills, but no skills to work at all".* [4]

It is likely that some of the qualification inflation and subsequent skills mismatch has been in part driven by successive government policies that have promoted higher education in a bid to build Australia's innovation and productivity and offer young people pathways to success. While the intent may have been genuine in its aim of providing opportunities for deeper skills development, the policy settings may have inadvertently led to the education market promoting the highest cost product, even when it may not be necessary.

This has led employers to demand higher education qualifications that employees accordingly strive to attain, despite the fact that these are often unnecessary in the practical job roles for which VET qualifications might be more appropriate.

It also needs to be acknowledged that perceptions of status are closely intertwined with the chase for higher qualifications.

A recent survey found four in five parents would prefer that their children attend university after school rather than undertake vocational education. The report on the survey noted that, among the Australian public, perceptions surrounding vocational education continue to be widely out of step with the reality of the sector and its achievements. The current over-emphasis on academic and university pathways means VET pathways are often not given due consideration by high school leavers.[5]

This point was reinforced by another recent survey that sought young people's views and found that 74 per cent of young people who responded did not or will not consider an apprenticeship or traineeship when they finish, or finished, school. This is despite the fact that nine out of ten jobs predicted to have the greatest growth in the next five years can be achieved via training courses provided by the VET sector.[6]

1.2 Employers need 'skills-ready' workers with the right type of qualification for the job

An objective of Australia's education and training system is to equip workers with the skills and knowledge to meet the requirements of their jobs. This is predominantly done

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2 ABS Catalogue 62270DO001_201605 Education and Work, Australia, May 2016 and ABS Education and Work, 6227.0 May 2006

3 Jennifer Westacott in "The future of education – Australia Davos Connection Forum Address" August 2016. Available at: http://www.bca.com.au/media/the-future-of-education---australian-davos-connection-forum-address-by-jennifer-westacott

4 News.com.au "Is it time to turn your back on university?" January 2016. Available at: http://www.news.com.au/finance/work/careers/is-it-time-to-turn-your-back-on-university/news-story/d027a70b034a7b3d8036bde535a5cce4

5 Wyman, N., McCrindle, M., Whatmore, S., Gedge, J. & Edwards, T. (2017). Perceptions are not reality: myths, realities & the critical role of vocational education & training in Australia; Skilling Australia Foundation, Melbourne, Australia

6 Bisson R and Stubley W (2017) After the ATAR: Understanding how Gen Z transition into further education and employment, Year13, Australia, p 33

through the completion of qualifications. At any given point in time in Australia, some workers will have the right type of qualifications, while others will not. Those who do not possess the right type of qualification could be over-qualified, under-qualified or hold a qualification that is misaligned to the requirements of their current job (Exhibit 1).

There are cases where it's difficult to establish the reason for the mismatch, which can be subject to an employer's unique and personal circumstances. There are also changing views on which skills are most valuable in today's workplace. For example, soft or employability skills are the bedrock of success for workers in the people-facing sectors, but may be less valuable elsewhere. Employers often express concern that these skills are missing in graduates, suggesting that either they are not being sufficiently embedded within qualifications or the training for these qualifications is not being delivered well by providers.

EXHIBIT 1 – QUALIFICATION ALIGNMENT OF AUSTRALIAN WORKERS

> **At any time, some Australian workers will have the right type of qualification while others will not**

AUSTRALIAN POPULATION

Workers with the right type of qualifications

Having the right type of qualification means:

Possessing the type of qualification that is required to perform a job

Workers with mismatched qualifications

Over-qualified workers

Under-qualified workers

Workers with misaligned qualifications

1.3 Higher qualifications might not always be the best option for employers or individuals

This report's findings highlight the question of whether there is value in the perceived status of a bachelor's degree, particularly given the associated personal debt often incurred to obtain it, when what might actually have been needed was a Certificate III to embark upon the work journey. A bachelor's degree may be highly valuable for a worker later on in the work journey as he or she continues to build knowledge and skills.

While much of the data and recent public debate has focused on the dramatic increase in the number of graduates with bachelor's degrees, it's significant to note that a mismatch in the skills and qualifications required for job roles can occur in every type and at every level of qualification.

This report examines over-qualification and the resultant skills mismatch across all qualifications in Australia, not just those resulting from or acquired via higher education. It focuses on the situation where job roles are occupied by individuals who possess a qualification which is superfluous, unnecessary or poorly aligned.

1.4 Methodology

Measuring the existing mismatch of jobs and qualifications in the Australian economy is a challenge.

Firstly, employers and workers may find it difficult to define the 'right' level of qualification for a job. It's possible to ask employers what qualifications they seek in candidates, but it may be that they simply follow a prevailing industry trend to hire workers with certain qualifications, even if those qualifications are not strictly needed to perform a certain role. Similarly, it's possible to ask individuals whether they consider themselves over-qualified for their jobs, but self-assessment is prone to innate biases.

Secondly, quantifying skills mismatch beyond qualification levels is difficult, as the value employers ascribe to worker skills is highly subjective and varies depending on business size, location, and personal preference.

This study undertook a three-step process to quantify the extent and cost of over-qualification in Australia.

1. The extent of over-qualification was estimated by measuring the extent to which the qualifications of more than 10 million Australians differ from the

Australian Bureau of Statistics' (ABS) official skills description for more than 400 occupations across the economy. Results were cross-checked using a rich source of US labour market data called O*NET, one of the most comprehensive occupation-level databases in the world, where US occupations are matched with Australian occupations and employment data.

2. The cost of over-qualification to individuals was calculated as a function of tuition costs and foregone income during the study period.

3. Finally, the report analysed what implications the extent of over-qualification has for both individuals and employers.

The broader challenge of skills mismatch is highly relevant to the people-facing sectors supported by SkillsIQ. The potential for skills mismatch is increased in sectors where labour is a key driver of the value and output of the industry. To better understand the cost to employers of skills mismatch, this report quantifies the contribution made by labour to an industry's output, and examines whether people-facing sectors, which are more labour-intensive, have a high share of employees that have recently joined, which in turn implies higher turnover (see Chapter 2).

The methodology is summarised in Exhibit 2. Detailed information about the methodology is at Appendix 1.

EXHIBIT 2 - SUMMARY OF METHODOLOGY

> The report analysed the actual versus 'required' level of qualification for >10 million Australians across ~400 occupations

1

Measuring the extent of over-qualification

Our approach

- Estimate the extent of over-qualification by using ABS classification of skill level for ~400 occupations.
- Cross-check using US data on workers' perception of qualification needed for work, matched to Australian occupations.

Source of insight

- ABS – actual qualification from Census; 'right' qualification level from ABS skill levels for each occupation
- O*NET – well-respected, large scale US labour market survey for the 'right' qualification level by occupation.

2

Measuring the cost of over-qualification

Our approach

- Estimate the cost of over-qualification as a function of wasted tuition costs and foregone income

Source of insight

- Publicly-available data on tuition costs and average earnings for each occupation

3

Implications for individuals and employers

Our approach

- Identify key implications for individuals seeking work and training
- Identify key implications for employers in hiring and training

SOURCE: ABS O*NET, AlphaBeta analysis

Chapter 2
Findings, impacts and implications

2.1 Employer demand for higher qualifications is increasing

Australian employers are expecting job candidates to be increasingly qualified. A sample of more than 3 million nationwide online job advertisements shows that the number of jobs indicating a requirement for bachelor's degrees has increased by 41 per cent over the past two years.[7]

A growing share of online job advertisements, particularly in some people-facing sectors, request a bachelor's degree from applicants (Exhibit 3). For example, over the past two years the number of online job advertisements

that state that bachelor's degrees are required within the Children's Education and Care sector has increased by 24 per cent; in the Community Services and Development sector by 86 per cent, and in the Technicians Support Services sector (such as a pathology collector or medical administrative assistant) by 71 per cent.

