



# Industry Demand for Higher Education Graduates in Victoria 2008-2022

an identification of the higher education graduates  
required to meet industry skill demands

October 2007

Department of Innovation,  
Industry and Regional Development  
Office of Training and Tertiary Education



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# Industry demand for higher education graduates in Victoria 2008 to 2022

Report prepared for the Office of Training and Tertiary Education,  
Department of Innovation, Industry and Regional Development  
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October 2007



**MONASH UNIVERSITY - ACER**  
**CENTRE FOR THE ECONOMICS OF EDUCATION AND TRAINING**

for





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## Foreword

### From the Secretary, Department of Innovation, Industry and Regional Development

Victoria's economy has profoundly changed over the last 30 years.

In keeping with other advanced economies, our traditional industries such as agriculture and manufacturing are increasingly transformed by innovation, ideas, knowledge and skills.

Examples of these include the growth in Victoria's advanced manufacturing, financial services, medical research, food processing, leisure and health sectors.

These changes have achieved significant economic prosperity and opportunities for Victorians, not just in terms of employment prospects but also in terms of the standard and quality of life that we enjoy.

Higher education is at the centre of these developments as a highly educated and well-trained workforce is critical to Victoria's prosperity.

Skills shortages and gaps present a key challenge to Victoria's economic growth. Private sector surveys consistently show the current availability of labour and the existence of skills shortages are placing significant constraints on business activity.

Therefore, the research presented in this report is important to Victoria's future.

It details how higher education participation in Victoria has increased significantly in the last decade. More importantly, it highlights that we must continue increasing this participation to meet rising skills demands, for both existing workers and those now moving through their school years.

This research reinforces the Victorian Government's commitment to ensuring the State's education and training sector reflects the changing demands of business and industry in the global environment.

I hope this report stimulates discussion and debate within government, business and industry about the size and shape our future higher education sector.

**Warren Hodgson**

Secretary

Department of Innovation, Industry and Regional Development

September 2007



## Executive summary

This report assesses supply and demand for people with higher education qualifications in Victoria from 2008 to 2022.

In particular, it estimates the shortfall or surplus of people with higher education qualifications in Victoria over the next 15 years.

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### **Victoria's workforce is changing**

Victoria's employment is projected to grow almost 14 per cent from 2.53 million in 2007 to 2.88 million by 2022.

As the state competes in the global economy, the industrial structure of its economy has been transforming from a manufacturing base to services and activities emphasising innovation.

This is also causing a shift in the occupational structure of Victoria's workforce.

Employment is increasing faster in occupations requiring people with qualifications, particularly at the higher level. In many occupations, there is evidence of *skills deepening*, meaning the growth in the number of people with qualifications is faster than employment growth.

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### **To remain competitive, Victoria's workforce must become more qualified**

If the trend in skills deepening continues, 78 per cent of employed people in Victoria will have qualifications in 2022, compared to 59 per cent in 2006.

Workers with higher education qualifications will be in particular demand.

To meet the requirements for people with higher education qualifications resulting from employment growth, turnover in jobs and skills deepening within occupations, an estimated 411,000 new entrants and 283,000 existing workers will need to acquire qualifications from 2008 to 2022.

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### **A shortfall of 49,000 people with higher education qualifications is projected**

At current levels of higher education course completions and migration, a shortfall in the number of people with bachelor and postgraduate (masters and doctorates) degrees is projected in the next 15 years. The net shortfall in graduates will be 49,000. A surplus in the number with graduate certificate and diplomas is projected.

The supply of science and engineering graduates will be short of requirements.

Projections in this report are based on Victoria's employment growing at 0.9 per cent year to 2022. If labour force participation rate increases above the level it assumes, higher employment growth is likely. This will mean higher requirements and a bigger shortfall in people with higher education qualifications.

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### **Victoria must increase course commencements by more than 10,000 per year**

Most new entrants completing a postgraduate degree or a graduate certificate or diploma also complete a bachelor degree. This means 96,000 additional bachelor degrees must be completed

from 2008 to 2022. This translates to raising the level of annual *commencements* by about 9,000 above the 2005 level over the next 15 years.

The number of additional postgraduate degree completions required is projected to be 10,000. This translates to raising the level of annual *commencements* by about 1,200 above the 2005 level over the next 15 years.

The number of additional commencements required to address the shortfall can be reduced if course completion rates improve. Moderating the net drain each year of Victorian graduates to interstate and overseas destinations will also help.

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### **Industry stakeholders believe skills gaps are looming**

Many stakeholders consulted for this report expressed concern about Australia's technological capacity if recent trends are not reversed.

For example, they believe demand for science and engineering graduates will increase as the focus on climate change strengthens.

Innovative strategies are needed to encourage more young people into science and engineering.

A nationally coordinated approach may be preferable as other states are likely to be facing similar problems.

Stakeholder consultations suggest a preference for locally trained graduates among employers.

Alternative modelling by the Victorian Government, using different data, suggests possible shortfalls in specific health-related occupations. These models assume higher demand in the health sector than assumed in this study. If higher employment growth is also assumed in this study, then the shortfall projected in the number of people with qualifications will be higher.





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# 1 Introduction

This report assesses supply and demand for people with higher education qualifications in Victoria over the next 15 years, from 2008 to 2022.

More specifically, it:

- projects the qualifications and occupational profile of the Victorian workforce in 2022
- estimates the extra people with higher education qualifications needed to meet this 2022 profile
- projects supply of people with higher education qualifications under current patterns of course completions and migrant flows
- estimates the shortfall or surplus of people with higher education qualifications from 2008 to 2022
- estimates the additional number of qualifications that need to be completed to meet the overall shortfall in people with higher education qualifications from 2008 to 2022.

It is important to note the analysis of qualifications in this report does not provide the whole picture of training and skills development. A considerable amount of training occurs outside the formal education and training system, and some people undertake formal training to complete particular units/modules rather than whole qualifications.

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## 1.1 Background

International competition and new technologies are affecting employment across a wide range of industries. While Australian jobs in low-skill manufacturing industries were initially most vulnerable, service and high-skill production jobs are increasingly exposed to competition.

This has caused a substantial and continuing shift in the industrial and occupational composition of Victoria's employed workforce.

While employment in industries requiring higher skill levels has grown, job opportunities have also increased in some low-skill jobs in insulated industries such as retail.

### 1.1.1 Demand factors

From 2001 to 2006, Victoria's employed workforce increased by over 192,000 to about 2.5 million in 2006.

Victoria's labour force participation rate for people aged 15-64 years increased 1.2 per cent to 76.7 per cent (the national increase was 2.3 per cent).

The number employed in construction, retail, business services, health and community services and education (with the last three industries having the most qualified workers) increased by 190,000 while in agriculture and manufacturing it decreased by 52,000. Employment of managers, professionals and associate professionals increased rapidly while employment of intermediate production and transport workers decreased.

These changes reflect the transformation of the state's economic base from manufacturing to activities focussing on innovation. This transformation will increase demand for skilled workers.

Growth in employment and replacement needs will also add to demand. While technological change generally increases demand for employees with higher skills, its net effect on demand for all skill types can be mixed if new technologies lead to deskilling in some occupations.

Initiatives to raise the proportion of people with qualifications and to change its distribution within occupations will also affect future demand for qualified people.

Removing skills gaps (where workers are under-skilled for the occupation they are employed in) or reducing skills shortages (where skilled jobs remain unfilled due to lack of trained people) can also add to demand.

The considerable numbers of people who do not hold what are considered relevant qualifications (even in high-skill occupations) indicates possible skills gaps, although many of these unqualified workers have acquired skills in other ways.

The desirable level of qualified people in an occupation is also not static. If more workers with qualifications become available, and new work specifications and technologies are introduced to utilise their higher skills, productivity improvements will follow.

The effect of labour turnover on skill requirements in Victoria's workforce must also be considered when assessing future demand. The number of workers retiring will rise in the coming years as the baby boomer generation ages.

The trend towards part-time employment also creates additional training needs simply because it means a larger number of people must be trained for a given level of equivalent full-time jobs. The ageing of the workforce is also likely to increase this trend towards part-time work.

Similarly, more females entering the workforce increases demand for training because females are currently more likely to have career breaks to raise families than males.

### 1.1.2 Returns to training

People with qualifications have higher rates of employment at any age and their working life tends to extend longer than for those without qualifications. Their annual income also tends to be considerably higher, and higher earnings usually reflect higher productivity.

A 2005 OECD study found:

- the effect of an additional year of education on long-term economic output in the OECD is estimated at 3 to 6 per cent
- analyses of human capital across 14 OECD economies based on literacy scores also suggest significant positive effects on growth within countries
- many analyses indicate a positive causal relationship between gaining higher educational qualifications and better mental and physical health, with the causality operating indirectly through income and employment, behavioural and psycho-social effects (OECD 2005).

### 1.1.3 Skills deepening

The major reason for increasing demand for workers with qualifications is skills deepening. This refers to the percentage increase in the number of workers with qualifications after allowing for employment growth.

Skills deepening is a result of:

- a structural shift in industries
- a shift in the occupational structure within industries
- a shift to part-time work requiring more workers to be trained for a given amount of work
- an overall rise in the level of skill and qualification requirements within occupations.

While employment growth also leads to increased demand for skills, its effect is much smaller than skills deepening. For example, while employment in Victoria increased 7 per cent from 2001 to 2006 the number of employed people with qualifications increased 16 per cent.

Note this report primarily aims to quantify how many people with different qualifications are needed to meet future requirements. It does not aim to identify separate elements of skills deepening.

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## 1.2 Scope of this report

Chapter 2 provides current qualification profiles of Victorian workers by occupation and other demographic variables.

Chapter 3 forecasts employment by occupation and qualification for 2022. It also assesses the extra people with qualifications needed between now and then to achieve Victoria's projected qualifications profile.

Chapter 4 describes the current patterns of supply of people with higher education qualifications for the Victorian workforce from various sources.

Chapter 5 assesses the imbalance in the supply and requirements for people with higher education qualifications over the next 15 years. Estimates are provided in terms of the number of qualifications and enrolments required to meet any shortfall.

Chapter 6 contains a synthesis of industry consultations and their views on the initial results of the modelling. Senior representatives of nine key organisations were consulted for this study.

Chapter 7 contains some concluding comments.

## 2 Qualifications in Victoria, 2001–06

This chapter describes the trends in non-school qualifications held by Victorians aged 15-64 years from 2001 to 2006. The analysis uses data from the ABS *Education and Work Surveys* (Cat. no. 6227.0) conducted in May each year.

These changes are examined in terms of demographic and labour market characteristics.

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### Key findings

- The number of people with qualifications in Victoria substantially increased from 2001 to 2006, especially those with higher education levels.
- Full-time workers were more likely than part-time workers to hold qualifications.
- Employment growth was generally higher in occupations requiring high-level qualifications.
- Part-time employment increased faster than full-time employment at every qualification level.
- While fewer females had qualifications than males, females with qualifications increased at a higher rate compared to males.
- More females held higher education qualifications although a larger proportion of males held postgraduate qualifications.
- 80 per cent of people with higher education qualifications employed in 2006 worked as managers, professionals or associate professionals.

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### 2.1 Overall changes

A snapshot of Victoria's civilian population and the qualifications people held in 2006 is presented in Table 1.

- 2.44 million of Victoria's 3.35 million people aged 15-64 years were employed.
- About 51.2 per cent had non-school qualifications (compared to 52.4 per cent for the national population).
- 58.6 per cent of employed Victorians in 2006 had a qualification (27 per cent at the higher education level).
- 42.4 per cent of unemployed people had a qualification (15 per cent at the higher education level).
- 29.4 per cent of those not in the labour force had a qualification (11.4 per cent at the higher education level).
- Full-time workers were more likely than part-time workers to hold a qualification.
- About 22.9 per cent of the population aged 15-64 years held a higher education qualification, mostly at the bachelor level.
- While the overall unemployment rate in Victoria in May 2006 was 5.1 per cent, for people with qualifications the rate was 3.7 per cent and for people without qualifications it was 6.9 per cent. Moreover, for people with higher education qualifications the rate was even lower at 3 per cent.

**Table 1 Qualifications (level) by labour force status, civilian population, Victoria, May 2006 (%)**

Highest non-school qualification	Employed			Unemployed	Not in labour force	Total
	Full-time	Part-time	All			
Higher education	29.2	21.7	27.0	15.0	11.4	22.9
<i>Postgraduate degree</i>	4.7	2.4	4.0	3.2	1.5	3.4
<i>Grad cert/dip</i>	3.4	3.2	3.3	1.2	1.6	2.8
<i>Bachelor degree</i>	21.1	16.2	19.7	10.6	8.3	16.7
VET <sup>a</sup>	34.2	25.5	31.6	27.4	18.0	28.3
With qualifications	63.4	47.2	58.6	42.4	29.4	51.2
Without qualifications	36.6	52.8	41.4	57.6	70.6	48.8
All	100.0	100.0	100.0	100.0	100.0	100.0
With qualifications ('000)	1,092	339	1,431	55	230	1,716
Without qualifications ('000)	630	379	1,009	75	552	1,637
All ('000)	1,722	718	2,441	130	782	3,353

Source: Unpublished ABS *Education and Work Survey*, 2006 (Cat. no. 6227.0). Scope: persons aged 15–64 years.

<sup>a</sup> Includes qualification levels not further defined (nfd)

Note that the *Education and Work Survey* has a slightly different scope to the *Labour Force Survey*, and therefore, some statistics reported here may vary from those reported elsewhere.

Table 2 shows the changes in qualifications of people in Victoria's labour force from 2001 to 2006. Two statistics are presented to show changes in the numbers of qualifications over this period. The first, *Average annual*, refers to the average year-on-year percentage changes from 2001 to 2006. The second, *Total*, refers to percentage change in the number during this time.

It is clear the Victorian labour force is becoming more qualified with a bias towards higher education qualifications, particularly postgraduate and bachelor degrees:

- While the labour force increased 5.6 per cent to 2.57 million people from 2001 to 2006, the number of people with qualifications increased at a faster rate (indicating skills deepening).
- 1.49 million of Victoria's labour force had qualifications in 2006, an increase of 15.2 per cent from 2001.
- The number of people without qualifications decreased 5.1 per cent from 2001 to 2006.
- The proportion of the labour force with qualifications increased to 57.8 per cent in 2006 (26.4 per cent higher education and 31.4 per cent VET), representing a rise of 4.8 per cent from 2001.
- While higher education qualifications increased 24.3 per cent from 2001 to 2006, the increase in VET qualifications was only 8.5 per cent. However, note that in 2006, higher education qualifications increased by an unusually large number from 2005 while VET qualifications actually declined. An explanation for this is not evident from the data.

**Table 2 Qualifications, persons in the labour force, Victoria, 2001–06 ('000)**

Highest non-school qualification							Change 2001–2006 (%)	
	2001	2002	2003	2004	2005	2006	Average annual	Total
Higher education	546	567	604	606	616	679	4.5	24.3
<i>Postgraduate degree</i>	72	59	89	87	93	103	9.5	42.6
<i>Grad cert/dip</i>	91	90	95	94	88	83	-1.8	-9.0
<i>Bachelor degree</i>	384	418	420	425	435	494	5.3	28.8
VET <sup>a</sup>	744	773	791	804	839	807	1.7	8.5
With qualifications	1290	1340	1395	1410	1454	1486	2.9	15.2
Without qualifications	1143	1102	1097	1063	1120	1084	-1.0	-5.1
All	2,433	2,442	2,492	2,473	2,575	2,571	1.1	5.6

Source: Unpublished ABS *Education and Work Survey*, 2001–06 (Cat. no. 6227.0). Scope: persons aged 15–64 years.

<sup>a</sup> Includes qualification levels not further defined (nfd)

## 2.2 Qualifications by gender

Table 3 shows changes in the qualifications of males and females in Victoria's labour force from 2001 to 2006.

- Female participation in the labour force steadily increased, in line with the rest of Australia.
- In 2006, females comprised 45.5 per cent of Victoria's labour force.
- The rate of increase of females in the labour force was, on average, 1.7 per cent each year from 2001 to 2006, compared to 0.7 per cent for males.
- Females with qualifications also increased at a higher rate compared to males.
- Despite this, in 2006 the proportion of females with qualifications (57.3 per cent) was still lower compared to males (58.3 per cent).
- More females, however, held higher education qualifications. While more than half of female qualifications were at the higher education level compared to 40.4 per cent of male qualifications, a smaller proportion of females than males held postgraduate qualifications.
- Females with higher education qualifications increased 5.8 per cent per year from 2001 to 2006. Those with bachelor degrees increased at an even higher rate of 7.2 per cent. In contrast, the corresponding rates for males were much lower.

**Table 3 Changes in qualifications (level) by sex, persons in the labour force, Victoria, 2001–06**

	Males				Females			
	May 2006		Change 2001–06		May 2006		Change 2001–06	
Highest non-school qualification	'000	%	Average annual (%)	Total (%)	'000	%	Average annual (%)	Total (%)
Higher education	329	23.5	3.4	17.9	350	29.9	5.8	31.0
<i>Postgraduate degree</i>	66	4.7	8.8	42.0	37	3.2	11.3	43.8
<i>Grad cert/dip</i>	31	2.2	-3.3	-17.9	51	4.4	-0.4	-2.5
<i>Bachelor degree</i>	232	16.6	3.8	19.2	262	22.4	7.2	38.7
VET <sup>a</sup>	487	34.7	1.6	8.0	320	27.4	2.1	9.3
With qualifications	816	58.3	2.3	11.8	670	57.3	3.7	19.6
Without qualifications	585	41.7	-1.3	-6.4	500	42.7	-0.6	-3.7
All	1401	100.0	0.7	3.4	1170	100.0	1.7	8.4

Source: Unpublished ABS *Education and Work Survey*, 2001–06 (Cat. no. 6227.0). Scope: persons aged 15–64 years.

<sup>a</sup> Includes qualification levels not further defined (nfd)

## 2.3 Qualifications by age

Table 4 shows the changes in the qualifications distribution of the Victorian labour force by age from 2001 to 2006.

- In 2006, 18.4 per cent of the workforce was aged 15–24 years.
- 47.1 per cent was aged 25–44 years.
- 34.5 per cent was aged 45–64 years.
- While the number of people in the labour force aged 15–44 years remained largely unchanged, the number aged 45–64 years increased 18.3 per cent.
- While the number with qualifications increased in all age groups, the number without qualifications declined substantially only in the two younger groups. In 2006, 33.3 per cent of people aged 15–24 years, 65 per cent aged 25–44 years and 61 per cent aged 45–64 years held qualifications. The low proportion among the group aged 15–24 years is because many young people are acquiring post-school qualifications.
- Higher education qualifications increased substantially among all age groups but an increase in VET qualifications is only evident in the 45–64 years group. In fact, VET qualifications among

the 25–44 years group appears to be declining, but this is largely due to the unusual data for 2006.

- The numbers with bachelor degrees increased overall at 5.3 per cent per year but among the group aged 45–64 years the increase was higher at 7.2 per cent per year. Not surprisingly, postgraduate degrees increased at a substantial rate only among the older age groups. Graduate certificate and diplomas only increased among those aged 45–64 years.

These trends could be a result of the rapid expansion in education and training 30 years ago. Ageing of those who gained qualifications then is perhaps swelling the ranks of qualified people aged 45–64 years now. The trends could also reflect that older people are undertaking more training.

**Table 4 Changes in qualifications (level) by age, persons in the labour force, Victoria, 2001–06**

	15–24 years				25–44 years				45–64 years			
	May 2006		Change 2001–06		May 2006		Change 2001–06		May 2006		Change 2001–06	
Highest non-school qualification	'000	%	Average annual (%)	Total (%)	'000	%	Average annual (%)	Total (%)	'000	%	Average annual (%)	Total (%)
Higher ed	59	12.5	6.9	30.7	389	32.2	3.5	18.6	231	26.0	6.2	33.5
<i>Postgraduate</i>	4	0.4	na	na	57	4.7	10.6	38.9	42	4.7	7.1	35.0
<i>Grad cert/dip</i>	3	0.6	na	na	38	3.1	-5.5	-27.2	42	4.8	3.2	12.5
<i>Bachelor</i>	53	11.1	5.0	19.9	294	24.3	4.7	25.2	147	16.6	7.2	40.7
VET <sup>a</sup>	98	20.8	0.2	-0.6	398	32.9	-0.7	-3.7	311	35.0	6.1	34.2
With quals.	157	33.3	1.9	9.2	787	65.0	1.2	6.1	542	61.0	6.0	33.9
Without quals.	316	66.7	-1.1	-6.3	423	35.0	-1.6	-8.1	346	39.0	0.1	0.0
All	473	100.0	-0.3	-1.6	1,210	100.0	0.1	0.7	887	100.0	3.4	18.3

Source: Unpublished ABS *Education and Work Survey*, 2001–06 (Cat. no. 6227.0). Scope: persons aged 15–64 years.

<sup>a</sup> Includes qualification levels not further defined (nfd)

na = not available because of small cell size

## 2.4 Qualifications by part-time/full-time status

Table 5 shows how *employment* of people with qualifications changed from 2001 to 2006.

- While full-time employment in Victoria increased 0.7 per cent per year, part-time increased 3.1 per cent.
- The number of part-time workers with qualifications also increased at more than twice the annual rate compared to full-time workers.
- The increase in full-time employment was restricted to qualified workers, but part-time employment increased for workers without qualifications.
- At every qualification level, part-time employment increased faster than full-time employment. This was partly caused by greater participation of females in the labour force, either because of greater demand for labour or supply-side factors, such as changing Australian Government policies relating to social support for single mothers and the disabled. These policies will have specifically increased the supply of unskilled or semi-skilled labour for part-time hours.
- Strong growth in part-time employment of people with higher education qualifications is also associated with a greater supply of females with qualifications at this level. More females enrol for and complete higher education courses than males, and this has been a trend over a number of years. Many females choose part-time work to balance paid work with family responsibilities.

**Table 5 Changes in qualifications (level) by full-time/part-time status, employed persons, Victoria, 2001–06**

Highest non-school qualification	Full-time				Part-time			
	May 2006		Change 2001–06		May 2006		Change 2001–06	
	'000	%	Average annual (%)	Total (%)	'000	%	Average annual (%)	Total (%)
Higher education	504	29.2	3.6	19.4	156	21.7	8.3	47.0
<i>Postgraduate</i>	81	4.7	8.3	37.0	17	2.4	23.4	87.5
<i>Grad cert/dip</i>	58	3.4	-2.2	-11.2	23	3.2	0.8	-2.6
<i>Bachelor</i>	364	21.1	4.3	22.7	116	16.2	10.0	57.7
VET <sup>a</sup>	588	34.2	1.5	7.4	183	25.5	3.4	16.7
With qualifications	1092	63.4	2.4	12.6	339	47.2	5.3	28.9
Without qualifications	630	36.6	-1.8	-8.7	379	52.8	1.3	5.8
All	1722	100.0	0.7	3.7	718	100.0	3.1	15.6

Source: Unpublished ABS *Education and Work Survey*, 2001–06 (Cat. no. 6227.0). Scope: persons aged 15–64 years.

<sup>a</sup> Includes qualification levels not further defined (nfd)

## 2.5 Qualifications by field of education

Table 6 shows the qualifications held by Victorians in 2006 by field of education. Table 7 shows how these have changed since 2001.

- Engineering, management and commerce made up 41.1 per cent of all qualifications in 2006.
- Most science and education qualifications were at the higher education level.
- Engineering, architecture, building, food, hospitality and personal services qualifications were mostly at the VET level.
- Many graduates qualify for teacher registration by completing a graduate diploma in education, which explains the high proportion of education qualifications at this level.
- From 2001 to 2006, architecture and building qualifications increased the fastest and food, hospitality and personal services the slowest.

**Table 6 Qualifications (level) by field of education, persons in the labour force, Victoria, May 2006 (%)**

Highest non-school qualification	Field of education											All
	Science	IT	Eng.	Arch. & bldg.	Agri. & environ.	Health	Educ.	Man. & comm.	Soc. & culture	Arts	Food hosp. & pers. <sup>b</sup>	
Higher ed	91.9	63.6	20.5	14.8	29.6	61.8	83.0	46.8	62.4	58.7	1.6	45.7
<i>Postgraduate</i>	19.4	15.9	3.3	0.4	9.6	5.7	7.2	8.3	10.8	3.6	0.2	6.9
<i>Grad cert/dip</i>	1.2	10.2	0.8	1.1	2.3	8.1	24.9	5.0	6.0	4.5	0.0	5.6
<i>Bachelor</i>	71.2	37.5	16.4	13.3	17.7	48.0	50.9	33.5	45.7	50.5	1.4	33.2
VET <sup>a</sup>	8.2	36.4	79.5	85.2	70.4	38.2	17.0	53.2	37.6	41.3	98.4	54.3
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Total ('000)	60	72	302	105	46	162	111	309	182	61	76	1,486

Source: Unpublished ABS *Education and Work Survey*, 2006 (Cat. no. 6227.0). Scope: persons aged 15–64 years.

<sup>a</sup> Includes qualification levels not further defined (nfd)

<sup>b</sup> Includes mixed field.

Table relates only to people with qualifications in the labour force.

**Table 7 Average annual changes in qualifications by level and field of education, persons in the labour force, Victoria, 2001–06 (%)**

Highest non-school qualification	Field of education											All
	Science	IT	Eng.	Arch. & bldg.	Agri. & environ.	Health	Educ.	Man. & comm.	Soc. & culture	Arts	Food hosp. & pers. <sup>b</sup>	
Higher ed	4.7	7.6	7.5	9.0	7.8	4.8	5.0	6.4	0.9	8.8	-8.3	4.5
VET <sup>a</sup>	2.2	1.7	0.7	5.8	5.3	5.6	-1.4	2.0	3.7	-0.9	0.6	1.7
Total	3.8	4.5	1.8	6.1	5.8	4.7	3.2	3.7	1.6	3.6	0.2	2.9

Source: Unpublished ABS *Education and Work Survey*, 2001–06 (Cat. no. 6227.0). Scope: persons aged 15–64 years.

<sup>a</sup> Includes qualification levels not further defined (nfd)

<sup>b</sup> Includes mixed field.

Table relates only to people with qualifications in the labour force.

## 2.6 Qualifications by occupation

Tables 8, 9 and 10 show the qualifications and occupations of employed people in Victoria. Table 11 includes the qualifications in selected<sup>1</sup> high-skill occupations.