While in some sectors the increase in stated requirements for bachelor's degrees may have been driven by higher regulation and various sector-specific factors, in other sectors the increase may be in part explained by the growing number of applicants with such degrees, resulting in employers raising the bar themselves. Over time, this results in qualification inflation.

EXHIBIT 3 – DEMAND FOR BACHELOR'S DEGREES, 2015 VS 2017

> Over the past 2 years, employer demand for bachelor's degrees has increased

Demand for bachelor's degrees, 2015 vs 2017

Growth in number of online job advertisements requesting a bachelor's degree, by sector, % growth from 2015 to 2017 (in bubble)

- 2015
- 2017

Whole Economy	Children's Education & Care	Community Sector & Development	Technicians Support Services
+41%	+24%	+86%	+71%
35,254 / 49.874	4,717 / 5,832	511 / 951	340 / 581

SOURCE: CEB Talent Neuron
NOTE: For each sector, online job advertisements have been analysed for the top 3–5 occupations. Comparison occurs between the two time periods: first 6 months of 2015 and first 6 months of 2017. >3.5 million online job advertisements were searched for relevant keywords associated with bachelor's degrees.

7 Data drawn from CEB Talent Neuron database. For each sector, online job advertisements have been analysed for the top 3-5 occupations by employment size. Comparison occurs between the two time periods: first 6 months of 2015 and first 6 months of 2017. ›3.5 million online job advertisements were searched for relevant keywords associated with bachelor's degrees.

2.2 One in four workers are over-qualified

To date, much of the public debate has focused on the inflation in bachelor's degrees.[8] However, this report provides evidence that over-qualification is a much more widespread phenomenon. An analysis of the skills mismatch across the economy, accounting for a range of qualification levels, reveals that over-qualification is very common in Australia. Across the whole economy, one in four or 2.5 million Australian workers can be considered over-qualified for their current roles.

Over-qualification exists at every level of qualification (Exhibit 4). For example, 8 per cent of workers have acquired a bachelor's degree that is not required to perform their current role. The same holds true for 4 per cent of workers who hold a Diploma, Advanced Diploma or Associate Degree qualification. Given the challenges with any data source, these results were cross-checked against a rich alternative source of labour market data in the US, which was matched to Australian occupations and employment data. This cross-check found a similar rate of over-qualification of 24%.[9]

1 in 4 workers in Australia are over-qualified, with workers possessing qualifications at every level that are not required for their current roles

EXHIBIT 4 – OVER-QUALIFIED WORKERS IN AUSTRALIA, BY LEVEL

Over-qualified workers in Australia, by level

Over-qualified workers, as a proportion of total workers in Australia, %, 2016 estimate

1 in 4 workers (25%) in Australia are over-qualified

1 in 13 workers in Australia (8%) possess a bachelor's degree that is not required for their current role

- **75.4%** Not over-qualified
- **24.6%** Over-qualified

- **75.4%** Not over-qualified
- **7.6%** Possess bachelor's degree or higher not required for current role
- **4.3%** Possess Diploma/Advanced Diploma not required for current role
- **6.3%** Possess Certificate III or IV not required for current role
- **6.4%** Possess Certificate II not required for current role

SOURCE: O*NET, ABS, AlphaBeta analysis

8 For example, see ABC News "University graduates struggle to find full-time work as enrolments increase, study finds" (1 October 2016) Available at: http://www.abc.net.au/news/2016-09-29/uni-graduate-job-prospects-in-decline/7890562; Courier Mail "High fees, massive debts and no job guarantees" http://www.couriermail.com.au/news/queensland/high-fees-massive-debts-and-no-job-guarantees--is-university-really-worth-it/news-story/811c4bf1cc97 6d48c10f7ea36dcac119; and Group of Eight Australia "Speech by Go8 CEO to Graduate Employability and Industry Partnerships Forum" (August 2016) Available at: https://go8.edu.au/sites/default/files/docs/article/graduate_employability_partnerships_forum_-_go8_ce_speech_2.pdf

9 See Appendix for detailed methodology

2.3 Within people-facing sectors, the potential for, and rate of, over-qualification is higher

The potential for skills mismatch is exacerbated in the people-facing sectors[10] of the economy, which rely more than others on the input of their workers; that is, labour is one of the most significant components of the business (see Exhibit 5). For example, in residential care and social assistance services, wages and salaries contribute 77 per cent of total industry value added (or output). In health care services, wages and salaries represent 54 per cent of industry output. In the retail trade, wages and salaries represent 40 per cent of industry output.[11]

EXHIBIT 5 – SHARE OF LABOUR IN INDUSTRY OUTPUT

Labour is a significant contribution to final output in many people-facing sectors

Share of labour in industry output

Employee compensation as share of gross value added (%), selected industries

Industry	%
Residential Care and Social Assistance Services	77%
Early Childhood, Primary and Secondary Education	69%
Health Care Services	54%
Public Order and Safety	51%
Public Administration and Regulatory Services	47%
Retail Trade	40%
Community Education Services	34%
Food and Beverage Services	31%
Wholesale Trade	31%
Personal Services	27%
Sports and Recreation	22%
Accommodation	21%
Construction Services	19%
Finance	18%
Coal Mining	15%
Residential Building Construction	8%
Equipment Manufacturing	6%

Many key people-facing industries rely on a high share of labour contribution to their output

Other industries have a lower share of labour contribution to output

SOURCE: ABS Input-Output tables, analysis by AlphaBeta
NOTE: Industries were selected based on a judgement of their relevance to SkillsIQ activity, prior to evaluating labour share of GVA.

10 See inside cover for list of 'people-facing' sectors which are relevant to the objectives of SkillsIQ
11 ABS Catalogue 5215 "Australian National Accounts: Input-Output Tables" (2013-14)

The analysis of qualifications found that on average, across all people-facing sectors, every third worker (35 per cent) possesses qualifications that are not required to perform their current role. A key driver of the mismatch is bachelor's degrees. On average, 13 per cent of workers in a people-facing role possess a bachelor's degree that is not required in the performance of their current role.

However, not all sectors are equally affected by over-qualification (Exhibit 6). Sectors with highly regulated entry requirements (such as qualifications which are mandatory in order to be registered to practice an occupation) or where there is a strong link between the requirements of the job and the content of the qualifications, such as nursing or dentistry, have lower over-qualification rates. Other services industries, including child care and the
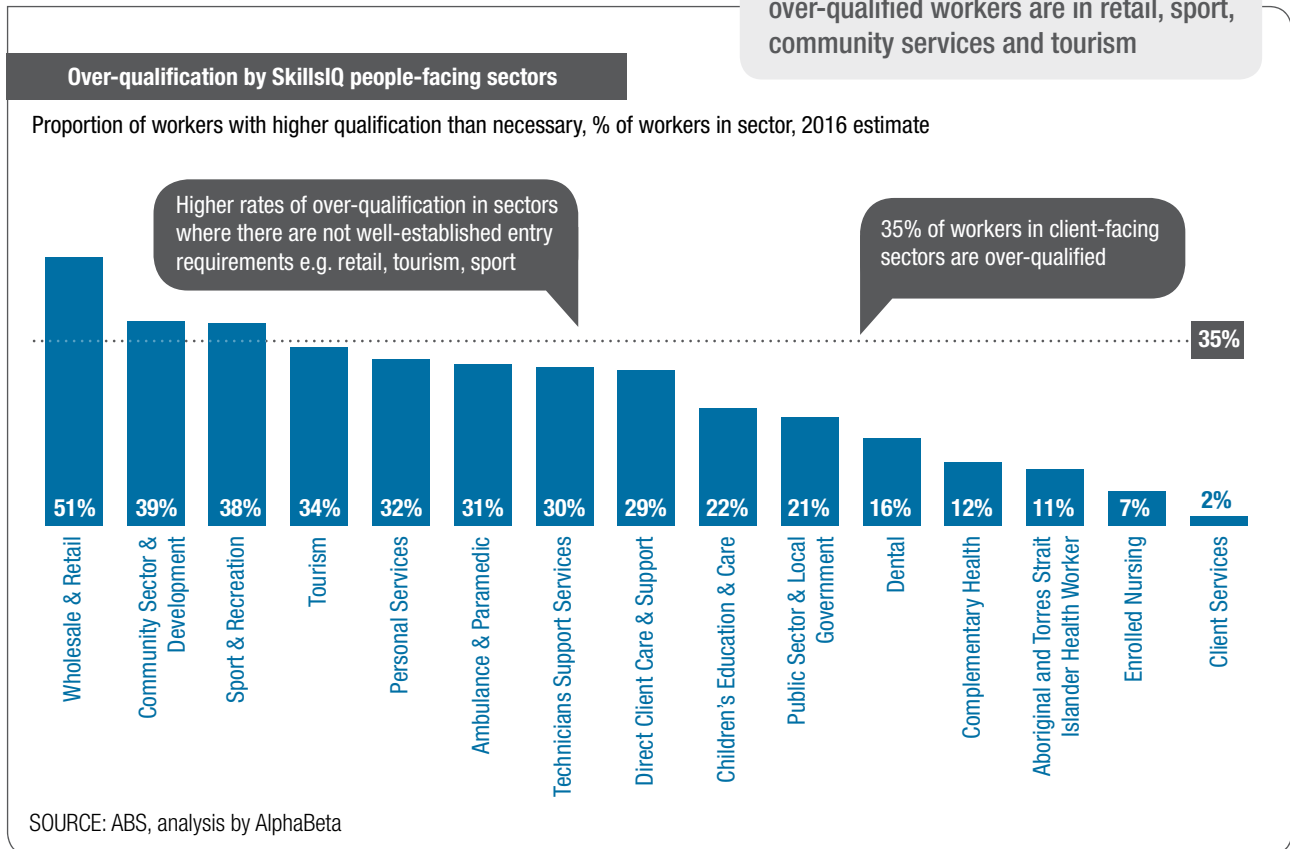
ambulance and paramedical sector, are moving towards regulation, in part to achieve a stronger match between job requirements and candidate skills.

In contrast, other sectors have higher over-qualification rates. For example, wholesale and retail (with 51 per cent over-qualified), sport and recreation (38 per cent over-qualified) and tourism (where 34 per cent of workers are over-qualified) are all sectors with a large proportion of workers whose qualifications are higher than necessary.

These results were cross-checked using an alternative source of data from the US, which matched occupations to Australian occupations and employment data, and also found high rates of over-qualification among client-facing sectors, ranging from 3% to 44%.[12]

EXHIBIT 6 – OVER-QUALIFICATION BY SKILLSIQ SECTORS

The sectors with the highest share of over-qualified workers are in retail, sport, community services and tourism

Over-qualification by SkillsIQ people-facing sectors

Proportion of workers with higher qualification than necessary, % of workers in sector, 2016 estimate

Higher rates of over-qualification in sectors where there are not well-established entry requirements e.g. retail, tourism, sport

35% of workers in client-facing sectors are over-qualified

35%

Sector	%
Wholesale & Retail	51%
Community Sector & Development	39%
Sport & Recreation	38%
Tourism	34%
Personal Services	32%
Ambulance & Paramedic	31%
Technicians Support Services	30%
Direct Client Care & Support	29%
Children's Education & Care	22%
Public Sector & Local Government	21%
Dental	16%
Complementary Health	12%
Aboriginal and Torres Strait Islander Health Worker	11%
Enrolled Nursing	7%
Client Services	2%

SOURCE: ABS, analysis by AlphaBeta
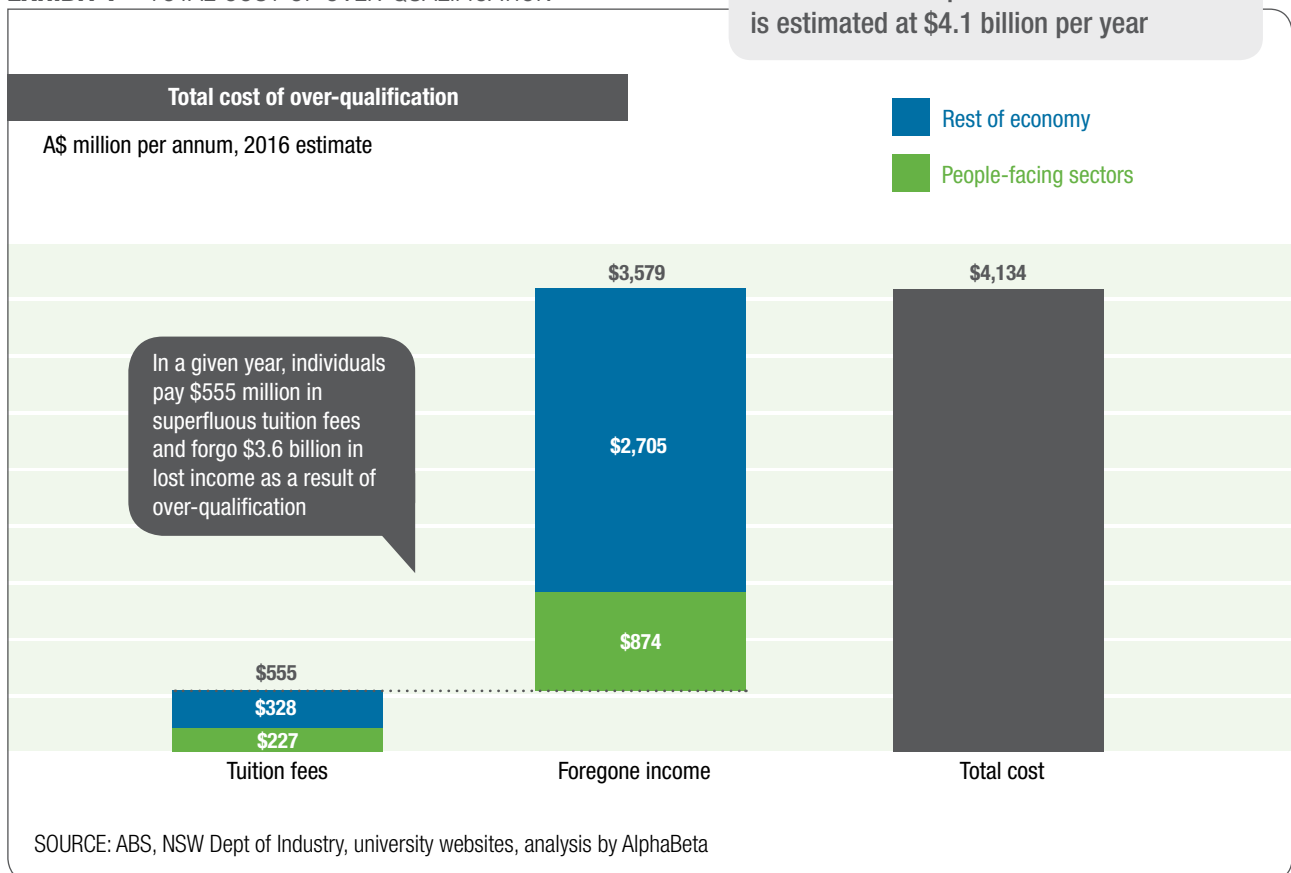
12 See Appendix for detailed methodology

2.4 The cost of over-qualification for individuals likely exceeds $4 billion per year

This over-qualification comes at a high cost. In 2016, Australians paid tuition fees worth an estimated $555 million for qualifications that were not required for their current career stage or roles, and may or may not be relevant for future roles. The unnecessary study time is equivalent to a combined $3.6 billion in foregone income, causing the total cost of over-qualification for individuals to jump to more than $4 billion per year nationally (see Exhibit 7).