- While overall employment in Victoria increased 1.4 per cent per year from 2001 to 2006, employment of people with qualifications increased 3 per cent per year (4.6 per cent for people with higher education qualifications and 1.9 per cent for people with VET qualifications).
- Overall employment for those without qualifications declined 0.7 per cent per year.
- 58.6 per cent of people in employment had qualifications in 2006— 27 per cent at the higher education level and 31.6 per cent at the VET level.
- The proportion with qualifications was much higher in some occupation groups than others. For example, 90 per cent of professionals had qualifications compared to only 28.5 per cent of workers in elementary clerical, sales and service occupations.
- Although most professionals had higher education qualifications, a significant minority (16.3 per cent) had VET qualifications.
- Qualifications at the higher education level were also common among managers and associate professionals. A significant number of people in low-skill occupations (all levels of clerical, sales and service) also held higher education qualifications.
- More than four out of every five people employed who had a higher education qualification worked in one of three occupation groups (managers, professionals or associate professionals). Postgraduate, graduate certificate and diploma level qualifications were even more concentrated in these occupations.
- Employment growth was generally higher in occupations requiring high-level qualifications. Within these occupations, higher education qualifications generally increased faster than VET qualifications. For example, employment increased 2.6 per cent per year in professional occupations but higher education qualifications in the same occupations increased 4.3 per cent per year. Note that while higher education qualifications increased rapidly in elementary clerical, sales and service occupations this was from a relatively low base.
- A substantial number of people in the three managerial occupations (general managers, specialist managers and farmers and farm managers) held either a VET qualification or no post-school qualification at all (see Table 11). Relatively few had higher education qualifications— only 13.5 per cent of farmers and farm managers held qualifications at this level.

<sup>1</sup> These occupations are generally at the ASCO 3-digit level. As some of these occupations are quite small, some cells should be interpreted with caution.

- In all but three professional occupations, more than half of those employed had higher education qualifications.
- University and vocational teachers and natural and physical science professionals had some of the highest proportions with postgraduate qualifications, while sales marketing and advertising and nursing professionals (division 1) had some of the highest proportions with VET qualifications. However, the ABS *Education and Work Survey* also shows that over 20 per cent of enrolled nurses (division 2) had a higher education qualification in 2006. In a household survey like this, in which any responsible adult can provide the answers to the survey questions, misclassification between the two classes of nurses is always possible.
- The proportion of school teachers with non-university qualifications has been declining since the minimum qualifications to teach in schools were raised in the 1970s. Over time, the proportion of nurses (division 1) with VET qualifications is also expected to decline, as all new entrants since the late 1980s have been required to have higher education qualifications after registered nurse training was transferred to the higher education sector.
- While VET was the most common qualification level among associate professionals, in some instances more than 30 per cent held higher education qualifications (medical and science technical officers and business and administration).
- A substantial number of people with higher education qualifications were employed in low-skill occupations. Possible reasons for this include the temporary employment of graduates in elementary jobs while they pursue further studies and the mismatch between jobs and qualifications for some recent immigrants. The usually high turnover of workers in low-skill occupations means that people with high-level qualifications may remain in these occupations for only short periods. There would be cause for concern if people with high-level qualifications were employed in low-skill jobs for long periods.

**Table 8 Qualifications (level) by occupation, employed persons, Victoria, May 2006 (%)**

Highest non-school qualification	Managers & admin.	Prof.	Associate prof.	Trades	Advanced clerical & service	Intermed. clerical, sales & service	Intermed. prod. & transport	Elem. clerical, sales & service	Labourers	Total
Higher education	37.8	73.7	23.7	4.5	17.4	13.1	6.8	9.2	4.8	27.0
<i>Postgraduate</i>	6.2	12.2	2.7	0.2	1.9	0.9	1.7	0.6	1.5	4.0
<i>Grad cert/dip</i>	4.2	10.3	2.6	0.3	2.3	1.5	0.2	0.5	0.2	3.3
<i>Bachelor</i>	27.4	51.2	18.4	3.9	13.2	10.7	5.0	8.1	3.2	19.7
VET <sup>a</sup>	32.2	16.3	38.8	60.8	35.3	33.8	31.0	19.3	25.2	31.6
With qualifications	70.0	90.0	62.5	65.4	52.7	46.9	37.8	28.5	30.1	58.6
Without quals.	30.0	10.0	37.5	34.6	47.3	53.1	62.2	71.5	69.9	41.4
All	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
All ('000)	203	527	289	305	97	387	205	238	190	2,441

Source: Unpublished ABS *Education and Work Survey*, 2006 (Cat. no. 6227.0). Scope: persons aged 15–64 years.<sup>a</sup> Includes qualification levels not further defined (nfd)

**Table 9 Employment in occupations by qualification (level), Victoria, May 2006 (%)**

Highest non-school qualification	Managers & admin.	Prof.	Associate prof.	Trades	Advanced clerical & service	Intermed. clerical, sales & service	Intermed. prod. & transport	Elem. clerical, sales & service	Labourers	Total
Higher education	11.6	58.8	10.4	2.1	2.5	7.7	2.1	3.3	1.4	100.0
<i>Postgraduate</i>	12.8	65.2	7.9	0.8	1.9	3.6	3.6	1.5	2.8	100.0
<i>Grad cert/dip</i>	10.5	66.8	9.4	1.2	2.7	7.0	0.4	1.4	0.4	100.0
<i>Bachelor</i>	11.6	56.2	11.1	2.5	2.7	8.6	2.1	4.0	1.3	100.0
VET <sup>a</sup>	8.5	11.1	14.5	24.1	4.4	16.9	8.2	6.0	6.2	100.0
With qualifications	9.9	33.1	12.6	13.9	3.6	12.7	5.4	4.7	4.0	100.0
Without quals.	6.0	5.2	10.7	10.5	4.5	20.3	12.6	16.9	13.2	100.0
All	8.3	21.6	11.8	12.5	4.0	15.8	8.4	9.8	7.8	100.0

Source: Unpublished ABS *Education and Work Survey*, 2006 (Cat. no. 6227.0). Scope: persons aged 15–64 years.

<sup>a</sup> Includes qualification levels not further defined (nfd)

**Table 10 Average annual changes in employment by qualification (level) and occupation, Victoria, 2001–06 (%)**

Highest non-school qualification	Managers & admin.	Prof.	Associate prof.	Trades	Advanced clerical & service	Intermed. clerical, sales & service	Intermed. prod. & transport	Elem. clerical, sales & service	Labourers	Total
Higher education	5.7	4.3	3.5	4.7	4.4	4.8	na	11.2	na	4.6
VET <sup>a</sup>	5.5	-1.5	3.8	1.4	3.5	2.2	5.7	1.9	3.4	1.9
With quals.	4.6	3.0	3.6	1.4	3.7	2.7	7.2	4.2	4.2	3.0
Without quals.	-2.5	0.0	1.0	1.3	-0.4	-0.6	-2.2	0.2	-0.5	-0.7
All	1.9	2.6	2.6	1.2	1.6	0.8	0.3	1.2	0.7	1.4

Source: Unpublished ABS *Education and Work Survey*, 2001–06 (Cat. no. 6227.0). Scope: persons aged 15–64 years.

<sup>a</sup> Includes qualification levels not further defined (nfd)

na = not available because of small cell size

**Table 11 Qualifications (level) by selected high-skill occupation, employed persons, Victoria, May 2006 (%)**

Occupation	Highest non-school qualification				Without qualification	Total	
	Postgraduate	Grad cert/dip	Bachelor	VET		%	'000
General managers	4.0	2.8	20.6	43.6	29.1	100.0	53
Specialist managers	8.2	5.9	36.4	24.1	25.3	100.0	113
Farmers & farm managers	3.3	0.9	9.3	40.4	46.1	100.0	37
Natural & physical science professionals	34.2	1.5	48.0	11.3	5.0	100.0	23
Building & engineering professionals	14.2	0.0	59.4	16.4	10.0	100.0	40
Accountants & auditors	6.2	4.1	69.2	11.4	9.1	100.0	35
Sales, marketing & advertising prof.	4.4	5.0	33.8	32.4	24.4	100.0	32
Computing professionals	14.5	11.5	50.2	10.6	13.2	100.0	50
Misc. business & information professionals	15.0	12.6	30.3	21.4	20.6	100.0	39
Medical practitioners	22.9	8.7	61.8	6.6	0.0	100.0	16
Nursing professionals (division 1)	4.5	14.8	52.2	25.3	3.3	100.0	55
Miscellaneous health professionals	6.1	6.3	72.3	14.1	1.2	100.0	28
School teachers	6.4	20.5	63.4	9.7	0.0	100.0	83
University & vocational education teachers	45.5	10.7	30.9	9.0	3.8	100.0	20
Miscellaneous education professionals	6.0	12.2	25.0	19.6	37.1	100.0	12
Social welfare professionals	17.8	16.6	42.3	16.2	7.0	100.0	26
Miscellaneous social professionals	17.8	1.9	69.7	1.7	8.9	100.0	20
Artists & related professionals	5.9	9.7	34.9	25.9	23.6	100.0	36
Miscellaneous professionals	3.7	0.0	36.5	35.9	24.0	100.0	10
Medical & science technical officers	3.7	3.8	23.7	53.1	15.9	100.0	10
Building & eng. associate professionals	1.4	2.9	19.2	60.9	15.6	100.0	25
Finance, business & admin. associate prof.	4.3	4.4	25.0	31.8	34.5	100.0	99
Manager and supervisor associate prof.	2.0	1.4	11.5	34.6	50.7	100.0	110
Other associate professionals	1.5	1.6	19.5	48.9	28.6	100.0	45

Source: Unpublished ABS *Education and Work Survey*, 2006 (Cat. no. 6227.0). Scope: persons aged 15–64 years. Note that some estimates in this table are based on small sample sizes and should be interpreted with caution. For example, the table indicates some small proportion of medical practitioners with VET as the highest qualification. This is most likely due to data coding error compounded by small sample size.

<sup>a</sup> Includes qualification levels not further defined (nfd)

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## 3 Forecasts of employment and required numbers with qualifications

This chapter forecasts employment by occupation and qualification in Victoria in 2022. It also estimates the number of people with higher education qualifications required in the next 15 years to achieve the qualifications profile projected for 2022.

It highlights that Victoria will need more qualified people to meet demand.

These will include new entrants as well as existing workers who gain new qualifications or upgrade their qualifications. Demand estimates for both groups from 2008 to 2008 are provided.

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### Key findings

- Victoria's employment will grow more slowly in the next 15 years. It is forecast to increase by 0.9 per cent per year, from 2.49 million in 2006 to 2.88 million in 2022. This is significantly lower than the 1.9 per cent historical rate from 1997 to 2006.
- Employment will grow more quickly in higher than in lower skilled occupations. The proportion of Victorians employed in the three high-skill occupations—managers, professionals and associate professionals—will increase by four percent to 45 per cent in 2022.
- Because of skills deepening and changes in the industrial and occupational structure of employment, the proportion of employed people with qualifications will increase from 59.2 per cent in 2007 to 77.6 per cent in 2022. Additional people with qualifications are required over the next 15 years to lift the proportion of people in employment with qualifications to 77.6 per cent.
- The number of people with higher education qualifications will increase 52.5 per cent and the number with VET qualifications will increase 45.8 per cent.
- In some occupations (managerial, professional and trade) more than 90 per cent will have a qualification in 2022 but less than half those employed in intermediate production and transport occupations will have them.
- Over 1.51 million Victorians—756,000 new entrants and 750,000 existing workers—need to acquire new qualifications or upgrade current ones from 2008 to 2022.
- About 46.1 per cent of the qualifications acquired need to be at a higher education level—73.5 per cent bachelor degrees, 21.8 per cent postgraduate degrees and 4.7 per cent graduate certificates or diplomas—and 53.9 per cent at a VET level. This translates to more than 694,000 people completing higher education courses.
- While 58.5 per cent of all qualified new entrants will be to the three high-skill occupations—managerial, professional and associate professional—only 44.1 per cent of existing workers upgrading qualifications will be in these occupations.

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### 3.1 Employment trends and forecasts

This report uses the MONASH occupational forecasts for 2007 to 2014, which were extended to obtain forecasts to 2022. A brief description of the MONASH model is provided in Appendix 1.

Figure 1 shows the trend in Victoria's employment over the decade from 1997 to 2006 as well as forecasted trend over the next 15 years.

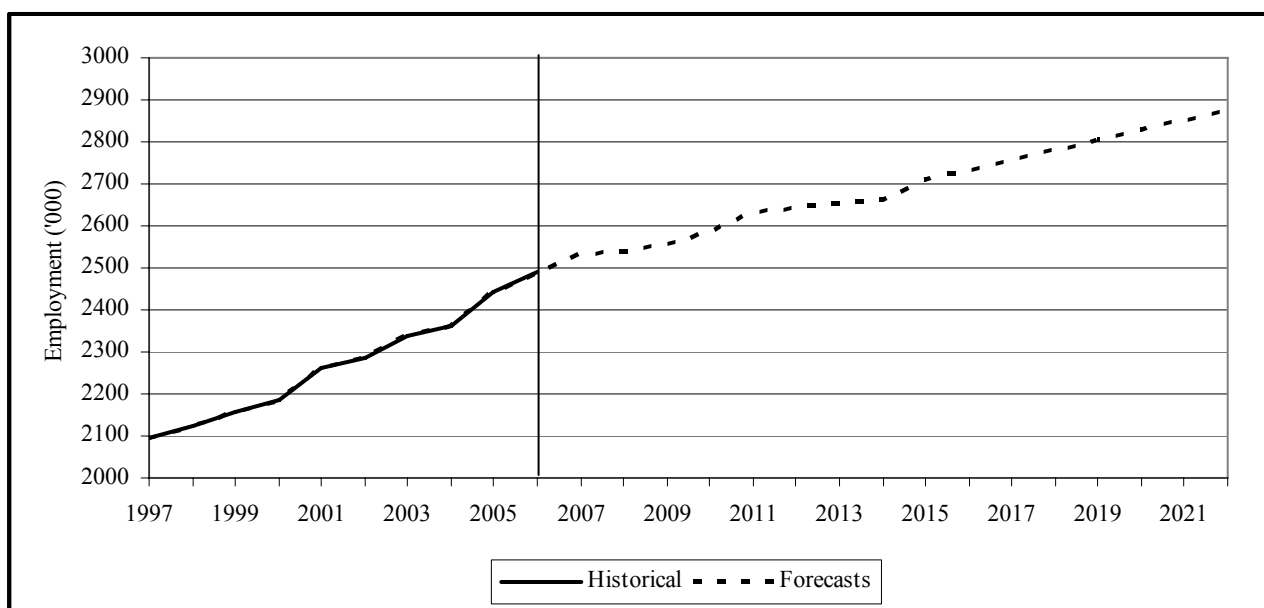
Employment steadily increased from 2.09 million in 1997 to 2.49 million in 2006. The MONASH model forecasts continuing employment growth of 0.9 per cent per year over the next seven years. This is significantly lower than the 1.9 per cent historical rate from 1997 to 2006.

If the labour force participation rate increases more than assumed in the MONASH model, then employment growth could be higher.

The labour force participation rate has in fact increased in recent years, particularly in the older age group.

In 2022, employment is forecast to be 2.88 million. The lower forecast of employment growth will tend to moderate the requirements for qualified people in the workforce.

**Figure 1 Employment, Victoria, 1997–06 (historical) 2007–22 (forecasts)**



Source: *Labour Force* (ABS Cat. no. 6202.0); Monash Economic Forecasts (CoPS November 2006); and CEET. Scope: persons aged 15 years or older.

Employment forecasts for 2022 by major occupation groups in Table 12 show a shift towards high-skill occupations:

- Above average growth is forecast only in high-skill occupations (managers, professionals and associate professionals). Employment in these occupations is projected to be 45.1 per cent of total employment in the state, an increase of four per cent from 2006.
- In 2022 there will be more people employed in associate professional occupations than in the trades in Victoria. The low projected growth in trades reflects the slower projected growth in the major industries (manufacturing and construction) which employ large numbers of tradespeople. However, it is also suggested that recent estimates of growth in the number of tradespersons could be a little understated. Some self-employed tradespeople may be classified as managers rather than tradespersons in official statistics.

**Table 12 Employment by occupation, Victoria, 2006 and 2022**

Occupation group	Actual 2006		Forecasts 2022		% change 2006–22
	'000	%	'000	%	
Managers & administrators	211	8.5	299	10.4	41.7
Professionals	518	20.8	645	22.4	24.5
Associate professionals	294	11.8	355	12.3	20.7
Tradespersons	309	12.4	322	11.2	4.2
Advanced clerical & service	101	4.1	112	3.9	10.9
Intermediate clerical, sales & service	406	16.3	459	15.9	13.1
Intermediate production & transport	199	8.0	222	7.7	11.6
Elementary clerical, sales & service	244	9.8	258	9.0	5.7
Labourers	207	8.3	205	7.1	-1.0
All	2,488	100.0	2,878	100	15.7

Source: *Labour Force Survey* (ABS Cat. no. 6202.0) and CEET.

## 3.2 Employment forecasts by occupation and qualification

This section projects Victoria's employment by occupation and qualification over the next 15 years to 2022.

Two scenarios are provided:

### *Scenario I—'no skills deepening'*

Assumes the current distribution of qualifications within each occupation will remain unchanged to 2022. This provides a baseline for comparative purposes.

### *Scenario II—'skills deepening'*

Assumes the current number and distribution of qualifications within each occupation will change from 2008 to 2022. Historical time series data suggest these changes are more likely to call for increased high-level qualifications in Victoria. This will also mean the proportion of people with qualifications in the workforce will continue increasing. It is assumed that recent trends in skills deepening will continue to 2022.

### 3.2.1 Scenario I—'no skills deepening'

Projections of qualifications in 2022 under this scenario are shown in Table 13. It shows the distribution of qualifications within each occupation remaining virtually unchanged.

**Table 13 Scenario I: Qualifications (level) by occupation, Victoria, 2022 (%)**

Highest non-school qualification	Managers & admin.	Prof.	Associate prof.	Trades	Advanced clerical & service	Intermed.	Intermed. prod. & transport	Elem. clerical, sales & service	Labourers	Total
						clerical, sales & service		clerical, sales & service		
Higher education	40.1	73.3	25.0	4.1	18.1	12.8	6.2	9.2	5.1	28.6
<i>Postgraduate</i>	6.6	12.0	2.8	0.1	1.7	1.0	1.5	0.7	1.6	4.3
<i>Grad cert/dip</i>	4.5	10.3	2.9	0.3	2.4	1.5	0.3	0.4	0.3	3.6
<i>Bachelor</i>	29.0	51.0	19.3	3.7	14.1	10.3	4.4	8.1	3.2	20.7
VET	30.9	16.4	38.7	61.6	35.4	34.0	30.7	19.7	25.3	31.3
With quals.	71.0	89.7	63.7	65.7	53.6	46.8	36.8	28.9	30.4	59.9
Without quals.	29.0	10.3	36.3	34.3	46.4	53.2	63.2	71.1	69.6	40.1
All	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
All ('000)	299	645	355	322	112	459	222	258	205	2,878

### 3.2.2 Scenario II—'skills deepening'

Chapter 2 highlighted that in Victoria the number of employed people with qualifications was growing faster than overall employment. This indicates *skills deepening*.

This is more evident in particular occupations. For example, the number of professionals employed from 2001 to 2006 increased an average 2.6 per cent per year but the number with higher education qualifications increased 4.3 per cent per year.

Projections of qualifications thus need to account for not just changes in the proportion of people employed in different occupations but also the *skills deepening* occurring within occupations.

The skills deepening *rate* is defined as the difference between growth in the number of people with qualifications and growth in employment. If employment growth in an occupation is 10 per cent and the number of people with a particular qualification grows 15 per cent, then the skills deepening rate is five *points*. In contrast, if employment growth is 15 per cent and the qualification growth is 10 per cent, the skills deepening rate will be negative.

Skills deepening rates for three levels of higher education and a single level for VET qualifications in each major occupation group from 2001 to 2006 were calculated for this report. The mathematical details for calculating these rates are provided in Appendix 2.

Weighted averages of these rates were then calculated, which are shown in Table 14.

While this shows overall average skills deepening rate in Victoria was 1.5 points at both the higher education and VET level, the rate varied substantially across occupations.

As the concentration of qualifications in an occupation increases, skills deepening rates usually taper unless qualifications are being upgraded to higher levels.

**Table 14 Weighted average skills deepening rates by qualification (level) and occupation, Victoria, 2001–06 (points)**

Highest non-school qualification	Managers & admin.	Prof.	Associate prof.	Trades	Advanced clerical & service	Intermed. clerical, sales & service	Intermed. prod. & transport	Elem. clerical, sales & service	Labourers	All
Higher education	0.6	0.8	-0.1	1.2	1.6	5.5	-0.7	1.5	13.9	1.5
<i>Postgraduate</i>	3.1	3.1	3.1	0.0	0.0	0.0	0.0	0.0	0.0	6.9
<i>Grad cert/dip</i>	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1
<i>Bachelor</i>	0.0	1.1	-0.1	5.7	0.7	6.1	-1.8	6.9	1.7	1.7
VET	4.7	-0.8	1.7	2.0	2.1	1.8	1.6	2.6	4.0	1.5
All	1.6	0.4	1.0	1.8	1.8	2.7	0.8	3.4	5.1	1.5

In some occupations the number of people with certain higher education qualifications is quite small, thus making the calculation of robust skills deepening rates using formula (1) difficult. Where this was considered to be the case, alternative estimates, which were generally the average across all occupations, were substituted. At the postgraduate level, the rate for professionals has been assumed for all three high-skill occupation groups and a zero rate has been assumed in all other occupation groups. The shaded cells indicate where the rates have been substituted.

Scenario II factors in skills deepening within occupations in projecting qualifications for 2022. The mathematical details for making these projections are provided in Appendix 3.

Table 15 and 16 provide projections of qualifications in 2007. These tables are included to provide a point of reference.

**Table 15 Scenario II: Projections of qualifications (level) by occupation, Victoria, 2007 (%)**

Highest non-school qualification	Managers & admin.	Prof.	Associate		Advanced clerical & service	Intermed.	Intermed. prod. & transport	Elem.	Labourers	Total
			prof.	Trades		clerical, sales & service		clerical, sales & service		
Higher education	37.9	74.3	23.9	4.6	17.5	13.4	6.6	9.7	4.9	26.9
<i>Postgraduate</i>	6.5	12.4	2.8	0.2	1.9	0.9	1.6	0.6	1.5	4.0
<i>Grad cert/dip</i>	4.1	10.1	2.7	0.3	2.3	1.4	0.2	0.4	0.2	3.2
<i>Bachelor</i>	27.3	51.8	18.4	4.1	13.4	11.0	4.7	8.7	3.2	19.7
VET	33.6	16.2	39.6	62.4	35.9	34.2	31.3	19.9	26.2	32.3
With quals.	71.4	90.5	63.5	67.1	53.4	47.6	37.9	29.6	31.1	59.2
Without quals.	28.6	9.5	36.5	32.9	46.6	52.4	62.1	70.4	68.9	40.8
All	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
All ('000)	221	527	300	313	102	411	202	247	210	2,533

**Table 16 Scenario II: Projections of qualifications (level) by selected high-skill occupation, Victoria, 2007 (%)**

Occupation	Highest non-school qualification					Total	
	Grad		Bachelor	VET	Without qualification	%	'000
	Postgraduate	cert/dip					
General managers	4.5	2.9	22.2	44.2	26.1	100.0	55
Specialist managers	8.5	5.9	36.6	25.3	23.7	100.0	120
Farmers & farm managers	3.4	0.9	9.3	42.3	44.1	100.0	47
Natural & physical science professionals	35.3	1.4	48.6	11.2	3.5	100.0	20
Building & engineering professionals	14.6	0.0	60.1	16.3	9.0	100.0	40
Accountants & auditors	6.4	4.0	70.0	11.4	8.2	100.0	41
Sales, marketing & advertising prof.	4.6	4.9	34.2	32.1	24.2	100.0	29
Computing professionals	15.0	11.2	50.7	10.5	12.5	100.0	51
Misc. business & information professionals	15.5	12.3	30.7	21.3	20.2	100.0	41
Medical practitioners	23.6	8.6	62.5	5.3	0.0	100.0	19
Nursing professionals (division 1)	4.6	14.5	52.8	25.1	3.1	100.0	58
Miscellaneous health professionals	6.3	6.2	73.1	14.0	0.5	100.0	25
School teachers	6.6	20.1	64.1	9.2	0.0	100.0	81
University & voc ed teachers	46.9	10.5	31.2	9.0	2.4	100.0	19
Miscellaneous education professionals	6.2	11.9	25.3	19.5	37.1	100.0	12
Social welfare professionals	18.4	16.3	42.8	16.1	6.5	100.0	28
Miscellaneous social professionals	18.4	1.8	70.5	1.7	7.7	100.0	17
Artists & related professionals	6.1	9.5	35.2	25.7	23.4	100.0	36
Miscellaneous professionals	3.8	0.0	36.9	35.7	23.6	100.0	11
Medical & science technical officers	3.8	3.7	23.6	54.0	14.9	100.0	10
Building & eng. associate professionals	1.4	2.8	19.2	61.9	14.6	100.0	26
Finance, business & admin. associate prof.	4.4	4.3	24.9	32.4	33.9	100.0	107
Manager and supervisor associate prof.	2.0	1.3	11.5	35.6	49.6	100.0	109
Other associate professionals	1.6	1.8	18.2	49.2	29.2	100.0	49

Note that some estimates in this table are based on small sample sizes and interpreted with care. For example, the table indicates a small number of medical practitioners with the highest attained qualification at the VET level. In reality, this is unlikely to be true for any registered medical practitioner in Victoria because the minimum qualification for registration has been a university degree for a very long time. The result is most likely due to data coding error, compounded by a small sample size. In contrast, teacher training was only transferred to the university sector in the mid 1970s and nurse (division 1) training in the late 1980s and, therefore, there are still a number of teachers and nurses in the workforce with VET qualifications. Over time, the proportion with VET qualifications in these two occupations is expected to decline.

Tables 17–20 provide projections of qualifications by occupation for 2022.

- In Victoria, the number of employed people with qualifications is projected to increase significantly, from 59.2 per cent in 2007 to 77.6 per cent in 2022.
- Although more people will still have VET than higher education qualifications in 2022, the proportion with higher education qualifications is projected to increase by a bigger margin—52.5 per cent compared to 45.9 per cent. While the proportion of people with postgraduate and bachelor degrees will increase, the proportion with graduate certificates and diplomas will decline.