These figures represent the cost to individuals alone and don't capture additional costs, such as government costs related to tuition support and foregone tax, or employer costs caused by lengthy hiring procedures and lost productivity. Other impacts of over-qualification, qualification inflation and the resultant skills mismatch are examined in the next section.

EXHIBIT 7 – TOTAL COST OF OVER-QUALIFICATION

The cost of over-qualification to individuals is estimated at $4.1 billion per year

Total cost of over-qualification

A$ million per annum, 2016 estimate

- Rest of economy
- People-facing sectors

In a given year, individuals pay $555 million in superfluous tuition fees and forgo $3.6 billion in lost income as a result of over-qualification

$3,579

$2,705

$874

$4,134

$555

$328

$227

Tuition fees

Foregone income

Total cost

SOURCE: ABS, NSW Dept of Industry, university websites, analysis by AlphaBeta

> **What we really have to make sure that we're not doing is creating more qualification inflation . . . when that is not necessary and does not give [workers] the skills that they need for the job they want to do.**
>
> – The Hon. Karen Andrews, Assistant Minister for Vocational Education and Skills, Interview on Sunrise, April 2017
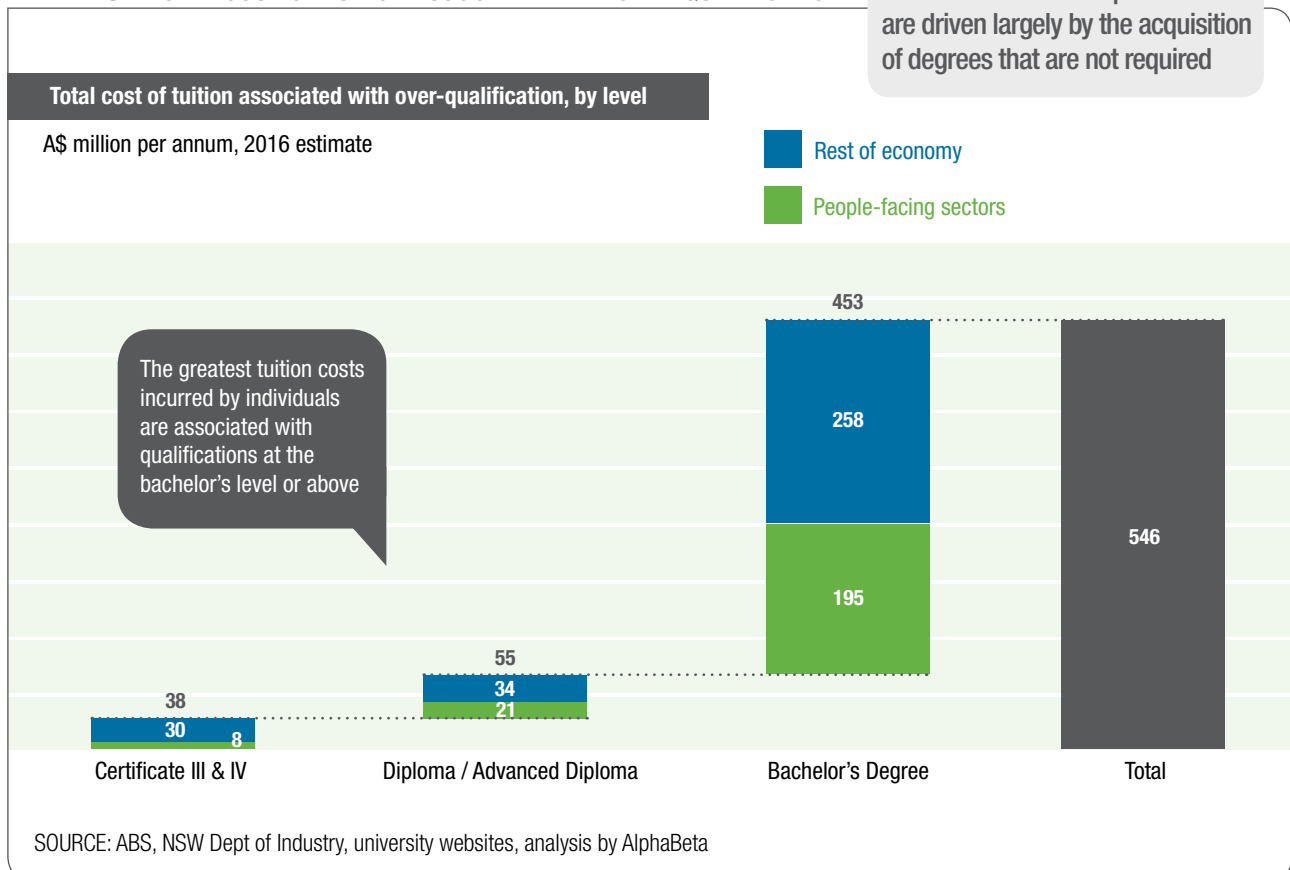
The majority of superfluous tuition fees each year are driven by acquiring bachelor's degrees that are not required to perform a worker's current role. Specifically, 80 per cent of the combined $555 million of superfluous tuition costs were spent to acquire unnecessary bachelor's degrees. Bachelor's degrees are typically more expensive than other qualifications (Exhibit 8).

The costs in tuition and foregone income, as well as other costs related to skills mismatch more broadly, are not just borne by young people. They can occur at multiple points within an individual's working life. Most career pathways are no longer linear. This is increasingly the case where the nature of work is changing. People at all stages of life need to consider their employment prospects and participate in ongoing skills development. It's important that the costs of skills gained through qualifications offer a return on investment.

EXHIBIT 8 – TOTAL COST OF TUITION ASSOCIATED WITH OVER-QUALIFICATION

The annual costs of tuition associated with over-qualification are driven largely by the acquisition of degrees that are not required

Total cost of tuition associated with over-qualification, by level

A$ million per annum, 2016 estimate

■ Rest of economy
■ People-facing sectors

The greatest tuition costs incurred by individuals are associated with qualifications at the bachelor's level or above

Certificate III & IV	Diploma / Advanced Diploma	Bachelor's Degree	Total
38	55	453	546
30	34	258	
8	21	195	

SOURCE: ABS, NSW Dept of Industry, university websites, analysis by AlphaBeta

Examples of over-qualification

An applicant for a retail manager's position has a Diploma of Business but limited experience in either retail or management. This applicant may not possess the practical, vocational skills for the role.

A hotel receptionist holds an Advanced Diploma of Travel and Tourism Management. The receptionist will require practical, vocational skills for the role but has undertaken a qualification that is not necessary to perform the job.

2.5 Other impacts of over-qualification and skills mismatch for employers and employees

Over-qualification can be challenging and costly for both employers and their employees (Exhibit 9). Employers may hire a candidate with a seemingly relevant qualification, only to find out later that the new hire lacks crucial practical skills. In these instances, employers may ultimately become dissatisfied with their choice and lose faith in the value of the qualifications. Workers, on the other hand, may become disillusioned as they find that they lack crucial practical skills and that they progress more slowly than they had hoped when they set out to acquire a qualification that ultimately may appear to be superfluous.

They may soon start looking for a new job. This adds to the hiring cost of the employer who is forced to find a replacement.

Case study
The over-qualified bartender who lacks practical skills

Peter needs a bartender to work in his wine and cocktail bar in the CBD. As a small-business owner, he can only afford one additional staff member for the front of house, so he needs the new hire to be highly skilled.

Peter advertises the role and decides to include a requirement for applicants to hold a Diploma of Hospitality, thinking that this will ensure that they are well trained and have excellent bar skills.

John is recruited and, although he has a Diploma, it becomes clear that he doesn't know much about wine. He can't even make more than a very basic cocktail.

Peter approaches John about his skills deficit and finds out that his Diploma trained him in budgeting, management and supervision. He would be skilled to work in human resources, but lacks the skills required for a hands-on role at the bar.

Both parties agree that neither of their expectations have been met, and they part company. Peter needs to start the hiring process again, which means more time and more money spent on recruitment and induction.

For his part, John feels frustrated and disappointed that he spent time and money on a qualification that doesn't seem to 'fit', and his self-confidence starts to erode.

One international study, for example, found that over-qualified workers were over four times more likely to leave their position within six months than workers who were less over-qualified, and that they were more likely to move into a position where they felt less over-qualified.[13]

Over-qualified workers might also lose motivation and be less productive than others, as they might feel 'under-utilised' relative to their qualification. Workers with higher qualifications than required for their given roles have been found to have lower morale and job satisfaction and, as a result, turn up late to work, take more breaks, and are more likely to search for a new job and leave their jobs than workers that are not over-qualified.[14]

Research has repeatedly found that hiring ill-suited employees can lower productivity and profits.[15] It can also lead to 'contagious employee withdrawal'.[16]

EXHIBIT 9 – CHALLENGES OF OVER-QUALIFICATION FOR WORKERS AND EMPLOYERS

> Over-qualification generates challenges for both individuals and employers

1 Insufficient practical training

Consequences of not having practical, vocational skills which are required for job	Challenges for individual workers or employers
Workers don't have practical skills to do job →	Workers not qualified for actual job tasks/day-to-day work
Unsatisfied employers →	Employers expect workers to add value immediately. Big gap in enterprise or transferable skills
Lost faith in qualification →	Employers think there is no value in qualification
Slower worker progression →	Workers without practical skills don't progress fast in their careers

2 Theoretical training that is not required

Consequences of having unnecessary theoretical skills or theoretical skills acquired too early	Challenges for individual workers or employers
Superfluous tuition fees →	Tuition costs wasted on qualification that is not relevant to work duties
Foregone Income →	Loss of income during study period
Priced out of entry level jobs →	Over-qualified workers may struggle to find employment if they cost more (due to Award requirements or higher expectations)
Counter-productive work behaviours →	Under-utilised workers have lower morale, take more breaks

13 Maynard and Parfyonova (2013), 'Perceived overqualification and withdrawal behaviours: Examining the roles of job attitudes and work values', Occupational and Organisational Psychology, vol. 86, no. 3, pp. 435 − 455.

14 Maynard and Parfyonova (2013), 'Perceived overqualification and withdrawal behaviours: Examining the roles of job attitudes and work values', Occupational and Organisational Psychology, vol. 86, no. 3, pp. 435 − 455. See also: Cabral Vieira 2005, Green and Zhu 2006, Maynard et al 2005; Steven Wald, (2005) "The impact of overqualification on job search", International Journal of Manpower, Vol. 26 Issue: 2, pp.140-156, doi: 10.1108/01437720510597649; Giret et al 2006

15 Sagie, A., Birati, A., & Tziner, A. (2002). Assessing the costs of behavioral and psychological withdrawal: A new model and an empirical illustration. Applied Psychology: An International Review, 51, 67-89. Salgado, J. F., Viswesvaran, C., & Ones, D. S. (2001). Predictors used for personnel selection: An overview of constructs, methods and techniques. In Anderson, N., Ones, D. S., Sinangil, H. K., & Viswesvaran, C. (Eds.), Handbook of Industrial, Work and Organizational Psychology (pp. 165-199). London: Sage Publications.

16 Podsakoff, N. P., LePine, J. A., & LePine, M. A. (2007). Differential challenge stressor hindrance stressor relationships with job attitudes, turnover intentions, turnover and withdrawal behavior: A meta-analysis. Journal of Applied Psychology, 92, 438-454. Zimmerman, R. D. (2008). Understanding the impact of personality traits on individuals' turnover decisions: A meta-analytic path model. Personnel Psychology, 61, 309-348.

2.6 The impact is greater within the people-facing sectors

Any skills mismatch weighs particularly hard on businesses in the labour-intensive people-facing sectors. While there are various reasons for high workforce turnover, given the high rates of over-qualification identified in many of these sectors, skills mismatch is likely to be a leading driver.

There are signs that the turnover rate in many of the people-facing sectors supported by SkillsIQ is high, which is costly in terms of recruitment and investment in on-the-job training. For example, in accommodation and food services, 32 per cent of the workforce has been with their current employer for less than one year. In the retail trade, 22 per cent of the workforce has been with their current employer for less than one year (see Exhibit 10).
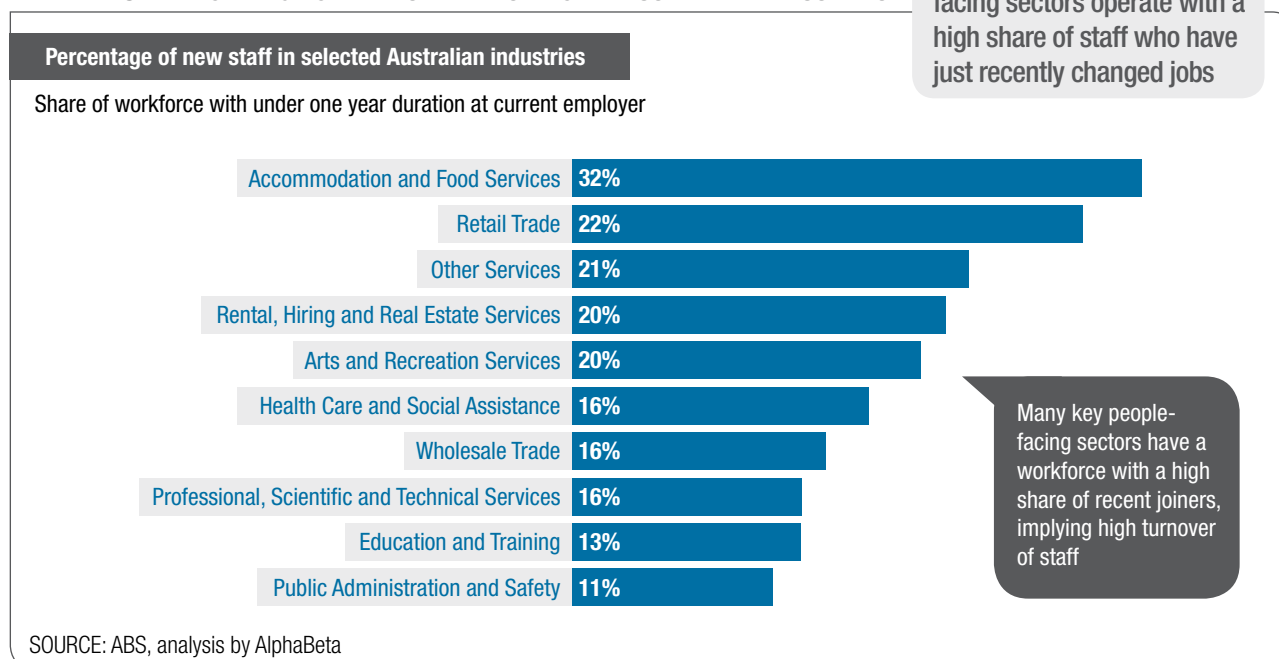
In the tourism industry the average employee turnover rate was reported as 66% in 2015. Businesses also identified recruitment and retention as significant issues, and the largest deficiency identified by businesses was a lack of appropriate skills. 69% of businesses identified skills deficiencies in their workforce.[17]