- The number of people with higher education qualifications is projected to increase by 358,000 from 2007 to 2022. The proportion with higher education qualifications is expected to increase in all occupation groups except intermediate transport and production. The highest increase, in absolute terms, will be 160,000 people in professional occupations.
- More than 90 per cent of people in managerial, professional and trade occupations will have qualifications in 2022. In contrast, less than half those working in intermediate production and transport occupations will have qualifications.
- The growing proportion of people with higher education qualifications in intermediate and elementary clerical, sales and service occupations is projected to continue. About a quarter will have higher education qualifications by 2022. Many higher education graduates enter the labour market in these occupations and further research could shed light on their career pathways.
- More than half (53.1 per cent) of all employed people with higher education qualifications will be in professional occupations in 2022. About equal numbers will work in managerial (12.4 per cent) and intermediate clerical, sales and service (12.6 per cent) occupations. Almost all employed people with postgraduate qualifications will work in the three high-skill occupation groups.
- In some high-skill occupations, almost every person will hold a qualification in 2022 while in some other occupations a significant number will still not have a qualification. These include not only managerial and associate professional occupations but also some professional occupations such as sales, marketing and advertising.
- Higher education will be the minimum qualification level in many professional occupations in 2022. A fifth of nursing professionals (division 1) are projected to have a VET qualification (which includes hospital-based qualifications or diplomas attained from a former college of advanced education) in 2022, down from a quarter in 2007. This proportion is expected to decline further as older nurses trained prior to 1988 retire from the workforce.
- Most university teachers will have postgraduate qualifications in 2022. Currently, many vocational teachers have their highest qualification at a VET level. While some will still have qualifications at this level in 2002, this is not indicated in the projections. A possible explanation for this is that teaching is a second job for some vocational education teachers, while their main job is another occupation, such as a trade. As a result, they are only counted in their main occupation in official statistics.

**Table 17 Scenario II: Projections of employment by qualification (level) and occupation, Victoria, 2022 ('000)**

Highest non-school qualification	Managers & admin.	Prof.	Associate prof.	Trades	Advanced clerical & service	Intermed. clerical, sales & service	Intermed. prod. & transport	Elem. clerical, sales & service	Labourers	Total
Higher education	129	552	91	30	21	131	11	63	12	1,040
<i>Postgraduate</i>	32	127	16	0	2	5	3	2	3	191
<i>Grad cert/dip</i>	10	47	7	1	2	5	0	1	0	74
<i>Bachelor</i>	87	378	67	29	17	122	7	60	8	776
VET	168	63	178	262	55	205	88	76	97	1,193
With quals.	297	615	269	292	76	336	100	140	109	2,233
Without quals.	2	30	87	31	35	123	123	119	96	644
All	299	645	355	322	112	459	222	258	205	2,878

**Table 18 Scenario II: Projections of qualifications (level) by occupation, Victoria, 2022 (%)**

Highest non-school qualification	Managers & admin.	Prof.	Associate prof.	Trades	Advanced clerical & service	Intermed. clerical, sales & service	Intermed. prod. & transport	Elem. clerical, sales & service	Labourers	Total
Higher education	43.0	85.6	25.6	9.2	19.0	28.6	5.0	24.4	6.0	36.2
<i>Postgraduate</i>	10.8	19.7	4.6	0.1	1.7	1.0	1.5	0.7	1.6	6.6
<i>Grad cert/dip</i>	3.2	7.3	2.1	0.2	1.7	1.1	0.2	0.3	0.2	2.6
<i>Bachelor</i>	29.1	58.5	18.9	8.9	15.6	26.5	3.3	23.4	4.1	27.0
VET	56.1	9.8	50.0	81.3	49.5	44.6	39.8	29.6	47.4	41.5
With quals.	99.2	95.4	75.6	90.5	68.5	73.2	44.8	54.1	53.3	77.6
Without quals.	0.8	4.6	24.4	9.5	31.5	26.8	55.2	45.9	46.7	22.4
All	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
All (000)	299	645	355	322	112	459	222	258	205	2,878

**Table 19 Scenario II: Projections of qualifications (field) by occupation, Victoria, 2022 (%)**

Field of education	Managers & admin.	Prof.	Associate prof.	Trades	Advanced clerical & service	Intermed. clerical, sales & service	Intermed. prod. & transport	Elem. clerical, sales & service	Labourers	Total
Sciences	4.6	7.8	3.0	0.8	1.4	2.5	0.7	2.2	1.1	3.5
Info. tech.	3.4	5.9	3.8	1.3	3.1	2.7	2.0	3.2	2.4	3.5
Engineering	20.5	9.5	12.7	44.4	2.2	6.2	21.4	6.8	16.8	15.3
Arch. & building	8.9	1.9	4.6	22.6	0.7	1.4	5.2	1.2	4.9	5.5
Agri. & environ.	7.7	1.4	1.4	5.1	1.0	1.7	3.0	1.5	2.7	2.7
Health	4.4	17.7	7.1	0.7	5.5	7.5	1.0	2.3	2.3	7.2
Education	5.0	13.4	3.1	1.1	3.3	3.4	0.5	2.1	1.3	5.0
Man. & commerce	30.4	16.7	22.5	3.2	37.5	21.6	5.3	16.3	9.0	17.5
Society & culture	9.3	15.0	9.8	2.0	8.4	17.5	1.9	8.3	3.8	10.0
Arts	3.2	5.7	1.6	3.0	2.7	3.2	0.8	4.5	2.2	3.4
Food, hosp. & Pers.	1.8	0.4	6.2	6.4	2.5	5.6	3.3	5.8	6.7	4.0
With quals.	99.2	95.4	75.6	90.5	68.5	73.2	44.8	54.1	53.3	77.6
Without quals.	0.8	4.6	24.4	9.5	31.5	26.8	55.2	45.9	46.7	22.4
All	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
All ('000)	299	645	355	322	112	459	222	258	205	2,878

**Table 20 Scenario II: Projections of qualifications (level) by selected high-skill occupation, Victoria, 2022 (%)**

Occupation	Highest non-school qualification				Without qualification	Total	
	Postgraduate	Grad cert/dip	Bachelor	VET		%	'000
General managers	8.0	2.4	24.3	65.3	0.0	100.0	77
Specialist managers	13.4	4.2	36.3	44.8	1.3	100.0	176
Farmers & farm managers	5.4	0.7	9.3	84.4	0.3	100.0	46
Natural & physical science professionals	56.1	1.0	42.8	0.0	0.0	100.0	26
Building & engineering professionals	23.1	0.0	71.2	5.7	0.0	100.0	43
Accountants & auditors	10.2	2.9	82.9	4.0	0.0	100.0	56
Sales, marketing & advertising prof.	7.2	3.6	40.5	28.6	20.1	100.0	40
Computing professionals	23.8	8.2	60.1	7.9	0.0	100.0	64
Misc. business & information professionals	24.6	9.0	36.3	19.0	11.1	100.0	51
Medical practitioners	37.5	6.2	56.3	0.0	0.0	100.0	22
Nursing professionals (division 1)	7.3	10.5	62.5	19.7	0.0	100.0	60
Miscellaneous health professionals	10.0	4.5	85.5	0.0	0.0	100.0	29
School teachers	10.4	14.6	75.0	0.0	0.0	100.0	100
University & voc ed teachers	74.4	7.6	17.9	0.0	0.0	100.0	23
Miscellaneous education professionals	9.9	8.7	30.0	17.3	34.1	100.0	13
Social welfare professionals	29.2	11.8	50.7	8.3	0.0	100.0	35
Miscellaneous social professionals	29.1	1.3	69.5	0.0	0.0	100.0	22
Artists & related professionals	9.7	6.9	41.7	22.9	18.7	100.0	47
Miscellaneous professionals	6.0	0.0	43.7	31.8	18.5	100.0	15
Medical & science technical officers	6.0	2.7	23.2	68.1	0.0	100.0	10
Building & eng. associate professionals	2.3	2.1	18.8	76.9	0.0	100.0	29
Finance, business & admin. associate prof.	7.1	3.1	24.5	42.1	23.2	100.0	144
Manager and supervisor associate prof.	3.1	1.2	11.7	47.5	36.5	100.0	117
Other associate professionals	2.4	1.3	18.6	58.5	19.2	100.0	55

### 3.3 Additional numbers required with qualifications

This section estimates the additional numbers of qualified people needed to achieve the qualifications profile projected for 2022 in Scenario II.

To estimate the additional numbers of people with qualifications required at each level in each occupation, the numbers of new entrants from 2008 to 2022 is first estimated, followed by the numbers of existing workers who need to upgrade qualifications.

Not all new entrants to an occupation have qualifications, just as not every existing worker upgrades their qualifications.

Existing workers who undertake training to achieve a higher qualification are counted towards the targets for qualified workers. Those who undertake training at the same level or at a lower level than the qualification they currently hold, even if it is in a different field, are deemed not to *add* to Victoria's stock of qualified workers.

#### 3.3.1 New entrants with qualifications

This section projects how many new entrants with qualifications are needed in each occupation from 2008 to 2022.

The projections take account of growth in employment and net turnover in occupations. Net turnover results from workers leaving an occupation for retirement, emigration, death or ill health etc.

As new entrants in any occupation are generally the youngest, their qualifications profile is also likely to be similar to workers of around the same age. Qualifications of leavers (who need to be replaced) are also likely to be similar to qualifications of the oldest in an occupation.

The steps for calculating the number of new entrants from 2008 to 2022 by qualification and occupation are provided in Appendix 4.

Tables 21–24 show the numbers of new entrants needed in Victoria from 2008 to 2022. Not all new entrants will have qualifications. In these tables, it is assumed that all new entrants to nursing (division 1) will have a higher education qualification, as this is mandatory for registration to practice in the occupation.

- Over 756,000 new entrants with qualifications are needed in Victoria from 2008 to 2022. Of these, 54.4 per cent need to have higher education qualifications and 45.6 per cent VET qualifications. Almost all the higher education qualifications need to be at the bachelor level.
- Most (92.4 per cent) new entrants to professional occupations will need higher education qualifications.
- Relatively high proportions of new entrants to clerical, sales and service occupations will also have higher education qualifications as they include many people still studying and recent graduates. High turnover in these occupations tends to inflate the number of new entrants.
- New entrants in many professional occupations, such as health and education related, will exclusively have higher education qualifications.

**Table 21 Scenario II: New entrants with qualifications by occupation and level of qualification, Victoria, 2008–22 ('000)**

Non-school qualification	Managers & admin.	Prof.	Associate prof.	Trades	Advanced clerical & service	Intermed.	Intermed. prod. & transport	Elem. clerical, sales & service	Labourers	Total
						clerical, sales & service		clerical, sales & service		
Higher education	69	206	32	4	13	36	4	44	4	411
<i>Postgraduate</i>	8	14	2	0	2	1	2	0	1	29
<i>Grad cert/dip</i>	4	11	2	0	1	1	0	0	0	18
<i>Bachelor</i>	57	181	29	4	11	35	2	43	3	364
VET	67	17	51	41	18	67	18	41	26	345
All	136	223	83	44	31	103	23	85	29	756

Note: Calculations assume all new entrants to nursing (division 1) will have higher education qualifications.

**Table 22 Scenario II: New entrants with qualifications (level) by occupation, Victoria, 2008–22 (%)**

Non-school qualification	Managers & admin.	Prof.	Associate prof.	Trades	Advanced clerical & service	Intermed.	Intermed. prod. & transport	Elem. clerical, sales & service	Labourers	Total
						clerical, sales & service		clerical, sales & service		
Higher education	50.6	92.4	39.0	8.2	42.5	35.0	18.9	51.6	12.6	54.4
<i>Postgraduate</i>	5.7	6.4	2.4	0.0	5.2	0.8	8.5	0.4	3.0	3.8
<i>Grad cert/dip</i>	3.1	4.8	1.9	0.0	2.5	0.5	0.0	0.4	0.0	2.4
<i>Bachelor</i>	41.8	81.2	34.6	8.2	34.8	33.7	10.4	50.8	9.5	48.2
VET	49.4	7.6	61.0	91.8	57.5	65.0	81.1	48.4	87.4	45.6
All	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Note: Calculations assume all new entrants to nursing (division 1) will have higher education qualifications.

**Table 23 Scenario II: New entrants with qualifications (field) by occupation, Victoria, 2008–22**

Field of education	Managers & admin.	Prof.	Associate prof.	Trades	Advanced clerical & service	Intermed. clerical, sales & service	Intermed. prod. & transport	Elem. clerical, sales & service	Labourers	Total
Sciences	5.3	8.1	4.1	1.0	2.7	3.1	0.6	4.4	1.3	5.0
Info. tech.	3.8	5.4	4.5	1.2	4.9	3.9	5.1	6.7	5.2	4.7
Engineering	19.3	11.0	14.9	54.4	2.9	9.6	46.3	11.4	23.5	16.5
Arch. & building	9.3	2.4	5.4	16.2	0.7	2.1	14.4	1.7	8.8	5.2
Agri. & environ.	6.2	1.4	1.7	5.4	1.6	2.2	8.1	2.4	5.6	3.1
Health	4.7	16.8	10.5	0.7	8.3	8.9	2.7	4.1	5.1	9.3
Education	5.5	16.8	4.0	0.5	6.2	3.7	0.4	3.6	3.6	7.7
Man. & commerce	29.6	15.1	29.8	3.6	52.8	34.5	11.0	31.9	17.5	24.7
Society & culture	11.4	15.9	16.6	2.3	13.2	19.4	4.3	16.3	9.5	14.2
Arts	3.3	6.6	2.2	5.2	3.8	4.3	1.4	7.8	4.7	4.9
Food, hosp. & Pers.	1.6	0.4	6.4	9.5	2.7	8.4	5.6	9.8	15.2	4.8
All	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Note: Calculations assume all new entrants to nursing (division 1) will have higher education qualifications.

**Table 24 Scenario II: New entrants with qualifications (level) by selected high-skill occupation, Victoria, 2008–22 (%)**

Occupation	Highest non-school qualification				Total	
	Postgrad	Grad cert/dip	Bachelor	VET	%	'000
General managers	6.0	1.9	27.7	64.4	100.0	38
Specialist managers	6.6	4.3	54.3	34.8	100.0	90
Farmers & farm managers	0.0	0.0	8.2	91.8	100.0	18
Natural & physical science prof.	16.3	0.3	83.3	0.0	100.0	9
Building & engineering professionals	5.0	0.0	90.6	4.4	100.0	18
Accountants & auditors	0.5	2.0	93.6	3.9	100.0	15
Sales, marketing & advertising prof.	5.3	2.8	63.7	28.2	100.0	19
Computing professionals	11.0	3.7	73.5	11.9	100.0	18
Misc. business & information prof.	6.6	7.8	73.2	12.4	100.0	25
Medical practitioners	10.1	0.0	89.9	0.0	100.0	8
Nursing professionals (division 1) <sup>a</sup>	1.7	7.2	91.2	0.0	100.0	19
Miscellaneous health professionals	0.2	1.1	98.8	0.0	100.0	9
School teachers	3.4	10.9	85.7	0.0	100.0	46
University & voc. education teachers	31.2	2.9	65.9	0.0	100.0	10
Miscellaneous education prof.	0.0	0.0	44.8	56.0	100.0	6
Social welfare professionals	17.2	6.1	66.2	10.5	100.0	10
Miscellaneous social professionals	5.0	1.1	94.0	0.0	100.0	7
Artists & related professionals	0.0	2.4	67.9	29.8	100.0	20
Miscellaneous professionals	0.0	0.0	81.5	18.4	100.0	7
Medical & science technical officers	5.3	3.2	29.9	62.0	100.0	2
Building & eng. associate prof.	0.0	1.9	34.2	64.0	100.0	7
Finance, bus. & admin. assoc. prof.	3.1	3.2	41.2	52.5	100.0	47
Manager and supervisor assoc. prof.	4.3	0.8	23.8	71.1	100.0	38
Other associate professionals	0.0	0.7	34.5	64.8	100.0	22

a Calculations assume all new entrants to nursing (division 1) will have higher education qualifications.

### 3.3.2 Existing workers upgrading qualifications

This section projects the number of existing workers who need to upgrade qualifications from 2008 to 2022. It excludes those who obtain another qualification at the same or lower level.

The projections are based on comparing the qualifications of people employed in 2007 who will still be employed in 2022. Comparing their qualifications now and in 2022 enables estimates of the number of existing workers who need to upgrade qualifications. Mathematical details of the calculations are provided in Appendix 5.

Tables 25–28 show the numbers of existing workers who need to upgrade qualifications in Victoria from 2008 to 2022. In these tables, it is assumed that existing nursing professionals upgrading qualifications will be doing so to a higher education level, as all of them already have at least the equivalent of an advanced diploma for registration. The tables exclude existing workers who will not upgrade qualifications.

- 750,000 existing workers need to upgrade qualifications.
- 37.7 per cent of these need to upgrade to a higher education level (16.3 per cent postgraduate, 2 per cent graduate certificate or diploma and 19.5 percent bachelor) and 62.3 per cent to a VET level.
- Upgrading to higher education qualifications needs to occur mostly in professional and intermediate clerical, sales and service occupations. Two-thirds of all people who upgrade to higher education qualifications will be in these occupations.
- Upgrading in many professional occupations, such as natural and physical science, medicine and teaching, mostly needs to be to a postgraduate level. In contrast, upgrading in associate professional occupations mostly needs to be to a VET level.
- A relatively high number of specialist managers need to upgrade qualifications although only a quarter of them need to be at the higher education level.

**Table 25 Scenario II: Existing workers upgrading qualification by occupation and qualification level, Victoria, 2008–22 ('000)**

Non-school qualification	Managers & admin.	Prof.	Associate prof.	Trades	Advanced clerical & service	Intermed. clerical, sales & service	Intermed. prod. & transport	Elem. clerical, sales & service	Labourers	Total
Higher education	34	126	15	18	0	62	2	19	6	283
<i>Postgraduate</i>	21	88	8	1	0	2	0	1	2	122
<i>Grad cert/dip</i>	2	10	0	0	0	2	0	0	1	15
<i>Bachelor</i>	11	28	7	17	0	59	1	19	3	146
VET	86	10	61	112	18	60	35	35	51	467
All	119	136	76	130	18	122	37	54	57	750

Note: Calculations assume all existing nursing professionals (division 1) will upgrade to only higher education qualifications.

**Table 26 Scenario II: Existing workers upgrading qualifications (level) by occupation, Victoria, 2008–22 (%)**

Non-school qualification	Managers & admin.	Prof.	Associate prof.	Trades	Advanced clerical & service	Intermed. clerical, sales & service	Intermed. prod. & transport	Elem. clerical, sales & service	Labourers	Total
Higher education	28.2	92.6	19.6	14.0	1.2	51.1	4.6	36.0	10.8	37.7
<i>Postgraduate</i>	17.7	64.6	10.3	0.5	0.0	1.4	0.5	1.1	3.2	16.3
<i>Grad cert/dip</i>	1.4	7.4	0.6	0.2	1.2	1.5	0.1	0.0	1.8	2.0
<i>Bachelor</i>	9.1	20.6	8.7	13.2	0.0	48.2	4.0	34.9	5.8	19.5
VET	71.8	7.4	80.4	86.0	98.8	48.9	95.5	64.0	89.2	62.3
All	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Note: Calculations assume all existing nursing professionals (division 1) will upgrade to only higher education qualifications.

**Table 27 Scenario II: Existing workers upgrading qualifications (field) by occupation, Victoria, 2008–22 (%)**

Field of education	Managers & admin.	Prof.	Associate prof.	Trades	Advanced clerical & service	Intermed. clerical, sales & service	Intermed. prod. & transport	Elem. clerical, sales & service	Labourers	Total
Sciences	3.5	11.5	3.0	0.8	1.2	4.3	1.6	3.3	4.3	4.5
Info. tech.	2.3	4.9	5.6	1.6	5.6	3.3	4.1	5.0	3.6	3.6
Engineering	23.8	8.1	19.7	47.4	4.1	6.8	47.9	14.0	31.9	22.5
Arch. & building	10.2	1.5	6.8	26.9	1.7	1.5	11.1	2.6	9.2	9.0
Agri. & environ.	10.7	2.3	2.0	5.7	1.4	2.3	6.1	3.3	3.9	4.6
Health	4.1	17.6	6.9	0.8	8.8	12.0	1.6	4.4	4.2	7.6
Education	4.3	8.1	3.5	1.8	2.8	5.9	1.0	3.6	3.1	4.4
Man. & commerce	29.3	21.9	31.7	3.6	58.1	22.7	12.1	29.3	15.8	21.5
Society & culture	6.3	19.8	9.5	3.3	7.3	28.5	3.5	14.0	6.6	12.7
Arts	3.0	3.8	1.7	2.6	4.1	5.1	1.9	8.0	4.4	3.7
Food, hosp. & Pers.	2.4	0.4	9.6	5.5	4.8	7.4	9.1	12.3	13.1	6.0
All	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Note: Calculations assume all existing nursing professionals (division 1) will upgrade to only higher education qualifications.

**Table 28 Scenario II: Existing workers upgrading qualifications by selected high-skill occupation, Victoria, 2008–22 (%)**

Occupation	Highest non-school qualification				Total	
	Postgraduate	Grad cert/dip	Bachelor	VET	%	'000
General managers	11.6	2.8	18.3	67.2	100.0	35
Specialist managers	23.9	0.0	1.1	75.0	100.0	55
Farmers & farm managers	13.3	2.3	13.2	71.2	100.0	30
Natural & physical science professionals	99.8	0.1	0.0	0.0	100.0	10
Building & engineering professionals	86.7	0.0	0.0	13.3	100.0	8
Accountants & auditors	23.2	1.7	64.9	10.2	100.0	16
Sales, marketing & advertising professionals	63.2	0.7	0.0	35.8	100.0	3
Computing professionals	81.6	0.1	18.3	0.0	100.0	10
Misc. business & information professionals	70.7	1.9	0.0	27.3	100.0	13
Medical practitioners	90.9	6.2	2.9	0.0	100.0	7
Nursing professionals (division 1) <sup>a</sup>	32.7	25.9	41.4	0.0	100.0	10
Miscellaneous health professionals	32.7	6.7	60.8	0.0	100.0	6
School teachers	98.8	0.0	1.0	0.0	100.0	7
University & vocational education teachers	90.6	9.4	0.0	0.0	100.0	14
Miscellaneous education professionals	32.3	27.0	40.7	0.0	100.0	4
Social welfare professionals	48.7	10.6	38.7	2.1	100.0	15
Miscellaneous social professionals	84.6	0.0	15.4	0.0	100.0	5
Artists & related professionals	58.6	39.7	0.0	1.6	100.0	6
Miscellaneous professionals	21.6	0.0	0.9	77.5	100.0	3
Medical & science technical officers	8.9	0.0	0.0	91.1	100.0	4
Building & eng. associate professionals	5.0	0.0	0.0	95.0	100.0	9
Finance, business & admin. associate prof.	16.6	1.0	12.1	70.3	100.0	34
Manager and supervisor associate prof.	4.2	0.6	10.2	84.9	100.0	21
Other associate professionals	6.6	0.0	4.5	88.9	100.0	8

a Calculations assume all existing nursing professionals (division 1) will upgrade to only higher education qualifications.

### 3.3.3 Total requirements of additional qualified workers

Tables 29-32 show the total number of people who need to gain or upgrade qualifications from 2008 to 2022 to meet demand under Scenario II. It includes new entrants and exiting workers gaining or upgrading qualifications.

Note this does not represent the total requirements of labour in Victoria. Only the proportion that will hold qualifications is provided and data in these tables does not represent Victoria's total labour requirements.

The total requirements for people with qualifications in Victoria from 2008 to 2022 are summarised in Table 33. It shows that while new entrants are more likely to have higher education qualifications, existing workers are much more likely to be upgrading to VET qualifications.

- 1.51 million people need to gain or upgrade qualifications from 2008 to 2022—46.1 per cent to a higher education level and 53.9 per cent to a VET level. About 21.8 per cent of the higher education qualifications need to be at the postgraduate level, 4.7 per cent at the graduate certificate or diploma level and the remaining 73.5 per cent at the bachelor level.
- Of all high-skill occupations, the qualifications requirements in the specialist manager occupation are by far the highest (see Table 32). The two factors contributing to the high requirements in this occupation are above average forecast of growth and high turnover. In particular, average growth is forecast at 2.9 per cent per year compared to an average of just 0.9 per cent across all occupations.