2.7 Implications for employers, individuals, training providers and policy makers

Skills mismatch poses a challenge for workers, employers, education providers and policymakers alike. There is a compelling need to find ways to better match worker skills with current job requirements and lower the prevalence and cost of over-qualification in Australia. This requires a concerted effort on all fronts.

Employers could reconsider which candidates have the most suitable practical skills for a job - known as being 'skills-ready' - rather than reach for the candidate who has advanced qualifications. Employers need to clearly define the skills required for a job role rather than rely solely on a qualification level. This may help lower the business costs associated with hiring the wrong person, including costs incurred as a result of lower worker retention rates, lower worker productivity, and higher recruiting costs.

EXHIBIT 10 – PERCENTAGE OF NEW STAFF IN SELECTED AUSTRALIAN INDUSTRIES

Employers in many people-facing sectors operate with a high share of staff who have just recently changed jobs

Percentage of new staff in selected Australian industries

Share of workforce with under one year duration at current employer

Industry	%
Accommodation and Food Services	32%
Retail Trade	22%
Other Services	21%
Rental, Hiring and Real Estate Services	20%
Arts and Recreation Services	20%
Health Care and Social Assistance	16%
Wholesale Trade	16%
Professional, Scientific and Technical Services	16%
Education and Training	13%
Public Administration and Safety	11%

Many key people-facing sectors have a workforce with a high share of recent joiners, implying high turnover of staff

SOURCE: ABS, analysis by AlphaBeta

17 Deloitte Access Economics Australian Tourism Labour Force Report: 2015-2020, Australian Trade Commission Austrade Oct 2015

Individuals could consider pursuing qualifications that best suit a particular career stage. Research shows that it may not always be the best option for an individual to favour a higher qualification over practical work experience early in their working life, but that they might subsequently build upon hands-on experience gained in the initial stages of their career by completing a relevant qualification later in their career path. The graduate with the Advanced Diploma of Travel and Tourism Management who is applying for a job as a hotel receptionist may have acquired the advanced qualification too early. Rather than enrolling in the Advanced Diploma straight out of school, it may have been more valuable for them to gain some practical experience or a lower qualification before pursuing the higher qualification.

image: ThinkStock

Case study

Sasha seeks further qualification as she takes on more responsibility

Sasha graduated from Year 12 and had worked on a casual basis in waitressing roles throughout high school and in between travelling to save some money. She always found the broader aspects of the café and restaurant businesses very interesting, including functions, and has become aware that as a result of her practical experience she now knows the answers to a lot of the questions newer staff members often ask.

She completes a Certificate III in hospitality, including food and beverage service, and some finance and IT electives. As her operational skills and experience in the industry increase, Sasha's interest continues to grow, as well as her awareness of senior roles with more responsibility and 'whole of business' functions. Her boss encourages her to enrol in a Diploma of Hospitality Management to develop some finance and HR skills which will complement the practical skills and knowledge she continues to build with her work in the industry.

With her qualifications and continued passion for the industry, Sasha is employed by an international hotel chain and is soon nominated by her boss for a fast track to promotion in their talent management system.

image: ThinkStock

Education providers could focus their efforts on aligning qualifications more closely with job roles. This includes making more specific information available about qualification programs and elective options, which are targeted to suit specific job roles or sectors. Student expectations regarding the achievement of qualifications should also be considered. Education providers are well placed to help students in selecting the most effective course for the desired job outcome. For example, students may think that enrolling in a Diploma will give them something more marketable than a Certificate III, only to find that they lack the foundations in the field of study to cope with the course requirements, or lack the industry experience to secure a role based on the qualification alone.

Case study

Case study: A change in career – Bob the vet

Bob is a veterinarian who recently moved to another city with his partner and felt ready for a career change. He thought about becoming a counsellor, but was unsure about what to study. After all, he had more experience with animals than people and didn't know much about a counsellor's day-to-day work and the level of commitment required to complete the Diploma of Counselling.

He approached a local training provider to enrol in the Diploma of Counselling but, after discussing his situation with them, they recommended he enrol in the Certificate III in Individual Support to obtain a solid foundation in the industry. Bob was worried that this would be pitched at too low a level for him given his previous degrees. However, he was looking forward to gaining some work experience in various support services in order to find out more about potential areas of specialisation, and was pleased that this could be incorporated within the Certificate III qualification.

Bob ended up being very happy with his choice, as the language, protocols and regulations of the counselling industry were completely different to what he was used to as a vet. Also, the last time he had done any formal study was 20 years ago, and he found the course requirements, including the use of technology, challenging. His concern that the Certificate III would mainly be pitched at too junior a level for him proved unfounded.

The past five years have been an ongoing learning experience for Bob who has now become a specialist counsellor for people with drug- and alcohol-related issues. He is currently enrolled in the Diploma of Counselling and is keen to specialise even further, as a counsellor for people with gambling issues.

For **policy makers**, the fact that over-qualification and skills mismatch can apply to people of all working ages also emphasises that these issues won't be resolved with a 'one-off' tactic. Better practices will need to be implemented on an ongoing basis as part of an overall strategy to alleviate the mismatch-related costs for employers, individuals and the wider society.

Case study

Richard sees benefit in acquiring practical skills first

Richard graduates from high school where he has completed a Certificate II in Salon Assistant through VET delivered within a secondary schools' program.

He wants to work in a beauty or hairdressing salon as a manager, not as a hairdresser or beauty therapist. He enrols in a Diploma of Salon Management.

Richard graduates from the Diploma and starts looking for a job, only to find that no one will hire him as he doesn't have any practical skills in working in a salon environment.

With hindsight, Richard realises he would have been better to gain some practical skills through work experience or a qualification such as a Certificate IV in Beauty Therapy in order to support his pathway to a management qualification and to a more senior position.

Chapter 3
Conclusion and next steps

Skills mismatch, whether due to over-qualification, under-qualification or misaligned qualifications, is an issue that has implications for workers, employers, policy makers and education providers alike.

This report's findings point to the need to recalibrate policy settings and employer and individual awareness and expectations so that people achieve 'the right qualification at the right time'. People need practical skills (including vocational training) to be 'skills-ready' for work. They also need to acquire higher-level skills (including those gained from degrees and advanced vocational qualifications) to support their career development, but not always as an entry ticket into their first job.