**Table 29 Scenario II: Total requirements of additional qualified workers by qualification (level) and occupation, Victoria, 2008–22 ('000)**

Non-school qualification	Managers & admin.	Prof.	Associate prof.	Trades	Advanced clerical & service	Intermed. clerical, sales & service	Intermed. prod. & transport	Elem. clerical, sales & service	Labourers	Total
Higher education	103	332	47	22	13	98	6	63	10	694
<i>Postgraduate</i>	29	102	10	1	2	3	2	1	3	151
<i>Grad cert/dip</i>	6	21	2	0	1	2	0	0	1	33
<i>Bachelor</i>	68	209	35	21	11	93	4	62	6	510
VET	153	27	112	152	36	127	53	76	77	812
Total requirements with qualifications	255	359	159	174	49	225	59	139	86	1,506
Total employment 2022										
With qualifications	297	615	268	291	77	336	99	139	109	2,234
All	299	645	355	322	112	459	222	258	205	2,878

**Table 30 Scenario II: Total requirements of additional qualifications (level) by occupation, Victoria, 2008–22 (%)**

Non-school qualification	Managers & admin.	Prof.	Associate prof.	Trades	Advanced clerical & service	Intermed. clerical, sales & service	Intermed. prod. & transport	Elem. clerical, sales & service	Labourers	Total
Higher education	40.4	92.5	29.6	12.6	26.5	43.6	10.2	45.3	11.6	46.1
<i>Postgraduate</i>	11.4	28.4	6.3	0.6	4.1	1.3	3.4	0.7	3.5	10.0
<i>Grad cert/dip</i>	2.4	5.8	1.3	0.0	2.0	0.9	0.0	0.0	1.2	2.2
<i>Bachelor</i>	26.7	58.2	22.0	12.1	22.4	41.3	6.8	44.6	7.0	33.9
VET	60.0	7.5	70.4	87.4	73.5	56.4	89.8	54.7	89.5	53.9
All	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

**Table 31 Total requirements of additional qualifications (field) by occupation, Victoria, 2008–22 (%)**

Field of education	Managers & admin.	Prof.	Associate prof.	Trades	Intermed.			Elem. clerical, sales & service	Labourers	Total
					Advanced clerical & service	clerical, sales & service	Intermed. prod. & transport			
Sciences	4.5	9.4	3.6	0.9	2.1	3.8	1.2	4.0	3.3	4.7
Info. tech.	3.1	5.2	5.0	1.5	5.2	3.5	4.5	6.0	4.1	4.1
Engineering	21.4	9.9	17.2	49.2	3.3	8.1	47.3	12.4	29.0	19.5
Arch. & building	9.7	2.0	6.0	24.2	1.1	1.8	12.3	2.1	9.1	7.1
Agri. & environ.	8.3	1.8	1.8	5.7	1.6	2.2	6.9	2.8	4.5	3.8
Health	4.4	17.1	8.8	0.8	8.5	10.6	2.1	4.2	4.5	8.4
Education	4.9	13.5	3.8	1.5	4.9	4.9	0.8	3.6	3.2	6.1
Man. & commerce	29.5	17.7	30.7	3.6	54.8	28.1	11.7	30.9	16.3	23.1
Society & culture	9.0	17.4	13.2	3.0	11.0	24.3	3.8	15.4	7.6	13.4
Arts	3.2	5.6	1.9	3.3	3.9	4.7	1.7	7.9	4.5	4.3
Food, hosp. & Pers.	2.0	0.4	8.0	6.5	3.5	7.9	7.8	10.8	13.8	5.4
All	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
All ('000)	255	359	159	174	49	225	59	139	86	1,506

**Table 32 Scenario II: Total requirements of additional qualifications (level) by selected high-skill occupation, Victoria, 2008–22 (%)**

Occupation	Highest non-school qualification				Total	
	Postgraduate	Grad cert/dip	Bachelor	VET	%	'000
General managers	8.7	2.3	23.2	65.8	100.0	73
Specialist managers	13.5	2.6	33.2	50.8	100.0	137
Farmers & farm managers	8.9	1.5	11.5	78.1	100.0	45
Natural & physical science professionals	60.3	0.3	39.5	0.0	100.0	19
Building & engineering professionals	30.0	0.0	62.9	7.1	100.0	26
Accountants & auditors	12.0	1.8	79.0	7.1	100.0	31
Sales, marketing & advertising professionals	15.0	2.4	53.0	29.5	100.0	17
Computing professionals	36.2	2.4	53.8	7.6	100.0	28
Misc. business & information professionals	32.9	5.4	43.2	18.5	100.0	33
Medical practitioners	50.3	3.1	46.7	0.0	100.0	15
Nursing professionals (division 1)	12.4	13.6	74.0	0.0	100.0	29
Miscellaneous health professionals	12.5	3.1	84.4	0.0	100.0	15
School teachers	15.8	9.5	74.7	0.0	100.0	52
University & vocational education teachers	66.9	6.8	26.3	0.0	100.0	24
Miscellaneous education professionals	23.7	19.8	41.7	14.8	100.0	5
Social welfare professionals	35.6	8.6	50.2	5.6	100.0	25
Miscellaneous social professionals	36.1	0.7	63.3	0.0	100.0	12
Artists & related professionals	17.9	13.8	47.2	21.2	100.0	20
Miscellaneous professionals	7.7	0.0	53.1	39.2	100.0	9
Medical & science technical officers	7.8	1.0	9.2	82.2	100.0	6
Building & eng. associate professionals	2.8	0.9	15.0	81.4	100.0	16
Finance, business & admin. associate prof.	9.7	2.1	26.9	61.3	100.0	68
Manager and supervisor associate prof.	4.3	0.7	16.8	78.3	100.0	41
Other associate professionals	1.9	0.5	25.9	71.7	100.0	27

**Table 33 Scenario II: Summary of total requirements of additional qualifications (level), Victoria, 2008–22**

Non-school qualification	Employment in 2022		Required number of persons with qualifications 2008-22					
			New entrants		Existing workers upgrading		Total	
	'000	%	'000	%	'000	%	'000	%
Higher education	1,040	36.2	411	54.4	283	37.7	694	46.1
<i>Postgraduate</i>	191	6.6	29	3.8	122	16.3	151	10.0
<i>Grad cert/dip</i>	74	2.6	18	2.4	15	2.0	33	2.2
<i>Bachelor</i>	776	27.0	364	48.1	146	19.5	510	33.9
VET	1193	41.5	345	45.6	467	62.3	812	53.9
With qualifications	2,234	77.6	756	100.0	750	100.0	1,506	100.0
Without qualifications	644	22.4						
Total	2,878	100.0						

## 4 Potential supply of people with higher education qualifications

The main source of supply of people with higher education qualifications for the Victorian workforce is the state's universities.

This supply is augmented with people from interstate universities and some private providers as well as interstate and international migration.

While the state's Technical and Further Education (TAFE) sector recently started offering degree level courses in a limited number of fields, the numbers graduating are relatively small.

This chapter analyses the:

- patterns of enrolments and commencements in, and completions, of higher education courses in Victorian universities
- occupational destinations of graduates from all Australian universities working in Victoria
- net gain in people with higher education qualifications from Australia's migration programmes.

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### Key findings

#### *Enrolments in higher education courses in Victoria from 2001 to 2005*

- Enrolments increased 12.1 per cent to 242,000 in 2005, of which 175,000 were domestic students. The increase in domestic students was just 2.9 per cent, and their numbers have changed little since 2002.
- On average, 12,700 interstate students were enrolled in Victorian universities each year and 10,500 Victorians were enrolled in interstate universities.
- While enrolments in postgraduate courses increased, they remained largely unchanged in bachelor courses and declined in graduate certificate and diploma courses.
- Females make up an increasing number of enrolments in higher education at every course level. In 2005, they comprised 56.7 per cent of all enrolments. Male numbers declined 2.6 per cent per year in graduate certificate and diploma courses, which partly reflects the growing number of females in courses such as the diploma of education.
- While enrolments generally increased in architecture and building, health, education and creative arts they dropped in information technology and engineering, though not in civil engineering.

#### *Commencements in higher education courses in Victoria from 2001 to 2005*

- In 2005, 60,400 domestic students commenced courses in Victoria— about two-thirds at the bachelor level and one-third at higher levels. Just under a third of all commencing students were from overseas.
- Commencements peaked at just over 89,600 in 2003 and they fell 3.4 per cent in 2004.
- Commencements by males declined one per cent per year and by females increased at a marginal rate.
- On average, commencements in bachelor degrees declined but increased in postgraduate courses.
- Commencements increased at a rapid rate in many health courses such as medicine, dentistry and veterinary science as well as for accounting courses.

- 
- On average, 9.1 per cent of students commencing bachelor degrees had a previous qualification at the same or higher level.

#### *Completions of higher education courses from 2001 to 2005*

- Total completions increased to nearly 62,000 in 2005, with about two-thirds by domestic students.
- On average, course completions by females increased by 2.1 per cent per year compared to just 0.3 per cent by males.
- Completions increased in all fields except sciences, information technology, engineering (while they declined in civil engineering they increased in electrical engineering) and management and commerce.
- Completions increased substantially in all health related courses, except nursing.

#### *Destinations of higher education graduates*

- About a quarter of all domestic students who completed courses were undertaking further study in the following year (compared to nearly 40 per cent of international students).
- 88.7 per cent of domestic students not undertaking further study were working.
- 60.9 per cent of those who were undertaking further study were working.
- Initial courses in sciences, agriculture, environment, society, culture and arts are less vocationally oriented and people who complete these tended to undertake further study (e.g. diploma in education), probably to prepare for particular vocations.
- More graduates from Victorian universities were working interstate than vice versa (6,700 compared to 2,900).
- Graduates not undertaking further study were more likely to be working in a managerial or professional occupation (57.4 per cent) than those undertaking further study (27.8 per cent).
- Many graduates found employment in associate professional (nine per cent) and clerical, sales and service (18.7 per cent) occupations.
- A higher percentage of people finishing courses in society, culture and arts fields found employment in clerical, sales and service occupations than those finishing vocationally oriented courses health education and engineering.
- The potential supply of graduates for the Victorian workforce from Australian universities in 2006 was estimated at 35,500. This number excludes people whose previous highest qualification was at the same or higher level as that of the qualification they just completed.

#### *Other sources of supply*

- Other sources of supply of higher education graduates for Victoria include private providers not included in the *Higher Education Student Data Collection* and Australia's various migration programmes.
- Lack of data from private providers and the complexity of the migration programmes make the task of estimating potential supply from these sources difficult. Tentative estimates from these sources total 8,000 persons with higher education qualifications. It is debateable whether working holiday makers should be included in this total. If they are excluded, potential supply from these other sources reduces to 6,800 persons.

## 4.1 Enrolments in higher education courses, 2001–05

This section describes student enrolment patterns in higher education courses in Victoria from 2001 to 2005. The main analysis relates to domestic students who enrol at the bachelor or higher level.

### 4.1.1 All course enrolments

Tables 34 to 36 show the numbers of students enrolled in higher education courses in Victoria from 2001 to 2005.

- Total numbers enrolled rose 12.1 per cent to 242,000 in 2005 – 175,000 were domestic students.
- A significant component of this growth can be attributed to an increase in overseas students, whose numbers increased 46.2 per cent from 2001 to 2005. By 2005, they comprised 27.7 per cent of Victoria's total student population. The increase in domestic students was just 2.9 per cent, and their numbers have changed little since 2002.
- Students do not always enrol in a university in their home state. On average, 12,700 interstate students were enrolled in Victorian universities from 2001 to 2005 and 10,500 Victorians were enrolled in interstate universities.
- While enrolments in postgraduate courses increased, they remained largely unchanged in bachelor courses and declined in graduate certificate and diploma courses. As a result, the share of postgraduate enrolments increased 2.3 per cent to 18.5 per cent in 2005.
- In 2005, the highest number of enrolments (about 40,800) was in the field of society and culture. Management and commerce accounted for another 38,700 enrolments.
- While enrolments generally increased in architecture and building, health, education and creative arts, they dropped in information technology and engineering.
- The biggest annual increase of 4.6 per cent per year was in architecture and building and the biggest decline of 8.5 per cent per year was in information technology.
- While enrolments generally declined in engineering, in civil engineering they increased 3.4 per cent per year.
- In health, enrolments in pharmacy, dentistry and veterinary science increased at above average rates. Enrolments also increased in medicine but at a much lower rate.
- Significant increases in enrolments also occurred in education, but only in sub-fields other than teacher education, and in accounting and law.
- The softness in the labour market for information technology professionals since 2000 is reflected in quite dramatic decline in enrolments. However, the recent turnaround in the labour market has not been reflected in enrolments. It is surprising, however, to see a drop in enrolments in engineering, other than civil, despite reports of a tight labour market for engineers. Increasing numbers of engineers are entering Australia under the temporary migration scheme.

**Table 34 Enrolments in higher education courses by qualification (level), Victoria, 2001–05**

Qualification level of course	Number					%				
	2001	2002	2003	2004	2005	2001	2002	2003	2004	2005
Postgraduate	27,521	30,083	32,404	33,077	32,392	16.2	17.2	18.4	18.9	18.5
<i>Doctorate</i>	7,652	7,888	8,317	8,575	8,800	4.5	4.5	4.7	4.9	5.0
<i>Masters</i>	19,869	22,195	24,087	24,503	23,592	11.7	12.7	13.7	14.0	13.5
Grad cert/dip	18,115	18,939	18,133	17,788	17,817	10.6	10.8	10.3	10.2	10.2
Bachelor	124,629	125,933	125,572	124,265	125,044	73.2	72.0	71.3	71.0	71.4
All domestic	170,264	174,954	176,110	175,130	175,253	100.0	100.0	100.0	100.0	100.0
Overseas students	45,885	52,308	59,193	65,404	67,089					
All	216,149	227,262	235,302	240,533	242,341					

Source: Unpublished *Higher Education Student Data Collection* (DEST). Scope: Bachelor and higher level.

**Table 35 Annual changes in enrolments in higher education courses by qualification (level), Victoria, 2001–05**

Qualification level of course	Year-on-year change (%)					Total change 2001 to 2005 (%)
	2001 to 2002	2002 to 2003	2003 to 2004	2004 to 2005	Average	
Postgraduate	9.3	7.7	2.1	-2.1	4.3	17.7
<i>Doctorate</i>	3.1	5.4	3.1	2.6	3.6	15.0
<i>Masters</i>	11.7	8.5	1.7	-3.7	4.6	18.7
Grad cert/dip	4.5	-4.3	-1.9	0.2	-0.4	-1.6
Bachelor	1.0	-0.3	-1.0	0.6	0.1	0.3
All domestic	2.8	0.7	-0.6	0.1	0.7	2.9
Overseas students	14.0	13.2	10.5	2.6	10.1	46.2
All	5.1	3.5	2.2	0.8	2.9	12.1

Source: Unpublished *Higher Education Student Data Collection* (DEST). Scope: Bachelor and higher levels.

**Table 36 Enrolments in higher education courses by qualification (field), Victoria, 2001–05**

Field of education of course	2005		Change 2001–05	
	Number	%	Average annual (%)	Total (%)
Natural & physical sciences	14,439	8.2	1.0	4.1
Information technology	8,966	5.1	-8.5	-30.6
Engineering	12,815	7.3	-2.3	-8.8
<i>Mechanical</i>	1,551	0.9	-2.2	-8.6
<i>Civil</i>	1,570	0.9	3.4	13.9
<i>Electrical</i>	3,728	2.1	-5.2	-19.5
<i>Other</i>	5,966	3.4	-1.5	-6.0
Architecture & building	4,147	2.4	4.6	19.5
Agriculture & environment	2,458	1.4	1.5	5.9
Health	23,214	13.2	3.0	12.6
<i>Medicine<sup>a</sup></i>	3,206	1.8	0.5	2.1
<i>Nursing (division 1)</i>	8,262	4.7	0.7	2.6
<i>Pharmacy</i>	932	0.5	9.4	41.0
<i>Dentistry</i>	341	0.2	5.2	22.2
<i>Optometry</i>	245	0.1	1.2	0.8
<i>VET science</i>	361	0.2	3.9	16.5
<i>Physiotherapy</i>	987	0.6	1.9	7.7
<i>Other</i>	8,880	5.1	6.1	26.7
Education	18,427	10.5	2.2	9.1
<i>Teacher education</i>	14,752	8.4	0.5	2.0
<i>Other</i>	3,675	2.1	11.1	51.8
Management & commerce	38,718	22.1	0.3	1.2
<i>Accounting</i>	4,465	2.5	2.5	10.4
<i>Other</i>	34,253	19.5	0.0	0.1
Society & culture	40,768	23.3	1.8	7.4
<i>Law</i>	7,522	4.3	7.0	30.7
<i>Economics<sup>b</sup></i>	601	0.3	29.4	-10.3
<i>Other</i>	32,645	18.6	0.9	3.5
Creative arts	11,256	6.4	3.5	14.7
Hospitality & mixed <sup>c</sup>	44	0.0	-10.2	-40.5
All domestic	175,253	100.0	0.7	2.9
Overseas students	67,089		10.1	46.2
All	242,341		2.9	12.1

Source: Unpublished *Higher Education Student Data Collection* (DEST). Scope: Bachelor and higher levels.

a Includes field of study codes from 60100 to 60199 or a course code the completion of which would allow provisional registration as a medical practitioner by an authority of a state, a territory or the Commonwealth.

b The annual data on enrolments in economics courses indicate a spike in numbers in 2003 to nearly three times the average for all other years. This is clearly seems to be an administrative data error.

c In the context of this report this field can be ignored as very few higher education courses are in this field.

### 4.1.2 Domestic student course enrolments by gender

Table 37 shows females outnumber males in higher education and this difference increased over the five years to 2005. The proportion of female students increased 2.7 per cent to 56.7 per cent. Most growth in student numbers can be attributed to increases in female enrolments.

In 2005, females outnumbered males at every course level.

On average, female numbers increased at every course level but male numbers actually declined 2.6 per cent per year at the graduate certificate and diploma level. A contributing factor for this is the growing number of females in courses such as the diploma in education.

**Table 37 Enrolments in higher education courses by domestic students by sex, Victoria, 2001–05**

Qualification level of course	Males				Females			
	2005		Change 2001–05		2005		Change 2001–05	
	Number	%	Average annual (%)	Total (%)	Number	%	Average annual (%)	Total (%)
Postgraduate	15,447	20.4	1.9	7.3	16,945	17.0	6.6	29.1
<i>Doctorate</i>	3,989	5.3	2.4	10.1	4,811	4.8	4.6	19.4
<i>Masters</i>	11,458	15.1	1.8	6.4	12,134	12.2	7.6	33.3
Grad cert/dip	6,548	8.6	-2.6	-10.2	11,269	11.3	1.1	4.1
Bachelor	53,821	71.0	0.0	0.0	71,224	71.6	0.1	0.6
All	75,816	100.0	0.1	0.4	99,437	100.0	1.2	4.9

Source: Unpublished *Higher Education Student Data Collection* (DEST). Scope: Bachelor and higher levels.

### 4.1.3 Domestic student course enrolments by age

Table 38 shows students in higher education tend to be relatively young.

- In 2005, 62.4 per cent were aged 15–24 years, with 26.4 per cent aged 25–39 years and just 11.2 per cent 40 years or older.
- More than three-quarters of all students enrolled in bachelor degrees were in the youngest age group. On the other hand, 56.9 per cent of students enrolled in postgraduate courses were aged 25–39 years. Most (75 per cent) people aged 40 years or older enrolled in courses at a higher level than the bachelor.
- Student numbers in the youngest age group increased the fastest from 2001 to 2005. In postgraduate courses, their numbers increased 8.2 per cent year.
- Although enrolments in bachelor degrees of people aged 24 years or older declined, they increased at a substantial rate in postgraduate courses.

**Table 38 Enrolments in higher education courses by domestic students by age, Victoria, 2001–05**

Qualification level of course	15–24 years				25–39 years				40 years or older			
	2005		Change 2001–05		2005		Change 2001–05		2005		Change 2001–05	
	Number	%	Average annual (%)	Total (%)	Number	%	Average annual (%)	Total (%)	Number	%	Average annual (%)	Total (%)
Postgraduate	4,364	4.0	8.2	35.2	18,430	39.8	4.2	17.6	9,597	49.1	2.8	11.4
<i>Doctorate</i>	1,263	1.2	2.7	10.9	4,379	9.4	3.9	16.5	3,158	16.2	3.5	14.7
<i>Masters</i>	3,101	2.8	11.2	48.4	14,052	30.3	4.4	17.9	6,439	33.0	2.4	9.8
Grad cert/dip	3,413	3.1	5.1	21.8	9,393	20.3	-2.4	-9.6	5,012	25.7	0.5	1.8
Bachelor	101,599	92.9	0.6	2.4	18,517	40.0	-1.9	-7.4	4,928	25.2	-2.4	-9.3
All	109,377	100.0	1.0	3.9	46,340	100.0	0.2	0.6	19,537	100.0	0.8	3.0

Source: Unpublished *Higher Education Student Data Collection* (DEST). Scope: Bachelor and higher levels.

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## 4.2 Commencements in higher education courses 2001–05

This section describes the trends in commencements in higher education courses in Victoria from 2001 to 2005. Changes in course commencements are more likely to reflect the impact of more recent policy changes than changes in enrolments.

### 4.2.1 All course commencements

Tables 39 to 41 show commencements peaked in Victoria at just over 89,600 in 2003.

- Just under a third of all commencing students were from overseas.
- In 2005, 60,400 domestic students commenced courses— about two-thirds at the bachelor level and one-third at higher levels.
- Commencements increased each year except 2004 when they declined 3.4 per cent. This coincides with Australian Government reforms to higher education, which increased student contributions for higher education courses. The effect of the substantial decline in 2004 was that average annual commencements declined 0.3 per cent per year from 2001 to 2005. The impact was higher on bachelor degree courses, with commencements declining 0.8 per cent per year.
- Commencements in postgraduate courses fluctuated from 2001 to 2005, reaching a peak of about 12,800 in 2003. Since then, numbers have declined mainly because of a significant drop in masters courses.
- The growth rate in commencements varied significantly across fields, ranging from negative 16.4 per cent per year in information technology to 5.7 per cent per year in architecture and building.
- In some fields, a positive correlation existed between commencement and enrolment numbers while in others the correlation was negative. For example, both commencements and enrolments declined in information technology but in physical and natural sciences enrolments increased even though commencements declined. Mechanical engineering commencements also increased even though enrolments declined.
- Commencements in many health courses including medicine, dentistry and veterinary science increased substantially. Most of these increases were caused by policy changes to address reported skill shortages and perhaps due to increasing numbers of full-fee paying students. On the other hand, policy changes such as not increasing higher education contribution charges for nursing and teacher training courses did not have the desired effect on commencements in nursing courses, which seemed to have stagnated.
- Although commencements in management and commerce generally declined over one per cent per year, in accounting they increased 4.5 per cent per year.
- The relatively lower annual increase in commencements than in enrolments in law is due to the transfer factor. Some students who initially fail to gain entry into a law course often do so after completing a year of another course. The data suggests the transfer factor could be significant.

**Table 39 Commencements in higher education courses by qualification (level), Victoria, 2001–05**

Qualification level of course	Number					%				
	2001	2002	2003	2004	2005	2001	2002	2003	2004	2005
Postgraduate	9,349	10,921	12,832	11,186	9,950	15.2	17.6	20.6	18.6	16.5
<i>Doctorate</i>	1,617	1,725	1,824	1,813	1,735	2.6	2.8	2.9	3.0	2.9
<i>Masters</i>	7,732	9,197	11,008	9,373	8,215	12.6	14.8	17.6	15.5	13.6
Grad cert/dip	11,172	11,458	10,850	10,884	11,021	18.2	18.5	17.4	18.1	18.2
Bachelor	40,805	39,615	38,702	38,208	39,473	66.5	63.9	62.0	63.4	65.3
All domestic	61,326	61,994	62,384	60,278	60,444	100.0	100.0	100.0	100.0	100.0
Overseas students	22,013	24,468	27,223	29,069	26,803					
All	83,339	86,462	89,607	89,348	87,247					

 Source: Unpublished *Higher Education Student Data Collection* (DEST). Scope: Bachelor and higher levels.

**Table 40 Annual changes in commencements of higher education courses by qualification (level), Victoria, 2001–05**

Qualification level of course	Year-on-year change (%)					Average	Total change 2001 to 2005 (%)
	2001 to 2002	2002 to 2003	2003 to 2004	2004 to 2005			
Postgraduate	16.8	17.5	-12.8	-11.1	2.6	6.4	
<i>Doctorate</i>	6.6	5.8	-0.6	-4.3	1.9	7.3	
<i>Masters</i>	18.9	19.7	-14.9	-12.4	2.9	6.2	
Grad cert/dip	2.6	-5.3	0.3	1.3	-0.3	-1.3	
Bachelor	-2.9	-2.3	-1.3	3.3	-0.8	-3.3	
All domestic	1.1	0.6	-3.4	0.3	-0.3	-1.4	
Overseas students	11.2	11.3	6.8	-7.8	5.3	21.8	
All	3.7	3.6	-0.3	-2.4	1.2	4.7	

 Source: Unpublished *Higher Education Student Data Collection* (DEST). Scope: Bachelor and higher levels.

**Table 41 Commencements in higher education courses by qualification (field), Victoria, 2001–05**

Qualification level of course	2005		Change 2001–05	
	Number	%	Average annual (%)	Total (%)
Natural & physical sciences	4,532	7.5	-0.6	-2.7
Information technology	2,496	4.1	-16.4	-51.4
Engineering	3,519	5.8	-4.3	-16.1
<i>Mechanical</i>	457	0.8	5.4	21.5
<i>Civil</i>	515	0.9	10.2	45.1
<i>Electrical</i>	911	1.5	-10.0	-35.6
<i>Other</i>	1,636	2.7	-5.4	-20.2
Architecture & building	1,434	2.4	5.7	23.3
Agriculture & environment	820	1.4	2.8	9.8
Health	8,871	14.7	3.2	13.1
<i>Medicine<sup>a</sup></i>	872	1.4	9.2	40.2
<i>Nursing (division 1)</i>	3,638	6.0	0.0	-0.7
<i>Pharmacy</i>	254	0.4	4.4	14.4
<i>Dentistry</i>	101	0.2	8.4	34.7
<i>Optometry</i>	114	0.2	10.1	25.3
<i>VET science</i>	88	0.1	3.3	11.4
<i>Physiotherapy</i>	313	0.5	2.4	6.1
<i>Other</i>	3,491	5.8	5.8	24.9
Education	8,390	13.9	3.3	13.5
<i>Teacher education</i>	6,934	11.5	2.3	8.7
<i>Other</i>	1,456	2.4	10.3	43.7
Management & commerce	12,459	20.6	-1.1	-5.2
<i>Accounting</i>	1,470	2.4	4.5	18.4
<i>Other</i>	10,989	18.2	-1.8	-7.7
Society & culture	13,555	22.4	0.5	1.8
<i>Law</i>	2,016	3.3	1.7	6.3
<i>Economics<sup>b</sup></i>	201	0.3	20.9	-15.2
<i>Other</i>	11,338	18.8	0.4	1.3
Creative arts	4,348	7.2	4.2	17.8
Hospitality & mixed <sup>c</sup>	20	0.0	450.7	-44.4
All domestic	60,444	100.0	-0.3	-1.4
Overseas students	26,803		5.3	21.8
All	87,247		1.2	4.7

Source: Unpublished *Higher Education Student Data Collection* (DEST). Scope: Bachelor and higher levels.

a Includes field of study codes from 60100 to 60199 or a course code the completion of which would allow provisional registration as a medical practitioner by an authority of a state, a territory or the Commonwealth.

b The annual data on enrolments in economics courses indicate a spike in numbers in 2003 to nearly three times the average for all other years. This is clearly seems to be an administrative data error.

c In the context of this report this field can be ignored as very few higher education courses are in this field.

#### 4.2.2 Domestic student course commencements by gender

Table 42 shows that females comprised 58.6 per cent of all course commencements in Victoria in 2005 and the trend suggests the gap between the sexes will continue increasing.

- Male commencements declined one per cent per year from 2001 to 2005 while female commencements increased at a marginal rate.
- The biggest annual rate of decline in male commencements was in graduate certificate and diploma courses but postgraduate commencements actually increased 1.2 per cent per year.
- While female commencements increased at a fair rate in postgraduate, graduate certificate and diploma courses, they declined one per cent per year in bachelor courses.

**Table 42 Commencements in higher education courses by domestic students by sex, Victoria, 2001–05**

Qualification level of course	Males				Females			
	2005		Change 2001–05		2005		Change 2001–05	
	Number	%	Average annual (%)	Total (%)	Number	%	Average annual (%)	Total (%)
Postgraduate	4,591	18.3	1.2	-2.4	5,359	15.1	4.1	15.4
<i>Doctorate</i>	779	3.1	1.5	5.4	955	2.7	2.3	8.8
<i>Masters</i>	3,812	15.2	1.4	-3.9	4,403	12.4	4.6	16.9
Grad cert/dip	3,883	15.5	-3.0	-11.9	7,138	20.2	1.4	5.6
Bachelor	16,555	66.1	-0.6	-2.3	22,917	64.7	-1.0	-3.9
All	25,029	100.0	-1.0	-4.0	35,414	100.0	0.1	0.4

Source: Unpublished *Higher Education Student Data Collection* (DEST). Scope: Bachelor and higher levels.

#### 4.2.3 Domestic student course commencements by age

Table 43 shows course commencements in three age groups.

- In 2005, people aged 15–24 years made up 63.5 per cent of all commencement.
- 25.7 per cent of people commencing courses were aged 25–39 years and just 10.8 per cent were aged 40 years or older.
- People aged 25–39 years made up more than half of postgraduate course commencements.
- Commencements in all age groups, except the youngest, declined from 2001 to 2005.
- While commencements of bachelor degrees declined among all age groups, postgraduate degree commencements increased. In particular, commencements increased 7.6 per cent per year among those aged 15–24 years. Commencements of graduate certificates and diplomas increased only in this group.

**Table 43 Commencements of higher education courses by domestic students by age, Victoria, 2001–05**

Qualification level of course	15–24 years				25–39 years				40 years or older			
	2005		Change 2001–05		2005		Change 2001–05		2005		Change 2001–05	
	Number	%	Average annual (%)	Total (%)	Number	%	Average annual (%)	Total (%)	Number	%	Average annual (%)	Total (%)
Postgraduate	2,140	5.6	7.6	29.2	5,326	34.3	1.6	1.7	2,483	37.9	1.5	1.2
<i>Doctorate</i>	497	1.3	1.6	4.2	752	4.8	3.9	15.5	486	7.4	-0.1	-0.7
<i>Masters</i>	1,643	4.3	10.4	39.4	4,574	29.4	1.4	-0.3	1,998	30.5	2.0	1.7
Grad cert/dip	2,818	7.3	6.3	26.7	5,427	34.9	-3.0	-11.8	2,776	42.4	-0.2	-0.7
Bachelor	33,396	87.1	-0.3	-1.3	4,785	30.8	-3.2	-12.2	1,291	19.7	-4.0	-15.5
All	38,354	100.0	0.4	1.7	15,539	100.0	-1.9	-7.7	6,550	100.0	-0.7	-3.4

Source: Unpublished *Higher Education Student Data Collection* (DEST). Scope: Bachelor and higher levels.

#### 4.2.4 Highest previous qualification of commencing domestic students

Many students already have a previous qualification when they commence a higher education course. The level of the previous qualification is mostly lower than the course they are commencing, but sometimes it is at the same or higher level. In the latter case, if a student completes the course the qualification obtained does not affect the stock or the profile of Victoria's qualified workforce as measured by highest level of qualification. Therefore, in terms of meeting requirements under Scenario II (skills deepening) these completions should be discounted.

Table 44 shows the previous highest qualification of students who commenced courses in Victoria from 2001 to 2005. Unfortunately, the information on the previous qualification is highly aggregated.

All qualifications higher than the bachelor level are included in a single category labelled 'postgraduate'. This means it is impossible to know, for instance, the number of commencing masters degree students whose previous highest qualification was also a masters degree.

The only useful information available relates to students commencing bachelor degrees. On average, 9.1 per cent of students who commenced a bachelor degree from 2001 to 2005 already had a qualification at the bachelor or higher level.

**Table 44 Previous highest qualification by qualification (level) of course enrolled in, domestic commencing students, Victoria, 2001–05 (average %)**

Qualification level of course	Previous highest qualification level			Total (%)	Total
	Postgraduate <sup>a</sup>	Bachelor	Other		
Postgraduate	31.1	52.9	15.9	100.0	10,848
<i>Doctorate</i>	39.3	49.6	11.1	100.0	1,743
<i>Masters</i>	29.6	53.6	16.9	100.0	9,105
Grad cert/dip	18.6	54.4	27.0	100.0	11,077
Bachelor	1.3	7.8	90.9	100.0	39,361
All	9.7	24.2	66.1	100.0	61,285

Source: Unpublished *Higher Education Student Data Collection* (DEST). Scope: Bachelor and higher levels.

a Includes graduate certificate/diploma.

### 4.3 Completions of higher education courses, 2001–05

Not all who commence a higher education course complete it, although some return to education later in life and do complete some course. As discussed earlier, people who complete a qualification at the same or lower level as their previous highest qualification do not change the stock or profile of the qualified population available for work.

#### 4.3.1 All course completions

Tables 45 to 47 show course completions in Victoria from 2001 to 2005.

- Total completions increased to nearly 62,000 in 2005.
- 68.3 per cent of these completions or 42,300 were by domestic students.
- Almost two-thirds of all completions by domestic students were bachelor degrees.
- Total completions by domestic students increased every year except 2005 and increased an average 1.3 per year.
- Postgraduate degree completions increased at a much faster rate.
- Completions of graduate certificates and diplomas declined significantly in 2003 and bachelor degrees declined significantly in 2005.
- In 2005, completions of courses in society and culture were the highest for any field. Completions in management and commerce were the next highest.
- Completions of courses in the sciences, information technology and engineering declined significantly from 2001 to 2005.
- The numbers completing management and commerce courses also declined but only marginally.
- Completions increased in all other fields. The highest annual increase of 6.1 per cent was in creative arts courses.
- While completion of electrical engineering courses increased 3.1 per cent year, enrolments and commencements declined significantly. In contrast, completions declined but enrolments and commencements increased in civil engineering.
- Completions increased substantially in health fields, except in optometry (for which data needs more scrutiny) and nursing.

**Table 45 Completions of higher education courses by qualification (level), Victoria, 2001–05**

Qualification level of course	Number					%				
	2001	2002	2003	2004	2005	2001	2002	2003	2004	2005
Postgraduate	5,185	5,560	6,105	6,935	6,934	12.9	13.8	14.8	16.2	16.4
<i>Doctorate</i>	973	1,076	1,164	1,191	1,256	2.4	2.7	2.8	2.8	3.0
<i>Masters</i>	4,213	4,484	4,941	5,743	5,678	10.5	11.1	12.0	13.4	13.4
Grad cert/dip	7,963	7,880	7,217	7,582	7,946	19.8	19.5	17.5	17.7	18.8
Bachelor	27,047	26,911	27,915	28,313	27,459	67.3	66.7	67.7	66.1	64.9
All domestic	40,195	40,351	41,237	42,830	42,339	100.0	100.0	100.0	100.0	100.0
Overseas students	12,091	13,959	14,748	17,228	19,642					
All	52,285	54,310	55,985	60,057	61,981					

Source: Unpublished *Higher Education Student Data Collection* (DEST). Scope: Bachelor and higher levels.**Table 46 Annual changes in completions of higher education courses by qualification (level), Victoria, 2001–05**

Qualification level of course	Year-on-year change (%)					Total change 2001 to 2005 (%)
	2001 to 2002	2002 to 2003	2003 to 2004	2004 to 2005	Average	
Postgraduate	7.2	9.8	13.6	0.0	7.7	33.7
<i>Doctorate</i>	10.6	8.2	2.3	5.4	6.6	29.1
<i>Masters</i>	6.4	10.2	16.2	-1.1	7.9	34.8
Grad cert/dip	-1.0	-8.4	5.1	4.8	0.1	-0.2
Bachelor	-0.5	3.7	1.4	-3.0	0.4	1.5
All domestic	0.4	2.2	3.9	-1.1	1.3	5.3
Overseas students	15.5	5.7	16.8	14.0	13.0	62.5
All	3.9	3.1	7.3	3.2	4.4	18.5

Source: Unpublished *Higher Education Student Data Collection* (DEST). Scope: Bachelor and higher levels.

**Table 47 Completions of higher education courses by qualification (field), Victoria, 2001–05**

Field of study	2005		Change 2001–05	
	Number	%	Average annual (%)	Total (%)
Natural & physical sciences	3,417	8.1	-1.2	-5.0
Information technology	2,431	5.7	-2.7	-11.7
Engineering	2,181	5.2	-2.2	-9.5
<i>Mechanical</i>	211	0.5	-9.6	-33.4
<i>Civil</i>	225	0.5	-1.0	-6.2
<i>Electrical</i>	753	1.8	3.1	11.7
<i>Other</i>	991	2.3	-3.8	-15.9
Architecture & building	875	2.1	5.1	20.9
Agriculture & environment	541	1.3	0.2	-0.4
Health	6,104	14.4	3.6	15.1
<i>Medicine<sup>a</sup></i>	843	2.0	5.9	23.8
<i>Nursing (division 1)</i>	2,474	5.8	1.6	6.0
<i>Pharmacy</i>	218	0.5	14.7	62.7
<i>Dentistry</i>	65	0.2	5.2	16.1
<i>Optometry</i>	20	0.0	-17.2	-78.3
<i>VET science</i>	80	0.2	5.3	17.7
<i>Physiotherapy</i>	261	0.6	4.7	18.1
<i>Other</i>	2,143	5.1	5.9	24.7
Education	5,704	13.5	2.5	10.3
<i>Teacher education</i>	4,878	11.5	1.7	6.7
<i>Other</i>	826	2.0	10.6	37.2
Management & commerce	8,884	21.0	-0.1	-0.5
<i>Accounting</i>	912	2.2	3.9	15.8
<i>Other</i>	7,971	18.8	-0.5	-2.1
Society & culture	9,311	22.0	2.4	9.7
<i>Law</i>	1,508	3.6	5.8	22.9
<i>Economics<sup>b</sup></i>	198	0.5	7.8	-15.4
<i>Other</i>	7,605	18.0	2.0	8.2
Creative arts	2,877	6.8	6.1	26.7
Hospitality & mixed <sup>c</sup>	13	0.0	93.7	225.0
All domestic	42,339	100.0	1.3	5.3
Overseas students	19,642		13.0	62.5
All	61,981		4.4	18.5

Source: Unpublished *Higher Education Student Data Collection* (DEST). Scope: Bachelor and higher levels.

a Includes field of study codes from 60100 to 60199 or a course code the completion of which would allow provisional registration as a medical practitioner by an authority of a state, a territory or the Commonwealth.

b The annual data on enrolments in economics courses indicate a spike in numbers in 2003 to nearly three times the average for all other years. This is clearly seems to be an administrative data error.

c In the context of this report this field can be ignored as very few higher education courses are in this field.

#### 4.3.2 Domestic student course completions by gender

Table 48 shows more females than males completed higher education courses from 2001 to 2005, in line with greater female enrolments.

- Females comprised 59.2 per cent of completions in 2005. The proportion of females completing graduate certificates and diplomas was even higher.
- The annual increase in completions was much higher for females than males—2.1 per cent per year compared to just 0.3 per cent for males. While female course completions increased at every level, male course completions only increased at the postgraduate level.

**Table 48 Completions of higher education courses by domestic students by sex, Victoria, 2001–05**

Qualification level of course	Males				Females			
	2005		Change 2001–05		2005		Change 2001–05	
	Number	%	Average annual (%)	Total (%)	Number	%	Average annual (%)	Total (%)
Postgraduate	3,427	19.8	6.1	25.7	3,507	14.0	9.4	42.6
<i>Doctorate</i>	606	3.5	5.5	23.7	649	2.6	7.8	34.6
<i>Masters</i>	2,820	16.3	6.3	26.2	2,858	11.4	9.8	44.5
Grad cert/dip	2,863	16.6	-2.6	-11.6	5,082	20.3	2.0	7.6
Bachelor	10,992	63.6	-0.3	-1.3	16,468	65.7	0.9	3.5
All	17,282	100.0	0.3	1.1	25,057	100.0	2.1	8.5

Source: Unpublished *Higher Education Student Data Collection* (DEST). Scope: Bachelor and higher levels.

### 4.3.3 Domestic student course completions by age

Table 49 shows that in 2005, people aged 15–24 years comprised 57.7 per cent of all course completions. Those aged 25–39 years comprised 29.7 per cent and those aged 40 years or older comprised 12.5 per cent.

- While 80 per cent of bachelor degree completions were by those aged 15–24 years, more than half the people completing postgraduate and graduate certificates and diplomas were aged 25–39 years.
- Completions increased in all age groups from 2001 to 2005 but the highest rate of increase was among the youngest group.
- Completions of bachelor degrees and graduate certificates and diplomas increased only in the 15–24 years age group. In the other age groups, completions of courses at these levels generally declined substantially.
- The overall increase in completions was largely the result of significant increases in completions of postgraduate courses across all age groups.

**Table 49 Completions of higher education courses by domestic students by age, Victoria, 2001–05**

Qualification level of course	15–24 years				25–39 years				40 years or older			
	2005		Change 2001–05		2005		Change 2001–05		2005		Change 2001–05	
	Number	%	Average annual (%)	Total (%)	Number	%	Average annual (%)	Total (%)	Number	%	Average annual (%)	Total (%)
Postgraduate	716	2.9	14.7	64.1	4,127	32.8	8.0	35.8	2,091	39.2	5.3	22.3
<i>Doctorate</i>	14	0.1	19.1	-26.3	769	6.1	6.4	26.9	472	8.9	8.2	35.9
<i>Masters</i>	702	2.9	15.7	68.2	3,357	26.7	8.5	38.0	1,619	30.4	4.7	18.8
Grad cert/dip	1,896	7.8	6.4	27.3	3,993	31.8	-2.3	-9.6	2,056	38.6	0.1	0.0
Bachelor	21,831	89.3	1.0	3.9	4,445	35.4	-1.6	-6.3	1,184	22.2	-2.0	-8.0
All	24,443	100.0	1.6	6.5	12,564	100.0	0.8	3.0	5,331	100.0	1.4	5.5

Source: Unpublished *Higher Education Student Data Collection* (DEST). Scope: Bachelor and higher levels.

### 4.3.4 Time to course completion

Table 50 shows the time students took to complete courses from 2001 to 2005.

The distribution of completion times are more skewed for doctoral courses than for bachelor degrees. Although the average time to complete a doctorate was six years, 32 per cent took seven or more years to complete.

In contrast, only 21 per cent of students who completed bachelor degrees took above average time to complete. About 77 per cent of students completing graduate certificates and diplomas took either one or two years to complete.

**Table 50 Time taken to complete a course by qualification (level), Victoria, 2001–05 (%)**

Time to completion	Qualification (level) of course completed			
	Doctorate	Masters	Graduate cert/dip	Bachelor
1 year	1	12	45	5
2 years	2	33	32	8
3 years	5	26	14	28
4 years	16	14	5	28
5 years	26	7	2	16
6 years	18	3	1	8
7–10 years	28	4	1	6
More than 10 years	4	1	0	1
All	100	100	100	100
Average time	6.0 years	3.1 years	2.0 years	4.0 years
Median time	6.0 years	3.0 years	2.0 years	4.0 years
Modal time	5.0 years	2.0 years	1.0 years	3.0 years

Source: Unpublished *Higher Education Student Data Collection* (DEST). Scope: Bachelor and higher levels.

## 4.4 Destination of higher education graduates

This section analyses the destinations of graduates who completed courses in 2005.

Not all people who complete higher education courses are immediately employed, let alone in the occupation most closely aligned to their qualification level and field of their course.

While some eventually end up working in an occupation for which they initially qualified, others never do. This does not mean their knowledge and skills are wasted because the skills they have gained are often general in nature and transferable between occupations.

Information on the labour market destination of students is collected in an annual *Graduate Destination Survey* (GDS). The survey, undertaken by Graduate Careers Australia, is conducted around four months after students complete their qualifications.

Although the survey is provided to all students who complete a course, less than 60 per cent actually complete and return it. Notwithstanding this limitation, the survey provides some useful information on the occupational destination of graduates from different higher education courses.

### 4.4.1 Labour force status and further study

Table 51 shows labour force status in 2006 of people who graduated from Victorian universities in 2005.

- Clearly, among all groups those undertaking further study were much less likely to be working as well. Only 25.8 per cent of international graduates undertaking further study were working compared to 69.1 per cent of those not studying. The corresponding percentages among Australian graduates (including citizens and permanent residents) were much higher at 60.9 and 88.7 per cent, respectively.
- Among those not undertaking further study in 2006, the percentage working was 88.7 per cent for Australian graduates and 69.1 per cent for international graduates.
- People who had completed higher level qualifications were generally more likely to be working than not working irrespective of whether they were undertaking further study or not, but the differences were larger among those undertaking further study.
- Overall, 18.1 per cent of all domestic graduates were not working in 2006 compared to nearly half (47.6 per cent) of international graduates.

**Table 51 Labour force status of graduates from Victorian universities by qualification completed, 2006 (%)**

Qualification/labour force status	Australian graduates			International graduates		
	Studying	Not studying	All	Studying	Not studying	All
Postgraduate	920	6020	6940	2010	5480	7490
% Working	74.4	88.8	86.9	33.0	69.5	59.7
% Not working	25.6	11.2	13.1	67.0	30.5	40.3
Graduate cert/dip	1840	6110	7950	790	520	1310
% Working	73.5	91.5	87.3	23.3	68.1	41.2
% Not working	26.5	8.5	12.7	76.7	31.9	58.8
Bachelor	7670	19790	27460	4770	6040	10810
% Working	56.3	87.8	79.0	23.2	68.8	48.7
% Not working	43.7	12.2	21.0	76.8	31.2	51.3
All	10430	31920	42350	7570	12040	19610
% Working	60.9	88.7	81.9	25.8	69.1	52.4
% Not working	39.1	11.3	18.1	74.2	30.9	47.6

Source: Unpublished data from *Graduate Destinations Survey 2006* (GCA) and *Higher Education Student Data Collection* (DEST).

Note: A person is classified to be working if they indicated 1) working more than zero hours per week; 2) described an occupation they were working in; or 3) provided the postcode of their employer. The table includes students who completed a bachelor degree or higher qualification. Excludes records for which there were missing values for international student indicator.

Table 52 shows the labour force status of graduates from Victorian universities by field of study. Table A1 in Appendix 6 shows the status of those undertaking further study and Table A2 shows the status of those not undertaking further study.

- People who completed courses in the fields of sciences, agriculture, environment, society, culture and arts were less likely to be working than not working compared to people who completed courses in other fields.
- However, a higher proportion of people who completed courses in these fields were also undertaking further study the following year. Initial courses in fields such as engineering, education and health have a vocational orientation and their completion can thus lead directly to employment. Science, society and culture and arts courses generally have a broader educational orientation and people who complete them increasingly tend to undertake additional vocationally oriented postgraduate courses to become work ready. For example, all teachers who have not completed a bachelor degree in education need to complete a graduate diploma before they can register to teach in schools.

**Table 52 Labour force status of graduates from Victorian universities by broad field of study and qualification completed, 2006**

Field of study	Australian graduates				International graduates			
	Postgrad	Graduate cert/dip	Bachelor	All	Postgrad	Graduate cert/dip	Bachelor	All
Sciences, agri. & environ.	520	160	3,280	3,960	140	50	550	740
% Working	90.2	82.0	61.7	66.3	61.4	19.7	27.9	33.6
% Not working	9.8	18.0	38.3	33.7	38.6	80.3	72.1	66.4
Information technology	530	190	1,710	2,430	1,840	160	1,890	3,890
% Working	79.7	86.4	77.8	78.9	57.9	38.5	48.6	52.6
% Not working	20.3	13.6	22.2	21.1	42.1	61.5	51.4	47.4
Eng., arch. & building	460	240	2,350	3,050	1,070	110	1,070	2,250
% Working	83.4	80.3	81.9	82.0	51.3	33.4	49.9	49.7
% Not working	16.6	19.7	18.1	18.0	48.7	66.6	50.1	50.3
Health	680	1,620	3,800	6,100	170	140	730	1,040
% Working	87.1	93.3	91.3	91.4	65.0	33.0	73.6	66.6
% Not working	12.9	6.7	8.7	8.6	35.0	67.0	26.4	33.4
Education	760	2,700	2,250	5,710	350	320	70	740
% Working	93.6	90.3	91.1	91.1	80.2	54.3	50.0	66.0
% Not working	6.4	9.7	8.9	8.9	19.8	45.7	50.0	34.0
Management & commerce	2,280	1,300	5,310	8,890	3,270	390	5,120	8,780
% Working	87.7	86.8	84.0	85.4	60.9	40.2	47.8	52.4
% Not working	12.3	13.2	16.0	14.6	39.1	59.8	52.2	47.6
Society & culture	1,420	1,300	6,590	9,310	510	90	600	1,200
% Working	85.9	79.5	73.6	76.3	62.0	33.9	43.1	50.5
% Not working	14.1	20.5	26.4	23.7	38.0	66.1	56.9	49.5
Arts <sup>a</sup>	290	440	2,170	2,900	160	60	780	1,000
% Working	80.4	77.7	73.0	74.4	52.3	45.8	48.3	48.8
% Not working	19.6	22.3	27.0	25.6	47.7	54.2	51.7	51.2
All	6,940	7,950	27,460	42,350	7,510	1,320	10,810	19,640
% Working	86.9	87.3	79.0	81.9	59.7	41.2	48.7	52.4
% Not working	13.1	12.7	21.0	18.1	40.3	58.8	51.3	47.6

Source: Unpublished data from *Graduate Destinations Survey 2006* (GCA) and *Higher Education Student Data Collection* (DEST).

Note: A person is classified to be working if they indicated 1) working more than zero hours per week; 2) described an occupation they were working in; or 3) provided the postcode of their employer. The table includes students who completed a bachelor degree or higher qualification. Excludes records for which there were missing values for international student indicator.

a Includes a very small number of students who completed courses in hospitality and mixed fields.

The labour market for higher education graduates has a more of a national and global scope than for VET graduates. A number of graduates from Victorian universities obtain jobs interstate or overseas. This is true for both domestic and international students, although international graduates are more likely to work overseas (most likely in their country of origin) than domestic students. On the other hand, some interstate graduates do obtain jobs in the Victorian labour market. Therefore, in terms of sources of graduate labour for Victoria it is important to consider graduates from Victorian as well as interstate universities.

Table 53 shows the potential supply of graduates for Victoria from the higher education sector in Australia in 2006. It shows the labour force status of graduates from Victorian and interstate universities separately. Separate analyses are presented for Australian and international graduates. The table pertains to all graduates irrespective of whether they were undertaking further study or not. Tables A3 and A4 in Appendix 6 contain analyses for those undertaking further study and those who were not.

- Of the 42,300 Australian graduates from Victorian universities in 2005, 63.6 per cent were working in Victoria in 2006, 15.9 per cent were working interstate and 2.3 per cent were working overseas.
- More graduates from Victorian universities were working interstate than vice versa (6,700 compared to 2,900). In part, this net outflow from Victoria is (as noted in section 4.1 above) the result of higher numbers of interstate students enrolling in Victorian universities than vice versa. After graduation, many interstate students return to their home state for employment. The net

outflow from Victoria at the postgraduate, graduate certificate or diploma and bachelor level was 600, 1,000 and 2,800 respectively.

- In 2006, 4,600, or 23.3 per cent of international graduates from Victorian universities (just under half with postgraduate degrees) were working in Victoria. The state's workforce was also boosted by an additional 450 international graduates from interstate universities.
- The likelihood of working overseas is higher for postgraduates than for other graduates. This is because the labour market for postgraduates is more global than for bachelor graduates.
- The potential total supply of graduates from universities for the Victorian labour market in 2006 was estimated to be 42,500 and included:
  - o Australian and international graduates from Victorian universities working in Victoria
  - o Australian and international graduates from interstate universities working in Victoria
  - o Australian graduates from Victorian and interstate universities who are resident in Victoria but are currently not working.
- The total included people whose previous highest qualification was at the same or higher level than the qualification they just completed. If a person in this group was employed when the qualification was completed, the completed qualification will not affect the qualifications profile of the workforce and they should be excluded from potential supply. In contrast, if a person was not employed, their previous qualification should be included when calculating potential supply. International students not working are excluded from potential supply. After adjustments for these factors, the net potential supply of graduates for Victoria in 2006 was estimated to be 36,700.
- It is however, uncertain as to how many international students who are undertaking further study and working will remain in the state after finishing their studies. If these students are excluded, the net potential supply for Victoria in 2006 reduces to 35,500 graduates.

**Table 53 Estimated potential supply of graduates for the Victorian labour force from Australian universities, 2006**

	Postgraduate		Grad cert/dip		Bachelor		All	
	Number	%	Number	%	Number	%	Number	%
<b>Labour force status</b>								
<b>Graduates from Victorian universities</b>								
Australian students	6,930	100.0	7,950	100.0	27,460	100.0	42,340	100.0
Working in Victoria	4,480	64.6	5,120	64.5	17,350	63.2	26,950	63.6
Working interstate	1,210	17.5	1,670	21.0	3,830	14.0	6,710	15.9
Working overseas	330	4.8	150	1.8	510	1.9	990	2.3
Not working (resident in Victoria)	830	12.0	920	11.6	5,400	19.6	7,150	16.9
Not working (resident interstate)	80	1.1	90	1.1	370	1.3	540	1.3
International students	7,490	100.0	1,310	100.0	10,810	100.0	19,620	100.0
Working in Victoria	2,190	29.3	270	20.3	2,110	19.5	4,570	23.3
Working interstate	460	6.1	70	5.0	620	5.8	1,150	5.9
Working overseas	1,820	24.3	210	15.8	2,530	23.4	4,560	23.2
Not working	3,020	40.3	770	58.8	5,550	51.3	9,340	47.6
<b>Graduates from interstate universities</b>								
Australian students	20,000	100.0	17,030	100.0	80,260	100.0	117,290	100.0
Working in Victoria	830	4.1	650	3.8	1,450	1.8	2,930	2.5
Working interstate	15,820	79.1	13,980	82.1	61,230	76.3	91,030	77.6
Working overseas	1,000	5.0	350	2.1	1,330	1.7	2,680	2.3
Not working (resident in Victoria)	90	0.5	80	0.5	310	0.4	480	0.4
Not working (resident interstate)	2,260	11.3	1,970	11.6	15,940	19.9	20,170	17.2
International students	22,320	100.0	3,830	100.0	22,800	100.0	48,960	100.0
Working in Victoria	260	1.2	30	0.7	160	0.7	450	0.9
Working interstate	6,010	26.9	790	20.6	5,870	25.7	12,670	25.9
Working overseas	7,380	33.0	710	18.4	5,850	25.7	13,940	28.5
Not working	8,670	38.9	2,310	60.4	10,920	47.9	21,900	44.7
<b>Potential supply for the Victorian labour force</b>								
Total <sup>a</sup>	8,680		7,070		26,770		42,520	
Net <sup>b</sup> (including international students undertaking further study and working)	8,810		5,960		22,690		37,450	
Net <sup>b</sup> (excluding international students undertaking further study and working)	8,380		5,840		22,020		36,230	

Source: Unpublished data from *Graduate Destinations Survey 2006* (GCA) and *Higher Education Student Data Collection* (DEST).