Skills mismatch does not just affect young people. As ongoing skills development and lifelong learning are becoming paramount for success throughout our working lives, the issue is relevant to every Australian. Still, young people are particularly vulnerable to acquiring misaligned or unnecessary qualifications in the expectation that it will increase their chances of finding a job.

This report uses new and unique data to quantify the extent and the cost of over-qualification in Australia. It finds that over-qualification affects one in four workers across the economy. It is particularly high in people-facing sectors, where 35 per cent of workers, on average, have spent money and time on qualifications that are not required to perform their current jobs.[18]

This rate of over-qualification is costly for both individuals and employers. For individuals, the cost of over-qualification annually amounts to $4.1 billion across Australia. This cost is based on skills mismatch resulting from over-qualification. There are other skills mismatch scenarios that are challenging to quantify, but are likely to be high in sectors where labour is a key driver of output. In many people-facing sectors, labour is a key share of output (up to 77 per cent in residential care and social assistance, for example) and turnover in some of these sectors is very high (with the proportion of employees who have recently joined a company above 30 per cent).

Individuals who take a path via the most appropriate qualification for their current job roles, combined with practical and on-the-job experience, prior to taking the step to the next appropriate qualification, may not only be providing a better career trajectory for themselves, but may also be part of a more productive, economic and sustainable approach to education.

> **Vocational education and training forms an integral piece of the Australian education system.**
>
> **The sector partners with industry and government to equip people, particularly younger people, with workplace-specific skills and knowledge designed to meet current and future employment.**
>
> Skilling Australia Foundation Report (2017)

3.1 Next steps

The data gathered in this report provides a foundation for further qualitative evidence-gathering and testing within industry. The second phase of this project will identify the links between the current data analysis and what is occurring in the people-facing workforce on a day-to-day basis. This in turn will allow for an informed debate on the issues, leading to the creation of strong, actionable recommendations on ways to address the issue of skills mismatch for the future workforce, based on authentic industry experience and best practice.

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18 See inside cover and Glossary for list of people-facing sectors

Appendix 1

Detailed methodology – Determining over-qualification of Australian workers nationwide

Estimating the actual level of qualifications in Australia
1. Qualification/Occupation data was extracted for all unique occupations from the most recent Census of Population and Housing data collected by the Australian Bureau of Statistics (ABS) in 2011.

- Occupations are defined at the 4-digit level, per the latest ANZSCO classification in 2013

- Qualifications have two components, Highest Year of School Completed (HSCP) and Non-School Qualification: Level of Education (QALLP). For statistical reliability, only workers with valid HSCP or QALLP were included.

2. Given HSCP and QALLP, the Level of Highest Educational Attainment (HEAP) for an individual worker was derived according to the following decision table provided by ABS.

SOURCE: ABS http://www.abs.gov.au/websitedbs/censushome.nsf/home/statementspersonheap?opendocument&navpos=430

HSCP	QALLP						
	Certificate nfd*	Certificate III & IV	Certificate IV	Certificate III	Certificate I & II nfd	Certificate II	Certificate I
Year 12	Year 12	Cert. III & IV nfd*	Cert. IV	Cert. III	Year 12	Year 12	Year 12
Year 11	Year 11	Cert. III & IV nfd	Cert. IV	Cert. III	Year 11	Year 11	Year 11
Year 10	Year 10	Cert. III & IV nfd	Cert. IV	Cert. III	Year 10	Year 10	Year 10
Year 9	Year 9	Cert. III & IV nfd	Cert. IV	Cert. III	Cert. I & II nfd	Cert. II	Cert. I
Year 8 or below	Year 8 or below	Cert. III & IV nfd	Cert. IV	Cert. III	Cert. I & II nfd	Cert. II	Cert. I

* not further defined

As a result, for each occupation, the number of Australian workers with a specific HEAP was determined. The HEAP was categorised into detailed qualification levels from "Did not go to school" to "Higher Doctorate".

Estimating the 'right' level of qualification
3. The 'right' level of qualification required for a given 4-digit ANZSCO occupation was based on the skill level indicated by ABS. Although ABS skill levels are defined in terms of formal education, working experience and on-the-job training, only formal education was taken into account given the focus of the report on qualifications. There are five skill levels defined under ANZSCO:

- Skill Level 1: Bachelor Degree or higher qualification

- Skill Level 2: Associate Degree, Advanced Diploma or Diploma

- Skill Level 3: Certificate III or IV

- Skill Level 4: Certificate II or III

- Skill Level 5: Certificate I or compulsory secondary education.

However, ABS skill levels do not factor in the Higher School Certificates (i.e. Year 11 and Year 12) which are important in deciding the highest educational attainment according to the table above. In order to address this, we

modified the Skill Levels 4 and 5 to obtain adapted skill levels for:

- Adapted Skill Level 4: Certificate II or Higher School Certificate

- Adapted Skill Level 5: Certificate I or Year 10 and below

Calculating the over-qualification rate

4. Workers were regrouped with detailed HEAP into five adapted skill levels and the number of workers within a particular skill level for each occupation was obtained, to generate:

	Skill Level 1	Skill Level 2	Skill Level 3	Skill Level 4	Skill Level 5
Occupation 1	N (1,1)	N (1,2)	N (1,3)	N (1,4)	N (1,5)
Occupation 2	N (2,1)	N (2,2)	N (2,3)	N (2,4)	N (2,5)
Occupation 3	N (3,1)	N (3,2)	N (3,3)	N (3,4)	N (3,5)
...	...	...	...	...	...
Occupation 358	N (358,1)	N (358,2)	N (358,3)	N (358,4)	N (358,5)

where $N(i,j)$ denotes the number of Australian workers who perform the i-th occupation with Skill Level j for each $i = 1, 2, …, 358$ and $j = 1, 2, …, 5$. Let A_i be the "right" skill level indicated by ABS for the i-th occupation and note that A_i must be either 1, 2, 3, 4 or 5. Thus, the total number of over-qualified workers for the i-th occupation can be calculated as follows

Over-qualified$(i) = N(i,A_i+1) + … + N(i,5)$

Given this method generates an estimate for 2011, in order to derive an estimate for 2016 we took into account the growth in employment for each occupation from year 2011 to year 2016. Let G_i be this growth rate for the i-th occupation and thus the total number of over-qualified workers for the i-th occupation is

Over-qualified$(i) = (N(i,A_i+1) + … + N(i,5)) * (1+G_i)$

and the subtotal number of all workers for this occupation in 2016 is

Subtotal$(i) = (N(i,1) + N(i,2) + … + N(i,5)) * (1+G_i)$

The over-qualification rate for the i-th occupation is

Over-qualification Rate(i) = Over-qualified(i)/Subtotal(i)

It is worth noting that given the 'right' level of education required for each occupation one can also easily determine the number of over-qualified Australian workers who perform a particular job with a specific qualification.

Cross-checking the result using US O*NET data

5. In order to validate the results derived using (adapted) ABS indicative skill levels as the 'right' level of education, we alternatively used the Education, Training and Experience data extracted from O*NET occupational database to re-estimate the 'right' qualification level for each 4-digit ANZSCO occupation.

· The O*NET data contains 961 US occupations

· For each US occupation, a sample of workers was surveyed for the level of education required to perform in this job and the survey data for this occupation is a distribution of numbers of respondents over 12 US qualification categories coded as integers from 1 to 12.