Note: A person is classified to be working if they indicated 1) working more than zero hours per week; 2) described an occupation they were working in; or 3) provided the postcode of their employer. The table includes students who completed a bachelor degree or higher qualification. Excludes records for which there were missing values for international student indicator. The numbers in this table have been rounded to the nearest ten. The row and column sums may not add to the margin totals because of rounding errors.

a Comprises Australian and international graduates from Victorian universities working in Victoria; Australian and international graduates from interstate universities working in Victoria; and Australian graduates from Victorian and interstate universities who are resident in Victoria but are currently not working

b Excludes people whose previous qualification is at the same or higher level than the qualification that they just completed.

#### 4.4.2 Occupational destinations

Although many qualifications are occupation-specific, others can lead to jobs in a multitude of occupations. The range of occupations people work in while undertaking further study can also be quite different to occupations they work in when they are not studying. Young people studying often have jobs in low-skill occupations.

This section examines the range of occupations that recent graduates work in while undertaking further study as well as when not undertaking further study. The analyses are on graduates from all Australian universities working in Victoria, including international students.

Tables 54–56 show the occupational destinations of graduates from all Australian universities who were working in Victoria. For more occupational detail, see Tables A5–A7 in Appendix 6. It also includes domestic graduates not working but who were resident in Victoria at the time of the survey.

- A clear difference is evident in the occupational destinations according to whether a person was undertaking further study or not and the level of the qualification completed.
- The chances of a person working are much higher if they are not undertaking further study. While 61.3 per cent of those undertaking further study were employed, the percentage employed amongst those who were not undertaking further study was 88 per cent.
- The chances of working in a managerial or professional occupation are much higher if a person is not undertaking further study. In 2006, only 27.8 per cent of graduates among those undertaking further study were employed in these occupations compared to 57.4 per cent among those not undertaking further study.
- Relatively higher percentages of people with high-level qualifications (above bachelor) were employed in managerial or professional occupations compared to people with bachelor degrees. This is perhaps due to selection bias, in the sense that individuals completing postgraduate courses often search for jobs closely related to their qualification. This is less likely to be the case for those who have just completed bachelor degrees. Note that a higher percentage of those who completed graduate certificates or diplomas (60.5 per cent) were employed in professional occupations than those who completed postgraduate degrees (46.6 per cent). A reason for this is that many graduate diplomas are vocationally focussed for particular professional occupations (e.g. graduate diploma in teaching is a registration requirement to teach in schools). However relatively higher proportion of postgraduates (14.1 per cent) were employed in managerial occupations compared people who completed graduate certificates or diplomas (7.5 per cent).
- A third of all graduates were employed in just three professional occupation groups—business and information, education and health. Only 1.9 per cent of graduates were employed in science occupations and 2.7 per cent in engineering and building.
- A significant proportion of higher education graduates found employment in associate professional occupations—mostly in finance, business, administration and managers and supervisory occupations. In 2006, nine per cent of all graduates found employment in these occupations, and a substantial number had qualifications at the postgraduate or graduate certificate or diploma level.
- Clerical, sales and service occupations provide employment for a significant number of higher education graduates. In 2006, 18.7 per cent of all graduates (22.5 per cent of those who were undertaking further study) were employed in these occupations. An interesting question for further research is: Are jobs in these occupations entry into the labour market for some graduates or are these more permanent occupational destinations for them? If these jobs are a stepping stone to jobs in professional occupations, how long is it before they make the transition and what are the necessary conditions for making the transition?

**Table 54 Occupational destinations of graduates from Australian universities in 2005 undertaking further study and working in Victoria in 2006 by qualification level**

Occupation	Postgraduate		Grad cert/dip		Bachelor		All	
	Number	%	Number	%	Number	%	Number	%
Managers	110	8.6	160	9.2	80	1.1	350	3.3
Professionals	520	40.0	650	38.4	1,400	18.6	2,570	24.5
<i>Natural &amp; physical science</i>	20	1.3	20	0.9	60	0.9	100	0.9
<i>Building &amp; engineering</i>	20	1.2	30	1.5	60	0.7	100	0.9
<i>Business &amp; information</i>	190	14.4	150	8.6	390	5.2	720	6.9
<i>Health</i>	70	5.1	150	8.8	240	3.2	460	4.4
<i>Educational</i>	170	13.3	210	12.6	420	5.6	810	7.7
<i>Social arts &amp; related</i>	60	4.7	100	6.0	230	3.0	390	3.7
Associate professionals	120	9.1	140	8.1	460	6.2	720	6.8
<i>Building &amp; engineering</i>	0	0.0	10	0.5	10	0.1	20	0.2
<i>Medical &amp; science technical</i>	10	0.8	10	0.3	40	0.5	50	0.5
<i>Finance, business and admin</i>	50	4.2	60	3.8	140	1.9	260	2.5
<i>Managers and supervisors</i>	40	3.3	30	1.5	190	2.5	260	2.5
<i>Others</i>	10	0.7	40	2.1	90	1.2	130	1.3
Trades	10	1.0	10	0.7	60	0.8	90	0.8
Clerical, sales & service	200	15.1	190	11.5	1980	26.3	2,370	22.5
Production, transport & labourers	80	6.0	50	3.0	220	2.9	350	3.3
Total working	1,030	79.8	1,200	70.8	4,210	55.9	6,440	61.3
Not working (resident in Victoria) <sup>a</sup>	260	20.2	500	29.2	3,320	44.1	4,070	38.7
All	1,290	100.0	1,700	100.0	7,520	100.0	10,510	100.0

Source: Unpublished data from *Graduate Destinations Survey 2006* (GCA) and *Higher Education Student Data Collection* (DEST).

Note: A person is classified to be working if they indicated 1) working more than zero hours per week; 2) described an occupation they were working in; or 3) provided the postcode of their employer. The table includes students who completed a bachelor degree or higher qualification. Excludes records for which there were missing values for international student indicator. The numbers in this table have been rounded to the nearest ten. The row and column sums may not add to the margin totals because of rounding errors.

a Excludes international students.

**Table 55 Occupational destinations of graduates from Australian universities in 2005 not undertaking further study and working in Victoria in 2006 by qualification level**

Occupation	Postgraduate		Grad cert/dip		Bachelor		All	
	Number	%	Number	%	Number	%	Number	%
Managers	1,120	15.1	380	7.0	610	3.2	2,100	6.6
Professionals	3,530	47.8	3,620	67.4	9,110	47.3	16,270	50.8
<i>Natural &amp; physical science</i>	280	3.8	60	1.1	390	2.0	730	2.3
<i>Building &amp; engineering</i>	180	2.4	50	1.0	830	4.3	1,060	3.3
<i>Business &amp; information</i>	1,300	17.6	430	7.9	2,580	13.4	4,310	13.5
<i>Health</i>	440	6.0	940	17.5	2,310	12.0	3,690	11.5
<i>Educational</i>	680	9.2	1,670	31.1	1,760	9.1	4,100	12.8
<i>Social arts &amp; related</i>	650	8.8	470	8.8	1,250	6.5	2,380	7.4
Associate professionals	700	9.5	370	6.9	2,030	10.5	3,100	9.7
<i>Building &amp; engineering</i>	30	0.5	10	0.2	120	0.6	160	0.5
<i>Medical &amp; science technical</i>	30	0.4	20	0.3	150	0.8	200	0.6
<i>Finance, business and admin</i>	410	5.5	170	3.1	790	4.1	1,370	4.3
<i>Managers and supervisors</i>	170	2.3	70	1.3	570	2.9	810	2.5
<i>Others</i>	60	0.9	100	1.9	400	2.1	570	1.8
Trades	40	0.5	20	0.4	160	0.9	230	0.7
Clerical, sales & service	1,000	13.5	370	6.8	4,240	22.0	5,600	17.5
Production, transport & labourers	270	3.6	60	1.2	550	2.8	880	2.7
Total working	6,650	90.0	4,820	89.8	16,700	86.7	28,170	88.0
Not working (resident in Victoria) <sup>a</sup>	740	10.0	550	10.2	2,560	13.3	3,840	12.0
All	7,390	100.0	5,370	100.0	19,250	100.0	32,010	100.0

Source: Unpublished data from *Graduate Destinations Survey 2006* (GCA) and *Higher Education Student Data Collection* (DEST).

Note: A person is classified to be working if they indicated 1) working more than zero hours per week; 2) described an occupation they were working in; or 3) provided the postcode of their employer. The table includes students who completed a bachelor degree or higher qualification. Excludes records for which there were missing values for international student indicator. The numbers in this table have been rounded to the nearest ten. The row and column sums may not add to the margin totals because of rounding errors.

a Excludes international students.

**Table 56 Occupational destinations of all graduates in 2005 from Australian universities working in Victoria in 2006 by qualification level**

Occupation	Postgraduate		Grad cert/dip		Bachelor		All	
	Number	%	Number	%	Number	%	Number	%
Managers	1,230	14.1	530	7.5	700	2.6	2,450	5.8
Professionals	4,050	46.6	4,280	60.5	10,520	39.3	18,840	44.3
<i>Natural &amp; physical science</i>	300	3.4	70	1.0	460	1.7	830	1.9
<i>Building &amp; engineering</i>	200	2.3	80	1.1	880	3.3	1,160	2.7
<i>Business &amp; information</i>	1,490	17.1	570	8.1	2,970	11.1	5,030	11.8
<i>Health</i>	510	5.8	1,090	15.4	2,550	9.5	4,150	9.7
<i>Educational</i>	850	9.8	1,880	26.6	2,170	8.1	4,910	11.5
<i>Social arts &amp; related</i>	710	8.2	580	8.1	1,480	5.5	2,770	6.5
Associate professionals	820	9.5	510	7.2	2,490	9.3	3,820	9.0
<i>Building &amp; engineering</i>	30	0.4	20	0.3	130	0.5	180	0.4
<i>Medical &amp; science technical</i>	40	0.5	20	0.3	190	0.7	250	0.6
<i>Finance, business and admin</i>	460	5.3	230	3.3	930	3.5	1,630	3.8
<i>Managers and supervisors</i>	210	2.4	100	1.4	760	2.8	1,060	2.5
<i>Others</i>	70	0.9	140	2.0	490	1.8	700	1.7
Trades	50	0.6	40	0.5	220	0.8	310	0.7
Clerical, sales & service	1,190	13.7	560	7.9	6,210	23.2	7,960	18.7
Production, transport & labourers	340	4.0	110	1.6	760	2.8	1,220	2.9
Total working	7,680	88.5	6,020	85.2	20,900	78.1	34,610	81.4
Not working (resident in Victoria) <sup>a</sup>	1,000	11.5	1,040	14.8	5,870	21.9	7,920	18.6
All	8,680	100.0	7,070	100.0	26,770	100.0	42,520	100.0

Source: Unpublished data from *Graduate Destinations Survey 2006* (GCA) and *Higher Education Student Data Collection* (DEST).

Note: A person is classified to be working if they indicated 1) working more than zero hours per week; 2) described an occupation they were working in; or 3) provided the postcode of their employer. The table includes students who completed a bachelor degree or higher qualification. Excludes records for which there were missing values for international student indicator. The numbers in this table have been rounded to the nearest ten. The row and column sums may not add to the margin totals because of rounding errors.

a Excludes international students.

Table 57 shows the occupational destination of graduates by broad field of education and reveals some interesting patterns in occupational destinations. Table A8 in Appendix 6 provides finer occupational details.

- There is significant variation by field of study in the proportion of people who completed courses in 2005 but who were not working the following year. While 35.2 per cent who completed a qualification in the science, agriculture and environment field were not working, only 9.8 per cent who completed a health related course were not working. However, as noted before, a higher proportion of graduates from fields such as science tend to undertake further study, and it seems on a full-time basis.
- 61.5 per cent of all graduates who were working were in a managerial or professional occupation but, once again, this proportion varied significantly across fields of study. While the proportion was well over 80 per cent for people who completed courses in education and health, it was two-thirds among those who completed courses in engineering, architecture and building and about half among those who completed all other courses.
- 18.7 per cent of all graduates who were working were employed in a clerical, sales or service occupation. Once again, this proportion varied significantly by field of study—from 6.8 per cent among those who completed education courses to more than 35 per cent among those who completed society, culture and arts courses.
- Completions of courses in some fields tend to be very much a preparation for employment in a select group of closely related occupations but completions of courses in other fields can lead to employment in a wide range of occupations. For example, 64.4 per cent of people who completed a health course were employed in health occupations and 69.5 per cent who completed a course in education were employed in education occupations but only 29.2 per cent of engineering, architecture and building graduates were employed in building or engineering occupation.

- A significant proportion of graduates in science, agriculture, environment, IT, engineering, architecture, building, management and commerce were employed as associate professionals. It would be interesting to research how many eventually make a transition into a professional occupation.

**Table 57 Occupational destinations of graduates from Australian universities in 2005 working in Victoria in 2006 by broad field of study (%)**

Occupation	Field of study								
	Sci, agri & environ	IT	Eng, arch & bldg	Health	Education	Man & commerce	Soc & culture	Arts	All
Managers	2.2	4.3	3.3	1.7	3.9	14.1	3.6	3.1	5.8
Professionals	30.7	38.7	51.8	72.5	75.5	29.6	33.9	32.3	44.3
<i>Natural &amp; physical science</i>	14.9	0.4	1.5	1.7	0.3	0.4	0.6	0.3	1.9
<i>Building &amp; engineering</i>	1.0	1.4	28.6	0.3	0.0	0.9	0.4	0.5	2.7
<i>Business &amp; information</i>	4.0	32.2	11.7	0.7	1.7	23.7	7.9	7.5	11.8
<i>Health</i>	1.9	0.5	0.4	64.4	1.8	1.1	1.9	0.7	9.7
<i>Educational</i>	6.3	3.2	2.1	1.5	69.5	2.0	6.4	6.6	11.5
<i>Social arts &amp; related</i>	2.5	1.2	7.5	4.0	2.2	1.5	16.7	16.7	6.5
Associate professionals	10.0	13.6	12.6	6.5	2.6	12.1	8.0	6.1	9.0
<i>Building &amp; engineering</i>	0.1	0.3	4.2	0.0	0.0	0.2	0.1	0.0	0.4
<i>Medical &amp; science technical</i>	4.1	0.1	0.7	0.7	0.1	0.2	0.2	0.1	0.6
<i>Finance, business and admin</i>	1.8	9.6	4.5	1.6	0.9	6.5	2.7	2.1	3.8
<i>Managers and supervisors</i>	2.2	3.2	2.7	0.7	0.9	4.2	2.3	2.8	2.5
<i>Others</i>	1.8	0.4	0.5	3.5	0.7	1.1	2.7	1.0	1.7
Trades	1.4	1.4	1.4	0.2	0.2	0.6	0.5	1.5	0.7
Clerical, sales & service	17.5	19.7	9.7	8.2	6.1	25.8	26.0	25.8	18.7
Production, transport & labourers	3.0	6.1	4.2	1.2	1.2	4.0	1.7	3.1	2.9
Total working	64.8	83.9	82.9	90.2	89.4	86.3	73.7	71.8	81.4
Not working (resident in Vic) <sup>a</sup>	35.2	16.1	17.1	9.8	10.6	13.7	26.3	28.2	18.6
All	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
All (number)	3,670	3,430	3,230	5,690	5,010	10,110	8,590	2,800	42,520

Source: Unpublished data from *Graduate Destinations Survey 2006* (GCA) and *Higher Education Student Data Collection* (DEST).

Note: A person is classified to be working if they indicated 1) working more than zero hours per week; 2) described an occupation they were working in; or 3) provided the postcode of their employer. The table includes students who completed a bachelor degree or higher qualification. Excludes records for which there were missing values for international student indicator. The numbers in this table have been rounded to the nearest ten. The row and column sums may not add to the margin totals because of rounding errors.

a Excludes international students.

Table 58 shows the source of graduates, in terms of types of courses completed, into different occupations in 2006. It reveals some distinct patterns of recruitment into different occupations. Table A9 in Appendix 6 contains finer occupational details.

- For some occupations, graduates are recruited from very specific vocationally-oriented courses related to the occupation. These occupations generally tend to be in health, education, building and engineering and they often have licensing and registration requirements stipulating completion of courses from specific fields of study.
- Seven out of every 10 people into managerial occupations were recruited from management and commerce (58.2 per cent) or society and culture courses (12.7 per cent). Many management courses such as masters in business management (MBA) have a clear focus on management training and it is thus expected that graduates from these courses will find jobs in these occupations. Generalist courses in the arts, including law and economics, also seem to be viewed as good preparation for many administrative and management trainee positions.

**Table 58 Broad field of study of graduates from Australian universities in 2005 who were working in Victoria in 2006 by occupational destination (%)**

Occupation	Field of study								All	
	Sci, agri & environ	IT	Eng, arch & bldg	Health	Edu	Man & comm	Soc & culture	Arts	%	Number
Managers	3.2	6.1	4.3	4.0	7.9	58.2	12.7	3.5	100.0	2,450
Professionals	6.0	7.0	8.9	21.9	20.1	15.9	15.4	4.8	100.0	18,840
<i>Natural &amp; physical science</i>	66.4	1.5	5.9	11.5	1.7	5.4	6.5	1.1	100.0	830
<i>Building &amp; engineering</i>	3.2	4.0	79.8	1.4	0.2	7.7	2.6	1.1	100.0	1,160
<i>Business &amp; information</i>	2.9	21.9	7.5	0.7	1.7	47.5	13.5	4.2	100.0	5,030
<i>Health</i>	1.7	0.4	0.3	88.3	2.2	2.7	4.0	0.5	100.0	4,150
<i>Educational</i>	4.7	2.2	1.4	1.8	70.8	4.0	11.3	3.7	100.0	4,910
<i>Social arts &amp; related</i>	3.3	1.5	8.8	8.1	4.1	5.6	51.7	16.9	100.0	2,770
Associate professionals	9.6	12.2	10.6	9.7	3.4	32.0	18.0	4.5	100.0	3,820
<i>Building &amp; engineering</i>	2.4	5.1	74.5	1.4	0.0	11.2	4.7	0.8	100.0	180
<i>Medical &amp; science technical</i>	59.4	1.2	9.1	15.4	1.5	6.7	5.2	1.7	100.0	250
<i>Finance, business and admin</i>	4.0	20.2	8.9	5.6	2.8	40.4	14.5	3.6	100.0	1,630
<i>Managers and supervisors</i>	7.7	10.5	8.1	3.7	4.4	39.8	18.5	7.4	100.0	1,060
<i>Others</i>	9.5	2.0	2.5	28.2	4.6	15.5	33.5	4.1	100.0	700
Trades	16.9	14.9	14.1	3.2	3.4	20.9	12.8	13.7	100.0	310
Clerical, sales & service	8.1	8.5	4.0	5.8	3.8	32.8	28.0	9.1	100.0	7,960
Prod, transport & labourers	9.2	17.2	11.0	5.5	5.1	32.7	12.3	7.1	100.0	1,220
Total working	6.9	8.3	7.7	14.8	12.9	25.2	18.3	5.8	100.0	34,610
Not working (resident in Vic) <sup>a</sup>	16.3	7.0	7.0	7.0	6.7	17.5	28.5	10.0	100.0	7,920
All	8.6	8.1	7.6	13.4	11.8	23.8	20.2	6.6	100.0	42,520

Source: Unpublished data from *Graduate Destinations Survey 2006* (GCA) and *Higher Education Student Data Collection* (DEST).

Note: A person is classified to be working if they indicated 1) working more than zero hours per week; 2) described an occupation they were working in; or 3) provided the postcode of their employer. The table includes students who completed a bachelor degree or higher qualification. Excludes records for which there were missing values for international student indicator. The numbers in this table have been rounded to the nearest ten. The row and column sums may not add to the margin totals because of rounding errors.

a Excludes international students.

## 4.5 Other sources of supply

While the publicly funded higher education sector supplies Victoria with most of its people with higher education qualifications, there are other sources of supply.

- Some TAFE institutes have begun offering degree level courses in the last few years. However, the total numbers completing courses from these institutes are quite small.
- Australia's immigration programmes provide workers with higher education qualifications. However, Australia also loses qualified people through emigration. Estimating the net effect of these flows to Victoria's labour supply is complex because of the multitude of programmes under which people enter the country and the difficulty in converting arrival and departure movements into numbers available for work in the state by occupation and qualification. The task is made difficult because detailed statistics on the flows of people into and out of Australia are usually not available to the public. Visa category 'jumping' compounds this problem. For example, a person who arrives on a student visa can apply for either a temporary working visa (visa subclass 457) or permanent residency visa after completing their course and while onshore.
- International students may apply to work while studying in Australia but their hours are generally capped at 20 per week during term time. No studies of the type of work they perform have been completed. In addition, overseas students are sometimes included in the ABS *Labour Force* surveys and at other times excluded. Even when included they are difficult to identify. Most student contribution to labour supply while they are studying is likely to be at the semi-skilled or unskilled level.

- Private higher education providers are another potential source of graduates in Victoria. Enrolments with some of these providers are already included in the *Higher Education Student Data Collection* but others are not. Data on those not included in this collection do not exist, at least not in the public domain.

#### 4.5.1 Net permanent movements

Permanent arrivals consist largely of settlers visaed offshore under the Migration and Humanitarian programmes. Permanent departures consist of Australian permanent residents (including former settlers) leaving Australia who do not intend to return on a permanent basis.

Table 59 shows the number of permanent settler arrivals to, and departures from, Victoria and Australia in 2006.

- Arrivals to Victoria totalled 32,300 and departures totalled 13,700 making a net inflow of about 18,600. Although, as a proportion of total arrivals to Australia, Victoria's share was in line with its share of population (about 25 per cent), the share of departures from the state was only about 20 per cent of the total.
- The qualifications data on permanent settler arrivals and departures are not collected. Hence, to estimate the number of arrivals and departures by qualification, it is assumed the qualifications profile within each occupational group is the same as for the Victorian workforce (see Table 8 in section 2.6 above).
- Under these assumptions, the total net gain to Victoria from permanent settler movements in 2005–06 was 18,680 with only 6,340 available for work. Of those available for work, just over 2,650 are estimated to have higher education qualifications—420 with postgraduate degrees, 350 with graduate certificates or diplomas and 1,880 with bachelor degrees.
- There is evidence that migrants, at least during the first few years of settlement, suffer from downward occupational mobility but this depends on a number factors, including their country of origin, proficiency in English and recognition of their qualifications. This means the qualification distribution by occupation for migrants is likely to vary from that for Australian-born.

**Table 59 Permanent arrivals and departures, Victoria and Australia, 2005–06**

Occupation group	Victoria			Australia		
	Arrivals	Departures	Net flow	Arrivals	Departures	Net flow
Managers & administrators	1,810	1,550	260	6,730	7,420	-690
Professionals	6,930	3,950	2,990	26,820	17,280	9,540
Associate professionals	1,790	990	800	7,320	5,210	2,110
Tradespersons	1,640	460	1,180	8,000	2,740	5,260
Advanced clerical & service	310	340	-30	1,410	1,570	-160
Intermed clerical, sales & service	1,460	1,050	410	6,470	5,570	910
Intermediate production & transport	320	130	190	1,540	880	660
Elementary clerical, sales & service	930	510	430	3,910	2,530	1,380
Labourers	260	140	120	1,090	750	340
Sub-total (employed)	15,450	9,110	6,340	63,290	43,940	19,350
Others (including missing values)	16,850	4,600	12,240	68,310	23,910	44,390
All	32,300	13,710	18,580	131,590	67,850	63,740

Source: DIAC (2007)

Note: The numbers in this table have been rounded to the nearest ten.

#### 4.5.2 Net long-term resident movements

Long-term resident departures are of people with permanent residency in Australia who expect to be absent for 12 months or more. Long-term resident arrivals are people with the same status who are returning to Australia after an absence of 12 months or more.

Table 60 shows the numbers of long-term resident arrivals to, and departures from, Victoria and Australia in 2006.

- The net gain to Victoria was just over 1,400. If similar assumptions about the qualifications distribution by occupation are made for calculating the net gain by qualification from permanent settler movements in the previous section, then the net gain in terms of people with higher education qualifications to Victoria is estimated to be 480—80 with postgraduate degrees, 60 with graduate certificates or diplomas and 340 with bachelor degrees.

**Table 60 Long-term resident arrivals and departures, Victoria and Australia, 2005–06**

Occupation group	Victoria			Australia		
	Arrivals	Departures	Net flow	Arrivals	Departures	Net flow
Managers & administrators	2,320	2,460	140	10,020	9,460	560
Professionals	8,650	9,160	510	37,310	35,230	2,080
Associate professionals	1,620	1,710	100	6,990	6,600	390
Tradespersons	1,040	1,100	60	4,500	4,250	250
Advanced clerical & service	530	570	30	2,310	2,180	130
Intermed clerical, sales & service	2,300	2,440	140	9,950	9,400	550
Intermediate production & transport	200	210	10	870	820	50
Elementary clerical, sales & service	830	880	50	3,600	3,400	200
Labourers	160	170	10	680	640	40
Sub-total (employed)	17,660	18,700	1,040	76,330	72,080	4,250
Others (including missing values)	6,380	6,760	380	27,570	26,040	1,540
All	24,040	25,460	1,420	103,900	98,100	5,790

Source: DIAC (2007). This publication contained only data for departures for Australia by occupation group. Arrivals data were aggregated as total figure. In this table, it is assumed that the occupational distribution for arrivals is the same as for departures. Furthermore, it is assumed that the Victoria's share is 24.5 per cent of the total in each occupation group.

Note: The numbers in this table have been rounded to the nearest ten.

#### 4.5.3 Net movements of New Zealand citizens

New Zealand citizens are free to enter and leave Australia without restrictions for tourism, visiting family and friends, study and work under the Trans-Tasman Travel Arrangement. A number come as permanent settlers and their numbers are included in section 4.5.1 *net permanent movements* above. Others come on long or short-term visits. Only long-term movements of New Zealand citizens are used to assess the potential addition to the labour supply for Victoria, as short-term arrivals are unlikely to come for work.

- DIMA (2007), together with data from the Department of Immigration and Citizenship website, suggest a net inflow of 4,700 long-term New Zealand citizen movements into Australia in 2006.
- The net gain to Victoria from long-term movements of New Zealand citizens in 2006 is estimated to be 510 people with higher education qualifications—80 with postgraduate degrees, 70 with graduate certificates or diplomas and 370 with bachelor degrees.

#### 4.5.4 Movements of temporary migrants (visa 457)

Australia's temporary migration programme (457 visa sub-class) provides up to four years temporary residency to people recruited by Australian companies as skilled workers or to people whose primary purpose is business-related. Those sponsored are not allowed to change jobs for the duration of their stay unless explicitly permitted by the sponsoring employer.

People recruited under this programme must satisfy some minimum skills requirements and they must be paid a gross salary above a minimum level. The current minimum gross salary that must be paid is \$41,850, or \$57,300 if the person is an IT professional (DIMA 2007). The primary purpose of the programme now is to alleviate short-term skills shortages though the original aim was somewhat different.

- The number of people issued with these visas has increased rapidly over the last few years.

- In 2006, over 71,000 visas were issued, a rise of 46 per cent over the previous year (DIMA 2007).
- About half the entrants on 457 visas were primary applicants and the rest dependents. New South Wales tended to be the preferred destination of a majority.
- In June 2006, 80,100 people on 457 visas were in the country. The group is highly mobile with 50 per cent staying in the country for about 5.5 months. A number apply for permanent residency onshore. In 2006, 13,300 made such applications (DIMA 2007).

Given the highly mobile nature of temporary workers and their relatively short stay in the country, it is difficult to assess their net contribution to Victoria's supply of people with higher education qualifications over the next 15 years. Furthermore, as applications for a 457 visa can be made onshore (e.g. Khoo et al. 2003 calculated 23,000 out of a total of 37,000 457 visa grants in 2001 were processed onshore), it is possible that international students can apply for this visa once they have completed their studies, provided they can find a sponsoring employer. International students working in Australia have, however, already been included as part of the supply of graduates from Australian universities. Care thus needs to be exercised when assessing the contribution of people on 457 visas to Victoria's supply of higher education graduates.

An estimate of the net contribution can be based on the number temporary migrants who apply for permanent residency.

- Under the same standard assumptions outlined in the previous section and using the occupational profile as in Shah and Burke (2005), the net gain in the number of people with higher education qualifications to Victoria in 2006 is estimated to be 1,380—220 with postgraduate degrees, 180 with graduate certificates or diplomas and 980 with bachelor degrees.

#### 4.5.5 Onshore visa grants

While the majority of people still make their application to migrate to Australia offshore, an increasing number are applying onshore.

- In 2006, 43,400 permanent residency permits were granted onshore, including 17,900 to students who completed their studies in Australia and (presumably) to 13,300 temporary migrants (visa 457). As these last two groups are already accounted elsewhere, the net number of onshore visa grants that should be counted in the calculation of the potential supply of graduates is 12,100.
- Under similar assumptions to that made in section 4.5.4, the net gain in the number of people with higher education qualifications to Victoria in 2006 is estimated to be 1,270—200 with postgraduate degrees, 170 with graduate certificates or diplomas and 900 with bachelor degrees.

#### 4.5.6 Movements of working holiday makers

The Australian Government's Working Holiday Makers programme is a potential source of labour for Victoria. However, in spite of often being skilled, most people who come under this scheme work in semi-skilled or unskilled jobs.

Furthermore, as part of their visa condition, there are restrictions on the period they can work for a particular employer. The average stay in the country by working holiday makers in 2002 was nine months (DIMA 2007). It is not clear if a working holiday maker can change their visa status to temporary (visa 457) or permanent status while onshore. According to our current knowledge there are no regulations preventing such an application.

Hence, estimating the contribution of working holiday makers to the supply of graduate labour to Victoria is difficult. Tentative estimates can be made using findings from a 2002 survey of working holiday makers (Harding and Webster 2002).

- Under similar assumptions as made in the calculations in the above sections and 112,000 arrivals in 2006, the supply of people with higher education qualifications to Victoria is estimated to be 1,150—190 with postgraduate qualifications, 160 with graduate certificates or diplomas and 800 with bachelor degrees. However, it is debateable whether working holiday makers should be included in the assessment of the total potential supply of graduate labour for Victoria.

#### 4.5.7 Private providers of higher education

Watson (2000) estimated just over 30,000 enrolments with private providers in 1999. Most enrolments were by Australian students (96 per cent) with 72 per cent on a part-time basis. About 90 per cent of enrolments were at the postgraduate or bachelor level, with just over half at the postgraduate level. Enrolments were concentrated in a narrow set of fields: business related (36.6 per cent), religious studies (25.8 per cent), health technology (7.5 per cent), law (4.3 per cent) and arts (four per cent). Data on completions or the average time to completions were unavailable and it is therefore difficult to assess accurately the potential supply of graduates from private providers. However, estimates of the numbers of graduates coming to Victoria through private providers can be made under the following assumptions:

- 20 per cent growth in enrolments since 1999
- 50 per cent of enrolments not already included in Higher Education Student Data Collection
- Victoria's share of enrolments is 24.5 per cent
- 90 per cent are domestic students
- 10 per cent have a previous qualification at the same or higher level than the one completed
- course completions as a percentage of enrolments are 70 per cent of that for Victorian universities.

On the basis of these assumptions, the expected supply of graduates for Victoria in 2005 through private providers not included in the *Higher Education Student Data Collection* is estimated to be 900—70 with postgraduate degrees, 520 with graduate certificates or diplomas and 310 with bachelor degrees.

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## 5 Industry consultations

The methodology for this study included consultations with relevant government departments and professional bodies to seek their advice about factors influencing supply and demand for people with higher education qualifications in their areas of interest. Their responses to the preliminary modelling estimates were also sought.

Senior representatives of nine organisations were consulted:

- CPA Australia
- Victorian Department of Education
- Law Institute of Victoria
- AusBiotech
- Engineers Australia
- Association of Professional Engineers, Scientists and Managers, Australia
- Australian Institute of Management
- Victorian Department of Human Services
- Australian Information Industry Association
- Multimedia Victoria (Department of Innovation, Industry and Regional Development).

This chapter summarises the common themes that emerged from consultations. Appendix 7 summarises consultations with each stakeholder.

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### Key themes

- The retirement of the baby boomer generation and the anticipated workforce shortages it will generate.
- Tackling climate change and infrastructure renewal will require additional skill capacity in science and engineering.
- The increasingly complex and specialised role of professionals is leading to an increase in demand for postgraduate qualifications. There is a need to develop awareness among employers to more fully utilise and develop the skills of their graduate workforce.
- In some areas, there is a trend towards employment of associate professionals to perform the lower level tasks traditionally undertaken by professionals. Changes in government licensing and regulatory frameworks are also facilitating a greater role for associate professionals (e.g. tax agents).
- There is a widespread concern about the declining in interest in science, maths and technology courses among university students. The general view was that a comprehensive national strategy is required, including action at the primary and secondary school level, to redress this problem.
- While there are significant ‘skill shortages’ perceived across a range of areas, it was reported that Australian industry has not been as proactive as it could be in developing and implementing strategies, such as cadetships and studentships, to address the shortages. A more favourable taxation regime (e.g. removing fringe benefits tax on payment of HECS fees) could provide incentives for firms to adopt such strategies. Some parts of industry have an expectation that universities will produce ‘job ready’ graduates and are not investing in staff training and development to a desirable level.
- Globalisation is having an impact with the outsourcing of some work functions to other countries, as is the employment of overseas professionals by Australian companies with

offshore operations. While skilled migration and temporary work permits represent significant government policies for addressing skill shortages, it appears they are not working as effectively as hoped in professional areas. There is evidence of some reluctance by Australian industry to employ professionals entering Australia under these schemes.

- The global workforce is increasingly mobile and more young Australians will take up opportunities to work overseas, reducing the onshore workforce pool.
- Some Australian industries have been slow to adopt flexible working conditions and ‘family friendly’ conditions and this is perceived as leading to a high attrition of female professionals.
- Rates of higher education completions in some fields do not necessarily translate to employment in the relevant profession or industry. For example, large percentages of law graduates never practise law and only a small percentage of science graduates take up ‘hands-on’ science occupations.
- Long term earning capacity is perceived to be a factor driving student choice of courses. It is also has an impact on turnover. The consultations suggest the professions suffering from skills shortages are often those where salary levels plateau relatively early in the graduate career path.
- Development of workforce needs models based on sound statistical data to support strategic workforce planning was welcomed. Government role for such activity although central need to be augmented by support from industry and professional bodies.
- The health sector expressed concern that projections of requirements in some areas were lower than their estimates. However, in other sectors there was either broad agreement with or no comment on projections.

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## 6 Shortfall in qualifications

The number of people with higher education qualifications required in the 15 years to 2022 to achieve Victoria's projected qualifications profile in 2022 under the skills deepening scenario was calculated in chapter 3. It projected the number of new entrants with qualifications needed and the number of existing workers who need to gain or upgrade qualifications.

Chapter 4 assessed the potential numbers of qualified people that may be available to Victoria from Australian universities and from Australia's migration programmes over the same period.

Assuming current graduation rates from universities and net migration flows, this chapter assesses the shortfall or surplus in the number of people with higher education qualifications needed to meet Victoria's workforce requirements from 2008 to 2022.

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### Key findings

- After considering the contribution of migration to graduate labour supply, a shortfall of 49,000 graduates is projected for Victoria from 2008 to 2022.
- The supply for people with postgraduate and bachelor degrees is projected to be short of requirements.
- Assuming all new entrants completing a postgraduate degree or a graduate certificate or diploma also complete a bachelor degree, the number of bachelor degrees that need to be completed to meet requirements will increase the overall number of bachelor completions to 96,000 from 2008 to 2022. This translates to raising the level of annual commencements to about 9,000 above the 2005 level over the next 15 years.
- The shortfall in postgraduate qualifications is projected to be about 10,000. This translates to raising the level of annual commencements to about 1,200 above the 2005 level over the next 15 years.

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### 6.1 Shortfall in the number of persons with qualifications

Table 61 shows the total requirements, the total potential supply and projected shortfall or surplus of graduates for Victorian from 2008 to 2022.

- Total requirements are for 694,000 graduates from 2008 to 2022.
- The two main sources of graduates for Victoria are Australian universities (mainly Victorian) and migration. In the table, projections of the numbers of domestic graduates from Victorian universities are based on estimates of the number of graduates available for the Victorian workforce from this source in 2006.

The estimates were based on the destinations in 2006 of students who completed courses in 2005. Only graduates who were resident in Victoria in 2006 were included as part of the supply. While all graduates who were working were included as part of supply, only a proportion of those who was *not working* were included. This is because not all who complete a higher education course will necessarily work or look for work. Some of them may have already retired from the workforce.

As mentioned earlier, an adjustment was made for graduates whose previous qualifications were at the same or lower level than the qualifications they just completed. If they were working, they were excluded from the estimate of supply and, if they were not working, their previous higher qualification was included in the assessment of supply.

Projections of the numbers of domestic graduates from interstate universities available for the Victorian workforce were made similarly. In deriving the numbers of interstate graduates available

to Victoria in 2006, only those who were resident in Victoria at that time were included in the calculations.

The projections of the numbers of international graduates available to Victoria were also based on these graduates' status in 2006. It was assumed the numbers available to Victoria included graduates working in Victoria and not studying. Presumably, they had either obtained or made an application for permanent residency.

- The number of graduates available from Victorian universities is projected to be 492,000 (including 52,000 international graduates) and from interstate universities 50,000 (including 5,000 international graduates) from 2008 to 2022. Thus, the total projected is 542,000.

The projections of the potential supply of graduates from migration programmes are based on the analyses in the previous chapter and assume the most recent patterns in migration (inbound and outbound) will continue over the next 15 years. Migration is projected to supply 103,000 graduates to Victoria from 2008 to 2022.

- Under the scenarios assumed for the supply and demand, a net shortfall of 49,000 graduates is projected for Victoria from 2008 to 2022.

The supply of people with graduate certificates or diplomas seems to be considerably in excess of requirements while the supply of people with postgraduate and bachelor degrees is short of requirements.

To meet Victoria's workforce needs from 2008 to 2022, the higher education system in the state will need to expand, with an emphasis on bachelor and postgraduate qualifications.

- Industry consultations together with trends in requirements and commencements indicate science and engineering to be areas of critical importance. Declining trends in commencements in both areas are of concern. People with postgraduate qualifications in science will be in increasing demand according to industry sources.
- The assessment of the supply and demand for IT graduates by Multimedia Victoria suggests a future shortfall in IT graduates. This shortage is due to a significant drop in IT commencements over the last few years whilst demand for high-level IT skills has increased across all industry sectors. Furthermore, IT skills are becoming core skills necessary in all professional occupations.
- Modelling by the Department of Human Services indicates shortfalls in a number of specific health-related occupations, including nursing specialities, dentistry, medicine, physiotherapy, occupational therapy, podiatry, radiography and speech pathology. In aggregate, completions and commencements of health courses have been on the rise in recent years. Therefore, some adjustments in the higher education delivery may be needed to address the shortfalls identified in specific areas in the modelling by the Department of Human Services.

Overall, and as the trends in course commencements indicate, it is likely there will be some adjustments between fields but the net shortfall of 49,000 is unlikely to disappear without new undergraduate places made available in Victorian universities or increasing migration to the state.

The reported unmet demand for university places in Victoria in recent years suggests problems of attracting students to courses are unlikely to occur if places are funded but getting these students into courses related to industry demand for graduates is another issue.

#### *Note on the surplus of graduate certificates and diplomas*

The decline in the requirements for graduate certificates and diplomas, indicated in the analysis in chapter 2 and to a certain extent captured in the forecast for 2022, appears to be partly due to a change in the qualifications used to enter an occupation. For example, in education the number of people completing double degrees (e.g. BEd/BA) instead of a BA and a Grad DipEd has been increasing. Note also that some people who complete graduate certificates or diplomas often progress to postgraduate qualifications. In such cases, the completion of a graduate certificate or

diploma is part of the pathway to a postgraduate qualification. On the other hand, chapter 4 showed that completions of these qualifications increased sharply in the last two years. These diverging trends are largely the reason for the large projected surplus of these qualifications.

**Table 61 Projected imbalances in the number of people with higher education qualifications in the Victorian workforce by qualification level, 2008–2022 ('000)**

Qualification level	Requirements	Potential sources of supply					Total	Projected surplus (+)/shortfall (-)
		Victorian universities		Interstate universities		International migration <sup>a</sup>		
		Domestic graduates	International graduates	Domestic graduates	International graduates			
Postgraduate	151	76	27	14	3	21	141	-10
Graduate cert/dip	33	74	2	9	0	19	104	71
Bachelor	510	276	22	22	2	78	400	-110
All	694	426	51	45	5	118	645	-49

<sup>a</sup> Includes a small number of graduates from private providers for whom data are not in the *Higher Education Student Collection*. The numbers are also adjusted to account for domestic graduates from Victorian universities who leave to work overseas as they have already been excluded in column 3.

Note: Column 3 excludes a small proportion of domestic graduates from Victorian universities who were resident in Victoria and were *not working*.

## 6.2 Net increase in the number of commencements

This report considers only the highest qualification of a person. Therefore, the assessment of total requirements in chapter 3, though correct in terms of the number of persons required, will tend to underestimate the total number of qualifications to be completed. For example, if a new entrant was to meet the demand for a person with a postgraduate degree, they will need to complete two qualifications—bachelor and postgraduate degree. This is less likely to be the case with an existing worker.

- Assuming all new entrants completing a postgraduate degree or a graduate certificate or diploma also complete a bachelor degree, the number of bachelor degrees that need to be completed increases from 49,000 to 96,000 from 2008 to 2022 (from Table 33, 47,000 new entrants are required with a postgraduate degree or a graduate certificate or diploma).
- 10,000 additional postgraduate degrees need to be completed from 2008 to 2022 (see Table 61).
- The average apparent completion rate for bachelor degrees has been stable at about 70 per cent in recent times. Assuming the rate remains unchanged, an additional 137,000 bachelor *commencements* are needed from 2008 to 2022. This translates to raising the level of annual commencements by about 9,000 above the 2005 level over the next 15 years.
- The average apparent completion rate for postgraduate degrees is about 57 per cent. Assuming the rate remains unchanged, an additional 18,000 postgraduate degree *commencements* are needed from 2008 to 2022. This translates to raising the level of annual commencements by about 1,200 above the 2005 level over the next 15 years.

## 7 Concluding remarks

This report has provided an assessment of any shortfall or surplus in the number of people with higher education qualifications to meet Victoria's workforce needs from 2008 to 2022.

The preliminary results from the statistical modelling were presented to a number of stakeholders for reflection and comment.

The projection of the 2022 qualifications profile considered the changing industrial and occupational structure of employment and skills deepening within occupations. ABS statistics show considerable skills deepening within occupations in Victoria. If these trends continue, 78 per cent of people in employment will have qualifications in 2022 compared to 59 per cent in 2006.

At current levels of supply from Australian universities, private higher education providers and migration, an overall shortfall in requirements is projected. The shortfall is only at the postgraduate and bachelor degree levels. At the graduate certificate and diploma levels, a substantial surplus is projected.

If adjustments are made to course profile to meet requirements from 2008 to 2022, they should involve expanding postgraduate and bachelor degree completions. Furthermore, the course profile needs to shift towards science and engineering and specific health-related courses.

Increasing the number of graduates in science and engineering is particularly important, as current trends in commencements in these courses are not encouraging. Many stakeholders consulted for this study expressed concern about the future technological capacity of the nation if trends are not reversed soon. They also believed demand for science and engineering graduates will increase as Australia begins to strengthen its focus on tackling climate change. The challenge ahead is to develop innovative strategies to encourage more young people to consider careers in science and engineering. A nationally coordinated approach may be preferable as other states are likely to be facing similar problems.

The projections in this report are based on Victoria's employment growing at 0.9 per cent year to 2022. If labour force participation rate increases above that assumed in the MONASH model then employment growth is likely to be higher. The consequence of this will be higher requirements and a bigger shortfall in the number of people with higher education qualifications.

Consultations with the Department of Human Services suggested the projection of requirements for graduates in health-related occupations in this report to be generally conservative. Under a scenario of higher demand, the overall shortfall could be even higher.

In the light of reported unmet demand for university places in Victoria in recent years, it would seem logical to use the education and training option rather than increased migration to address the projected shortfall in higher education qualifications. Stakeholder consultations indicated a preference for locally trained graduates among employers.

The number of additional bachelor degree commencements required to address the shortfall can be reduced if course completion rates improve. They can also be reduced if the net drain each year of Victorian graduates to interstate and overseas destinations for work is moderated. More graduates from Victorian universities were working interstate than vice versa, partly because more interstate students tend to enrol in Victorian universities. There are, however, other benefits of Victorians working out of state that need to be considered. Suggestions to alter the skills balance in some sectors to address the problem of shortages seem more about cost containment and rely on a pool of unskilled people available and willing to take up training at an associate professional level.

Finally, attracting additional Victorians to enrol in higher education courses to meet projected requirements may require further incentives. For example, adjusting the higher education

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contribution scheme and providing a more a generous living allowance could address some of the current financial disincentives and may encourage more people to enrol.

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## Appendix 1 MONASH model for forecasting employment

MONASH is a computational general equilibrium model for forecasting employment by occupation (Adams et al. 1994; Dixon and Rimmer 1996; Meagher 1997; and Dixon and Rimmer 2000). It is maintained by the Centre of Policy Studies (CoPS), Monash University. An intuitive description of the model is contained in Appendix O of Industry Commission (1997).

In brief, the MONASH model is a sequence of single-period models, linked through time by the behaviour of capital and labour markets. It has three main elements—a database, theory and parameters—that are embodied in the model’s system of equations. These equations describe how industries and consumers respond to changes in policy. The core of the database is a large input-output matrix, which shows how each sector of the economy is linked to other sectors. These linkages are only for a particular point in time. Behaviour responses of different groups to policy changes are based on economic theory. The model specifies likely responses of producers, consumers, foreigners and investors to policy changes. It also includes a government sector, the revenue and expenditure behaviour of which is modelled separately. While theory guides the model’s broad assumptions (which can be altered to accommodate different scenarios), actual numerical parameters are required to estimate the size of the responses. In MONASH, these parameters are derived either from the input-output database or from other external sources.

MONASH converts the forecast for aggregate output to forecasts for output by industry. These are then converted to forecasts of employment by industry, which in turn are converted to employment by occupation. MONASH uses the ACCESS Economics’ macro forecasts of output by industry as an input.

## Appendix 2 Calculation of skills deepening rates

The skills deepening rates are calculated at each qualification level for each occupation. The rate is defined as:

$$S_{ijt} = Q_{ijt} - O_{jt} \quad (1)$$

where  $Q_{ijt}$  is the percentage change in the number of people with qualification  $j$  in occupation  $i$  in the time period  $[t-1, t]$  and  $O_{jt}$  is the percentage change in total number of people employed in occupation  $i$  in the same period.

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## Appendix 3 Projection of qualifications by occupation

### Step 1

The projection of the number of people with qualifications in a given occupation for a future time period is:

$$E_{ijt} = E_{it} \times p_{ij2006} \times (a_{ij})^{(t-2006)} \quad (2)$$

where  $i$  is the occupation;  $j$  the qualification level;  $t$  the year;  $E$  the employment;  $p_{ij2006}$  is the proportion of people with qualification  $j$  in occupation  $i$  in 2006; and

$$a_{ij} = 1 + \frac{\bar{S}_{ij}}{1 + \bar{E}_i}$$

is the skills deepening adjustment factor, with  $\bar{S}_{ij}$  the average skills deepening rate and  $\bar{E}_i$  the average employment growth rate in occupation  $i$  from 2001 to 2006. The skills deepening rates are calculated at the major occupation group level and, therefore, for a given qualification level they are identical for all occupations that make up the major group.

### Step 2

The number of people without qualifications ( $j = 0$ ) in each occupation is calculated as:

$$E_{i0t} = E_{it} - \sum_j E_{ijt} \quad (3)$$

### Step 3

Adjust for any negative values resulting from Step 1 and 2.

For some occupations, the calculations in Step 1 or 2 may result in a negative value for  $E$ . In such instances the negative value is replaced with a zero and the value for the next higher level qualification is adjusted down correspondingly so that the sum across all levels remains unchanged. For example, if at Step 1 the number with VET qualifications is -10 and the number with bachelor degrees is 30, then the adjustment will replace these values with 0 and 20, respectively.

## Appendix 4 Calculation of new entrants

### Step 1

For each occupation, estimate the number of new entrants from 2008 to 2022 as a proportion of employment in 2022.

Suppose  $r_i$  is the 15-year net replacement rate and  $g_i$  is the 15-year growth rate in occupation  $i$ , then the 15-year new entrants' rate as a percentage is:

$$n_i = \begin{cases} \frac{r_i + g_i}{g_i + 100} \times 100 & \text{if } g_i > 0 \\ \frac{r_i}{g_i + 100} \times 100 & \text{if } g_i \leq 0 \end{cases} \quad (4)$$

The above formula assumes that if employment declines then jobs for new entrants will be a result of net replacement needs only.

### Step 2

Among those employed in 2022, estimate the proportion in each age group who will be new entrants. If  $\alpha_{ik}$  is this proportion then the following relationship must hold:

$$n_i = \sum_k \alpha_{ik} p_{ik} \quad (5)$$

where  $p_{ik}$  the proportion aged  $k$  in occupation  $i$  in 2022. This relationship assumes that in any occupation new entrants are the youngest workers. Note that the  $n_i$ 's have been estimated at (4) and all but one of the  $\alpha_{ik}$ 's will have values that are either zero or one. Therefore, the single  $\alpha_{ik}$  that is not zero or one can be estimated using (5).

### Step 3

Among people employed in 2022, estimate the number who are new entrants by qualification and occupation as:

$$N_{ij2022} = \sum_k E_{ij2022} p_{ijk} \alpha_{ik} \quad (6)$$

where  $p_{ijk}$  is the proportion aged  $k$ , with qualification  $j$ , in occupation  $i$ . The summation in (6) is over all age groups and the  $p_{ijk}$ 's are estimated with data from *Education and Work Surveys*. It is assumed  $p_{ijk}$  are invariant over time.

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## Appendix 5 Calculation of existing workers gaining or upgrading qualifications

### Step 1

The number of existing workers (or not stayers) is the difference between the total number of workers and the number who are new entrants. These numbers are calculated by qualification and occupation as:

$$X_{ij2022} = E_{ij2022} - N_{ij2022} \quad (7)$$

where  $j$  represents the qualification and  $i$  the occupation.

### Step 2

Let  $\beta_{ik}$  be the proportion of people aged  $k$ , in occupation  $i$ , in 2007 who will be in the same occupation also in 2022 (stayers or existing workers). Assuming that those who leave are the oldest and, therefore, stayers the youngest in any occupation, the proportion that is existing workers is:

$$s_i = (100 - r_i) \quad (8)$$

where  $r_i$  is the 15-year net replacement rate for occupation  $i$ .

It follows that the following relationship must necessarily hold:

$$s_i = \sum_k \beta_{ik} p_{ik} \quad (9)$$

where  $p_{ik}$  the proportion of people in occupation  $i$  in 2022 who are aged  $k$ .

Since  $s_i$  is known, relationship (9) can be used to determine each  $\beta_{ik}$  using a method similar to that for determining the  $\alpha_{ik}$ 's in (5).

### Step 3

The number of people with the same qualification and in the same occupation in 2007 and 2022 can then be calculated as:

$$S_{ij2007} = \sum_k E_{ij2007} a_{ijk} \beta_{ik} \quad (10)$$

The summation in (10) is over all age groups.