Thus, by taking the weighted average of integers from 1 to 12 based on the distribution of numbers of respondents for each occupation, one obtains the 'right' level of qualification for this US occupation. However, in order to use these 'right' US qualifications for Australian workers, we needed to match US occupations with 6-digit ANZSCO occupations according to the O*NET/ABS occupational concordance table constructed. This is because US occupations are comparable to 6-digit ANZSCO occupations. It is possible that multiple US occupations map into the same 6-digit occupation and we took simple averages to obtain the unique 'right' qualification level for this 6-digit occupation. As a result, we obtained the following table:

6-digit Occupation	O*NET Estimate
Occp6.1	O_1
Occp6.1	O_2
Occp6.1	O_3
...	...
Occp6.1011	O_1011

where O-i is the 'right' qualification level estimated from O*NET database for the i-th 6-digit ANZSCO occupation.

However, since 2011 Census Qualification/Occupation data is only at the 4-digit occupational level, we were required to derive the O*NET estimate for each 4-digit occupation. To achieve this, at first, 6-digit occupations were grouped by their first 4 digits, and for a particular 4-digit occupation the numbers of workers employed in its associated 6-digit occupations were obtained. So, for example, for each 4-digit occupation, one will have a table as follows:

4-digit Occupation	6-digit Occupation	O*NET Estimate	Employment
Occp4.1	Occp6.1	O_1	E_1
Occp4.1	Occp6.2	O_2	E_2
Occp4.1	Occp6.3	O_3	E_3

Then, in this case, the O*NET estimate of the required level of education for the 4-digit occupation is the employment-weighted average; that is

$$\text{4-digit O*NET estimate} = (O\_1 * E\_1 + O\_2 * E\_2 + O\_3 * E\_3)/(E\_1 + E\_2 + E\_3)$$

This process was repeated for all the 4-digit occupations and one eventually obtained

4-digit Occupation	O*NET Estimate
Occp. 1	O_1
Occp. 2	O_2
Occp. 3	O_3
...	...
Occp. 353	O_353

Once again, workers were regrouped with detailed HEAP into 12 Australian qualification categories equivalent to US categories and the number of workers within a particular

category for each occupation was obtained. One will then eventually obtain the table below:

	Cat. 1	Cat. 2	Cat. 3	...	Cat. 12
Occp. 1	N(1,1)	N(1,2)	N(1,3)	...	N(1,12)
Occp. 2	N(2,1)	N(2,2)	N(2,3)	...	N(2,12)
Occp. 3	N(3,1)	N(3,2)	N(3,3)	...	N(3,12)
...	...	...	...	...	
Occp. 353	N(353,1)	N(353,2)	N(353,3)	...	N(353,12)

where $N(i,j)$ denotes the number of Australian workers performing the i-th occupation with qualification j for each $i = 1, 2, \ldots, 353$ and $j = 1, 2, \ldots, 12$. Notice that the 'right' qualification estimated from O*NET for the i-th occupation O_i must be either 1, 2, 3, 4, … or 12. Thus, the total number of over-qualified workers estimated based on O*NET for the i-th occupation in the year 2016 can be calculated as follows:

$$\text{Over-qualified}(i) = (N(i,O\_i+1) + \ldots + N(i,12)) * (1+G\_i)$$

and the over-qualification rate for the i-th occupation is

$$\text{Over-qualification Rate}(i) = (N(i,O\_i+1) + \ldots + N(i,12))/(N(i,1) + N(i,2) + \ldots + N(i,12)).$$

It is worth noting that the quality of validation analysis based on the O*NET database depends on the extent to which the tasks performed by occupations in Australia and the US are similar to each other.

Detailed methodology − Determining over-qualification of Australian workers in SkillsIQ sectors

Note that over-qualification of Australian workers has been already determined for all 4-digit ANZSCO occupations at the national level. Thus, over-qualification in SkillsIQ's sectors has been derived by matching occupations in those sectors through 6-digit ANZSCO occupations with 4-digit ANZSCO occupations. SkillsIQ

occupations are not directly mapped into 4-digit ANZSCO occupations, because they are much closer to 6-digit ANZSCO occupations. Where multiple SkillsIQ occupations map into the same 4-digit occupation, the employment data at the 6-digit occupational level has been used to calculate the weight for each SkillsIQ occupation and then the total number of workers for the 4-digit occupation has been distributed over SkillsIQ occupations that match with it according to these weights.

Detailed methodology – Determining foregone income and tuition costs for Australian workers

1. There are five adapted ABS qualification levels and each qualification level consists of several Australian Qualifications Framework (AQF) qualifications. The average length of the j-th qualification level is then calculated as:

length(j) = the sum of mid-point lengths of qualifications in the j-th level given by AQF/the number of qualifications.

Please note that AQF data used for the calculation can be found at the link https://www.aqf.edu.au/sites/aqf/files/aqf-2nd-edition-january-2013.pdf .

To obtain the estimates of tuition cost for irrelevant education an over-qualified worker has undertaken, the expected annual tuition cost for each qualification level should be derived. The expected annual tuition cost used in this report has been determined according to government information. Specifically, the expected annual tuition cost of Certifications I-IV, Diploma and Advanced Diploma has been obtained by taking the average of tuition costs of a wide range of relevant qualifications listed by the NSW government (available at: https://www.training.nsw.gov.au/forms_documents/smartandskilled/prices_fees/2016_prices_fees_subsidies.pdf). The expected annual tuition cost of a bachelor's degree is the average of student contribution in Band 1 and Band 2 in the year 2016 (source: http://studyassist.gov.au/sites/studyassist/helppayingmyfees/csps/pages/student-contribution-amounts). The expected annual tuition cost of a graduate certificate or higher has been obtained as an average of select publicly-available full-fee-paying costs of graduate certificates and master's programs.

In order to estimate the foregone income, one has to decide the level of extra education that has been incurred by an over-qualified worker. The educational volume of a worker with qualification level j is

volume(1) = length(1); volume(2) = length(1) + length(2);

volume(j) = volume(2) + length(j), j = 3, 4, 5

Note here that after finishing high school, Australian workers are assumed to enrol in just one higher qualification rather than pursue these degrees successively.

2. At either the national or the SkillsIQ sectoral level, one has already determined the 'right' qualification required as A_i and the numbers of workers with the j-th qualification for the i-th 4-digit occupation, denoted by $N(i,j)$. Then, the total annual foregone income of over-qualified workers performing the i-th 4-digit occupation with j-th qualification level is

$F(i,j) = N(i,j) * (volume(j) − volume(A\_i)) * WE\_i *52/40$

where $j › A\_i$ and WE_i is the weekly earning of the i-th occupation and the data is the Employee Earnings provided by ABS (at the link: http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/6306.0May per cent202016?OpenDocument). The value 50 is the approximate working life.

The total annual foregone income of over-qualified workers for the i-th occupation can then be derived by summing up $F(i,j)$ over all qualification levels.

3. For the j-th qualification level, one has already determined the expected annual tuition cost, denoted by $T(j)$. Given the 'right' qualification required A_i and the number of workers at the i-th occupation with j-th qualification $N(i,j)$, the total annual tuition cost of over-qualified workers performing the i-th occupation within j-th qualification level is

$C(i,j) = N(i,j) * T(j) * length(j) *52/40$

where $j›A\_i›=1$. Please note again here that Australian workers are assumed to enrol in only one higher qualification after the completion of high school. The tuition cost of appropriately qualified and under-qualified workers are both set to zero.

The total annual tuition cost of over-qualified workers for the i-th occupation can be then derived by summing up $C(i,j)$ over all qualification levels.