### Step 4

Finally, the number of existing workers gaining or upgrading qualifications in the 15 years to 2022 is:

$$D_{ij2022} = \begin{cases} X_{ij2022} - S_{ij2007} & \text{if } X_{ij2022} > S_{ij2007} \\ 0 & \text{Otherwise} \end{cases} \quad (11)$$

## Appendix 6 Additional tables

**Table A1 Labour force status of graduates from Victorian universities undertaking further study by field of study and qualification completed, 2006**

Field of study	Australian graduates				International graduates			
	Postgrad	Graduate cert/dip	Bachelor	All	Postgrad	Graduate cert/dip	Bachelor	All
Sciences, agri. & environ.	50	40	1,710	1,800	50	40	390	480
% Working	60.2	60.7	43.1	44.0	29.0	16.5	11.5	13.6
% Not working	39.8	39.3	56.9	56.0	71.0	83.5	88.5	86.4
Information technology	70	60	340	480	410	110	800	1,320
% Working	69.8	76.2	51.8	57.8	27.7	32.7	24.7	26.3
% Not working	30.2	23.8	48.2	42.2	72.3	67.3	75.3	73.7
Eng., arch. & building	50	80	360	490	360	70	390	820
% Working	81.0	63.6	50.8	56.3	28.6	19.5	14.3	21.1
% Not working	19.0	36.4	49.2	43.7	71.4	80.5	85.7	78.9
Health	90	290	700	1,080	40	110	110	250
% Working	70.1	82.5	71.2	74.2	24.4	13.4	10.8	13.9
% Not working	29.9	17.5	28.8	25.8	75.6	86.6	89.2	86.1
Education	120	300	170	600	70	120	30	210
% Working	90.2	76.0	68.8	76.8	42.7	31.0	0.0	30.8
% Not working	9.8	24.0	31.2	23.2	57.3	69.0	100.0	69.2
Management & commerce	310	480	990	1,780	890	250	2,440	3,580
% Working	81.6	79.2	64.4	71.4	39.4	25.7	27.1	30.0
% Not working	18.4	20.8	35.6	28.6	60.6	74.3	72.9	70.0
Society & culture	190	470	2,650	3,310	150	60	290	500
% Working	61.1	68.4	58.1	59.8	23.6	13.2	23.5	22.3
% Not working	38.9	31.6	41.9	40.2	76.4	86.8	76.5	77.7
Arts	40	110	750	900	40	30	330	400
% Working	58.3	50.7	57.2	56.4	18.2	14.3	20.9	20.1
% Not working	41.7	49.3	42.8	43.6	81.8	85.7	79.1	79.9
All	920	1,840	7,670	10,430	2,010	790	4,770	7,570
% Working	74.4	73.5	56.3	60.9	33.0	23.3	23.2	25.8
% Not working	25.6	26.5	43.7	39.1	67.0	76.7	76.8	74.2

Source: Unpublished data from *Graduate Destinations Survey 2006* and *Higher Education Student Data Collection*.

Note: A person is classified to be working if they indicated 1) working more than zero hours per week; 2) described an occupation they were working in; or 3) provided the postcode of their employer. The table includes students who completed a bachelor degree or higher qualification. Excludes records for which there were missing values for international student indicator. The numbers in this table have been rounded to the nearest ten. The row and column sums may not add to the margin totals because of rounding errors.

a Includes a very small number of students who completed courses in hospitality and mixed fields.

**Table A2 Labour force status of graduates from Victorian universities not undertaking further study by field of study and qualification completed, 2006**

Field of study	Australian graduates				International graduates			
	Postgrad	Graduate cert/dip	Bachelor	All	Postgrad	Graduate cert/dip	Bachelor	All
Sciences, agri. & environ.	470	120	1,570	2,160	90	10	160	260
% Working	93.2	90.0	81.9	84.8	78.2	38.8	68.5	71.2
% Not working	6.8	10.0	18.1	15.2	21.8	61.2	31.5	28.8
Information technology	460	130	1,370	1,950	1,420	50	1,090	2,560
% Working	81.3	91.6	84.4	84.1	66.7	50.0	66.2	66.1
% Not working	18.7	8.4	15.6	15.9	33.3	50.0	33.8	33.9
Eng., arch. & building	410	160	2,000	2,570	700	40	690	1,430
% Working	83.8	88.9	87.4	87.0	62.9	60.0	70.0	66.2
% Not working	16.2	11.1	12.6	13.0	37.1	40.0	30.0	33.8
Health	590	1,340	3,100	5,030	130	40	620	790
% Working	89.5	95.6	95.9	95.1	76.7	91.6	84.4	83.5
% Not working	10.5	4.4	4.1	4.9	23.3	8.4	15.6	16.5
Education	640	2,390	2,080	5,110	280	200	50	530
% Working	94.3	92.1	93.0	92.8	89.4	67.9	80.0	80.3
% Not working	5.7	7.9	7.0	7.2	10.6	32.1	20.0	19.7
Management & commerce	1,970	820	4,320	7,110	2,380	140	2,680	5,200
% Working	88.6	91.2	88.5	88.9	68.9	66.9	66.7	67.7
% Not working	11.4	8.8	11.5	11.1	31.1	33.1	33.3	32.3
Society & culture	1,230	830	3,950	6,000	350	30	310	690
% Working	89.7	85.9	83.9	85.4	78.9	81.2	61.2	71.0
% Not working	10.3	14.1	16.1	14.6	21.1	18.8	38.8	29.0
Arts	250	330	1,410	1,990	120	20	450	600
% Working	83.9	86.4	81.4	82.5	63.6	90.0	68.1	68.0
% Not working	16.1	13.6	18.6	17.5	36.4	10.0	31.9	32.0
All	6,020	6,110	19,790	31,910	5,480	520	6,040	12,050
% Working	88.8	91.5	87.8	88.7	69.5	68.1	68.8	69.1
% Not working	11.2	8.5	12.2	11.3	30.5	31.9	31.2	30.9

Source: Unpublished data from *Graduate Destinations Survey 2006* and *Higher Education Student Data Collection*.

Note: A person is classified to be working if they indicated 1) working more than zero hours per week; 2) described an occupation they were working in; or 3) provided the postcode of their employer. The table includes students who completed a bachelor degree or higher qualification. Excludes records for which there were missing values for international student indicator. The numbers in this table have been rounded to the nearest ten. The row and column sums may not add to the margin totals because of rounding errors.

a Includes a very small number of students who completed courses in hospitality and mixed fields.

**Table A3 Labour force status of graduates from Australian universities in 2005 undertaking further study, 2006**

Labour force status	Postgraduate		Grad cert/dip		Bachelor		All	
	Number	%	Number	%	Number	%	Number	%
Graduates from Victorian universities								
Australian students	920	100.0	1,840	100.0	7,670	100.0	10,430	100.0
Working in Victoria	530	57.9	950	51.7	3,430	44.6	4,910	47.1
Working interstate	120	13.4	370	19.9	830	10.9	1,320	12.7
Working overseas	30	3.1	40	2.0	60	0.8	130	1.2
Not working (resident in Victoria)	220	24.2	450	24.4	3,110	40.5	3,780	36.2
Not working (resident interstate)	10	1.4	40	2.0	240	3.2	290	2.8
International students	2,010	100.0	790	100.0	4,770	100.0	7,570	100.0
Working in Victoria	390	19.5	110	13.9	630	13.1	1,130	14.9
Working interstate	90	4.3	30	2.9	160	3.3	270	3.5
Working overseas	190	9.3	50	6.5	320	6.7	560	7.4
Not working	1,350	67.0	610	76.7	3,660	76.8	5,620	74.2
Graduates from interstate universities								
Australian students	2,710	100.0	4,570	100.0	20,850	100.0	28,140	100.0
Working in Victoria	90	3.2	140	3.1	170	0.8	400	1.4
Working interstate	1,910	70.5	3,250	71.0	11,500	55.1	16,660	59.2
Working overseas	110	3.9	90	2.1	120	0.5	310	1.1
Not working (resident in Victoria)	20	0.7	30	0.7	150	0.7	200	0.7
Not working (resident interstate)	590	21.7	1,060	23.1	8,920	42.8	10,560	37.5
International students	5,700	100.0	2,550	100.0	7,960	100.0	16,200	100.0
Working in Victoria	40	0.7	10	0.5	40	0.5	90	0.6
Working interstate	1,440	25.2	4,010	15.9	1,690	21.3	3,540	21.8
Working overseas	780	13.7	180	7.1	680	8.5	1,640	10.1
Not working	3,440	60.4	1,950	76.5	5,540	69.7	10,930	67.5

Source: Unpublished data from *Graduate Destinations Survey 2006* and *Higher Education Student Data Collection*.

Note: A person is classified to be working if they indicated 1) working more than zero hours per week; 2) described an occupation they were working in; or 3) provided the postcode of their employer. The table includes students who completed a bachelor degree or higher qualification. Excludes records for which there were missing values for international student indicator. The numbers in this table have been rounded to the nearest ten. The row and column sums may not add to the margin totals because of rounding errors.

**Table A4 Labour force status of graduates from Australian universities in 2005 not undertaking further study, 2006**

Labour force status	Postgraduate		Grad cert/dip		Bachelor		All	
	Number	%	Number	%	Number	%	Number	%
Graduates from Victorian universities								
Australian students	6,020	100.0	6,110	100.0	19,790	100.0	31,910	100.0
Working in Victoria	3,950	65.6	4,170	68.3	13,920	70.4	22,040	69.1
Working interstate	1,090	18.1	1,310	21.4	3,000	15.2	5,400	16.9
Working overseas	300	5.0	110	1.8	450	2.3	860	2.7
Not working (resident in Victoria)	610	10.1	470	7.7	2,290	11.6	3,370	10.5
Not working (resident interstate)	70	1.1	50	0.8	130	0.6	240	0.8
International students	5,480	100.0	520	100.0	6,040	100.0	12,050	100.0
Working in Victoria	1,800	32.9	160	30.0	1,480	24.5	3,440	28.6
Working interstate	370	6.8	40	8.3	470	7.7	880	7.3
Working overseas	1,630	29.8	160	29.8	2,210	36.6	4,000	33.2
Not working	1,670	30.5	170	31.9	1,890	31.2	3,730	30.9
Graduates from interstate universities								
Australian students	17,290	100.0	12,460	100.0	59,410	100.0	89,160	100.0
Working in Victoria	740	4.3	510	4.1	1,280	2.2	2,530	2.8
Working interstate	13,910	80.5	10,740	86.2	49,740	83.7	74,380	83.4
Working overseas	890	5.2	260	2.1	1,210	2.0	2,360	2.7
Not working (resident in Victoria)	70	0.4	50	0.4	160	0.3	280	0.3
Not working (resident interstate)	1,670	9.7	910	7.3	7,020	11.8	9,610	10.8
International students	16,630	100.0	1,290	100.0	14,840	100.0	32,750	100.0
Working in Victoria	220	1.3	10	1.1	120	0.8	360	1.1
Working interstate	4,570	27.5	380	29.8	4,170	28.1	9,130	27.9
Working overseas	6,600	39.7	520	40.7	5,170	34.8	12,290	37.5
Not working	5,240	31.5	370	28.4	5,370	36.2	10,970	33.5

Source: Unpublished data from *Graduate Destinations Survey 2006* and *Higher Education Student Data Collection*.

Note: A person is classified to be working if they indicated 1) working more than zero hours per week; 2) described an occupation they were working in; or 3) provided the postcode of their employer. The table includes students who completed a bachelor degree or higher qualification. Excludes records for which there were missing values for international student indicator. The numbers in this table have been rounded to the nearest ten. The row and column sums may not add to the margin totals because of rounding errors.

**Table A5 Occupational destinations of graduates from Australian universities in 2005 undertaking further study and working in Victoria in 2006 by qualification level**

Occupation	Postgraduate		Grad cert/dip		Bachelor		All	
	Number	%	Number	%	Number	%	Number	%
Managers	110	8.6	160	9.2	80	1.1	350	3.3
Professionals	520	40.0	650	38.4	1,400	18.6	2,570	24.5
<i>Natural &amp; physical science</i>	20	1.3	20	0.9	60	0.9	100	0.9
<i>Building &amp; engineering</i>	20	1.2	30	1.5	60	0.7	100	0.9
<i>Civil engineers</i>	0	0.0	10	0.3	10	0.1	10	0.1
<i>Electrical engineers</i>	0	0.2	0	0.0	10	0.1	10	0.1
<i>Mechanical engineers</i>	10	0.5	0	0.1	10	0.1	10	0.1
<i>Other building &amp; engineering</i>	10	0.5	20	1.1	30	0.4	60	0.6
<i>Business &amp; information</i>	190	14.4	150	8.6	390	5.2	720	6.9
<i>Accountants</i>	60	4.3	20	1.0	140	1.9	220	2.1
<i>Sales, marketing &amp; advertising</i>	30	2.4	20	1.0	50	0.6	90	0.9
<i>Computing</i>	40	3.2	30	2.0	80	1.0	150	1.5
<i>Other business &amp; information</i>	60	4.5	80	4.5	130	1.7	260	2.5
<i>Health</i>	70	5.1	150	8.8	240	3.2	460	4.4
<i>Medical practitioners</i>	20	1.3	10	0.7	10	0.1	40	0.4
<i>Nursing (division 1)</i>	30	2.1	100	6.0	90	1.1	220	2.0
<i>Dentists</i>	0	0.1	0	0.1	0	0.0	0	0.0
<i>Pharmacists</i>	0	0.0	10	0.3	110	1.4	110	1.1
<i>Optometrists</i>	0	0.0	0	0.2	0	0.0	0	0.0
<i>Physiotherapists</i>	0	0.1	0	0.2	0	0.0	10	0.1
<i>Veterinarians</i>	0	0.0	0	0.0	0	0.0	0	0.0
<i>Other health</i>	20	1.4	20	1.2	40	0.5	80	0.7
<i>Educational</i>	170	13.3	210	12.6	420	5.6	810	7.7
<i>Pre-primary school teachers</i>	0	0.1	0	0.1	0	0.0	0	0.0
<i>Primary school teachers</i>	10	0.6	30	2.0	30	0.4	70	0.7
<i>Secondary school teachers</i>	30	2.0	80	4.5	60	0.7	160	1.5
<i>Other school teachers</i>	20	1.5	30	1.5	60	0.8	100	1.0
<i>University &amp; VET teachers</i>	90	7.0	60	3.3	250	3.3	400	3.8
<i>Other education</i>	30	2.1	20	1.2	20	0.3	70	0.7
<i>Social arts &amp; related</i>	60	4.7	100	6.0	230	3.0	390	3.7
<i>Social welfare</i>	20	1.7	50	2.8	70	0.9	140	1.3
<i>Legal</i>	20	1.3	10	0.8	30	0.4	60	0.6
<i>Artists &amp; related</i>	10	0.5	10	0.4	80	1.1	90	0.9
<i>Other social, arts &amp; misc.</i>	10	1.1	30	1.9	50	0.6	90	0.9
Associate professionals	120	9.1	140	8.1	460	6.2	720	6.8
<i>Building &amp; engineering</i>	0	0.0	10	0.5	10	0.1	20	0.2
<i>Medical &amp; science technical</i>	10	0.8	10	0.3	40	0.5	50	0.5
<i>Finance, business and admin</i>	50	4.2	60	3.8	140	1.9	260	2.5
<i>Managers and supervisors</i>	40	3.3	30	1.5	190	2.5	260	2.5
<i>Others</i>	10	0.7	40	2.1	90	1.2	130	1.3
Trades	10	1.0	10	0.7	60	0.8	90	0.8
Clerical, sales & service	200	15.1	190	11.5	1980	26.3	2,370	22.5
Production, transport & labourers	80	6.0	50	3.0	220	2.9	350	3.3
Total working	1,030	79.8	1,200	70.8	4,210	55.9	6,440	61.3
Not working (resident in Victoria) <sup>a</sup>	260	20.2	500	29.2	3,320	44.1	4,070	38.7
All	1,290	100.0	1,700	100.0	7,520	100.0	10,500	100.0

Source: Unpublished data from *Graduate Destinations Survey 2006* and *Higher Education Student Data Collection*.

Note: A person is classified to be working if they indicated 1) working more than zero hours per week; 2) described an occupation they were working in; or 3) provided the postcode of their employer. The table includes students who completed a bachelor degree or higher qualification. Excludes records for which there were missing values for international student indicator. The numbers in this table have been rounded to the nearest ten. The row and column sums may not add to the margin totals because of rounding errors.

a Excludes international students.

**Table A6 Occupational destinations of graduates from Australian universities in 2005 not undertaking further study and working in Victoria in 2006 by qualification level**

Occupation	Postgraduate		Grad cert/dip		Bachelor		All	
	Number	%	Number	%	Number	%	Number	%
Managers	1,120	15.1	380	7.0	610	3.2	2,100	6.6
Professionals	3,530	47.8	3,620	67.4	9,110	47.3	16,270	50.8
<i>Natural &amp; physical science</i>	280	3.8	60	1.1	390	2.0	730	2.3
<i>Building &amp; engineering</i>	180	2.4	50	1.0	830	4.3	1,060	3.3
<i>Civil engineers</i>	20	0.3	10	0.1	110	0.6	140	0.4
<i>Electrical engineers</i>	40	0.5	10	0.1	110	0.6	160	0.5
<i>Mechanical engineers</i>	30	0.5	0	0.0	140	0.7	170	0.5
<i>Other building &amp; engineering</i>	90	1.2	40	0.7	470	2.4	590	1.8
<i>Business &amp; information</i>	1,300	17.6	430	7.9	2,580	13.4	4,310	13.5
<i>Accountants</i>	220	2.9	70	1.3	530	2.7	810	2.5
<i>Sales, marketing &amp; advertising</i>	160	2.2	60	1.1	460	2.4	680	2.1
<i>Computing</i>	400	5.5	60	1.0	690	3.6	1,150	3.6
<i>Other business &amp; information</i>	520	7.0	250	4.6	910	4.7	1,670	5.2
Health	440	6.0	940	17.5	2,310	12.0	3,690	11.5
<i>Medical practitioners</i>	100	1.4	40	0.7	380	2.0	510	1.6
<i>Nursing (division 1)</i>	140	1.8	750	13.9	1,280	6.6	2,160	6.7
<i>Dentists</i>	10	0.1	0	0.1	40	0.2	60	0.2
<i>Pharmacists</i>	20	0.2	10	0.1	110	0.6	130	0.4
<i>Optometrists</i>	0	0.0	10	0.2	0	0.0	20	0.0
<i>Physiotherapists</i>	20	0.2	10	0.2	40	0.2	70	0.2
<i>Veterinarians</i>	10	0.2	10	0.1	70	0.4	90	0.3
<i>Other health</i>	140	1.9	120	2.3	390	2.0	660	2.0
Educational	680	9.2	1,670	31.1	1,760	9.1	4,100	12.8
<i>Pre-primary school teachers</i>	10	0.1	50	0.9	110	0.6	160	0.5
<i>Primary school teachers</i>	60	0.9	350	6.5	1,020	5.3	1,430	4.5
<i>Secondary school teachers</i>	160	2.2	990	18.3	400	2.1	1,540	4.8
<i>Other school teachers</i>	60	0.8	110	2.1	90	0.5	260	0.8
<i>University &amp; VET teachers</i>	330	4.4	130	2.4	90	0.5	540	1.7
<i>Other education</i>	70	0.9	50	0.9	50	0.2	160	0.5
Social arts & related	650	8.8	470	8.8	1,250	6.5	2,380	7.4
<i>Social welfare</i>	300	4.0	180	3.3	320	1.7	790	2.5
<i>Legal</i>	120	1.6	60	1.1	230	1.2	410	1.3
<i>Artists &amp; related</i>	90	1.3	100	1.8	400	2.1	590	1.8
<i>Other social, arts &amp; misc.</i>	140	1.9	140	2.7	310	1.6	590	1.8
Associate professionals	700	9.5	370	6.9	2,030	10.5	3,100	9.7
<i>Building &amp; engineering</i>	30	0.5	10	0.2	120	0.6	160	0.5
<i>Medical &amp; science technical</i>	30	0.4	20	0.3	150	0.8	200	0.6
<i>Finance, business and admin</i>	410	5.5	170	3.1	790	4.1	1,370	4.3
<i>Managers and supervisors</i>	170	2.3	70	1.3	570	2.9	810	2.5
<i>Others</i>	60	0.9	100	1.9	400	2.1	570	1.8
Trades	40	0.5	20	0.4	160	0.9	230	0.7
Clerical, sales & service	1,000	13.5	370	6.8	4,240	22.0	5,600	17.5
Production, transport & labourers	270	3.6	60	1.2	550	2.8	880	2.7
Total working	6,650	90.0	4,820	89.8	16,700	86.7	28,170	88.0
Not working (resident in Victoria) <sup>a</sup>	740	10.0	550	10.2	2,560	13.3	3,840	12.0
All	7,390	100.0	5,370	100.0	19,250	100.0	32,010	100.0

Source: Unpublished data from *Graduate Destinations Survey 2006* and *Higher Education Student Data Collection*.

Note: A person is classified to be working if they indicated 1) working more than zero hours per week; 2) described an occupation they were working in; or 3) provided the postcode of their employer. The table includes students who completed a bachelor degree or higher qualification. Excludes records for which there were missing values for international student indicator. The numbers in this table have been rounded to the nearest ten. The row and column sums may not add to the margin totals because of rounding errors.

a Excludes international students.

**Table A7 Occupational destinations of graduates in 2005 from Australian universities who are working in Victoria in 2006 by qualification level**

Occupation	Postgraduate		Grad cert/dip		Bachelor		All	
	Number	%	Number	%	Number	%	Number	%
Managers	1,230	14.1	530	7.5	700	2.6	2,450	5.8
Professionals	4,050	46.6	4,280	60.5	10,520	39.3	18,840	44.3
<i>Natural &amp; physical science</i>	300	3.4	70	1.0	460	1.7	830	1.9
<i>Building &amp; engineering</i>	200	2.3	80	1.1	880	3.3	1,160	2.7
<i>Civil engineers</i>	20	0.2	10	0.2	120	0.4	150	0.4
<i>Electrical engineers</i>	40	0.5	10	0.1	120	0.5	170	0.4
<i>Mechanical engineers</i>	40	0.5	0	0.0	140	0.5	190	0.4
<i>Other building &amp; engineering</i>	90	1.1	60	0.8	500	1.9	650	1.5
<i>Business &amp; information</i>	1,490	17.1	570	8.1	2,970	11.1	5,030	11.8
<i>Accountants</i>	270	3.1	90	1.2	670	2.5	1,030	2.4
<i>Sales, marketing &amp; advertising</i>	200	2.2	80	1.1	510	1.9	780	1.8
<i>Computing</i>	450	5.1	90	1.3	770	2.9	1,300	3.1
<i>Other business &amp; information</i>	570	6.6	320	4.5	1,030	3.9	1,930	4.5
Health	510	5.8	1,090	15.4	2,550	9.5	4,150	9.7
<i>Medical practitioners</i>	120	1.4	50	0.7	390	1.4	550	1.3
<i>Nursing (division 1)</i>	160	1.9	850	12.0	1,360	5.1	2,370	5.6
<i>Dentists</i>	10	0.1	10	0.1	50	0.2	60	0.1
<i>Pharmacists</i>	20	0.2	10	0.2	210	0.8	240	0.6
<i>Optometrists</i>	0	0.0	20	0.2	0	0.0	20	0.0
<i>Physiotherapists</i>	20	0.2	20	0.2	40	0.1	80	0.2
<i>Veterinarians</i>	10	0.1	10	0.1	70	0.3	90	0.2
<i>Other health</i>	160	1.8	140	2.0	430	1.6	730	1.7
Educational	850	9.8	1,880	26.6	2,170	8.1	4,910	11.5
<i>Pre-primary school teachers</i>	10	0.1	50	0.7	110	0.4	170	0.4
<i>Primary school teachers</i>	70	0.8	380	5.4	1,060	3.9	1,510	3.5
<i>Secondary school teachers</i>	190	2.1	1,060	15.0	450	1.7	1,700	4.0
<i>Other school teachers</i>	80	0.9	140	1.9	150	0.6	360	0.8
<i>University &amp; VET teachers</i>	420	4.8	190	2.6	340	1.3	940	2.2
<i>Other education</i>	90	1.1	70	1.0	70	0.3	230	0.5
Social arts & related	710	8.2	580	8.1	1,480	5.5	2,770	6.5
<i>Social welfare</i>	320	3.7	230	3.2	390	1.5	930	2.2
<i>Legal</i>	140	1.6	70	1.0	260	1.0	470	1.1
<i>Artists &amp; related</i>	100	1.2	100	1.5	480	1.8	680	1.6
<i>Other social, arts &amp; misc.</i>	160	1.8	180	2.5	350	1.3	690	1.6
Associate professionals	820	9.5	510	7.2	2,490	9.3	3,820	9.0
<i>Building &amp; engineering</i>	30	0.4	20	0.3	130	0.5	180	0.4
<i>Medical &amp; science technical</i>	40	0.5	20	0.3	190	0.7	250	0.6
<i>Finance, business and admin</i>	460	5.3	230	3.3	930	3.5	1,630	3.8
<i>Managers and supervisors</i>	210	2.4	100	1.4	760	2.8	1,060	2.5
<i>Others</i>	70	0.9	140	2.0	490	1.8	700	1.7
Trades	50	0.6	40	0.5	220	0.8	310	0.7
Clerical, sales & service	1,190	13.7	560	7.9	6,210	23.2	7,960	18.7
Production, transport & labourers	340	4.0	110	1.6	760	2.8	1,220	2.9
Total working	7,680	88.5	6,020	85.2	20,900	78.1	34,610	81.4
Not working (resident in Victoria) <sup>a</sup>	1,000	11.5	1,040	14.8	5,870	21.9	7,920	18.6
All	8,680	100.0	7,070	100.0	26,770	100.0	42,520	100.0

Source: Unpublished data from *Graduate Destinations Survey 2006* and *Higher Education Student Data Collection*.

Note: A person is classified to be working if they indicated 1) working more than zero hours per week; 2) described an occupation they were working in; or 3) provided the postcode of their employer. The table includes students who completed a bachelor degree or higher qualification. Excludes records for which there were missing values for international student indicator. The numbers in this table have been rounded to the nearest ten. The column sum may not add to the margin total because of rounding errors.

a Excludes international students.

**Table A8 Occupational destinations of graduates from Australian universities in 2005 working in Victoria in 2006 by field of study (%)**

Occupation	Field of study								All
	Sci, agri & environ	IT	Eng, arch & bldg	Health	Education	Man & commerce	Soc & culture	Arts	
Managers	2.2	4.3	3.3	1.7	3.9	14.1	3.6	3.1	5.8
Professionals	30.7	38.7	51.8	72.5	75.5	29.6	33.9	32.3	44.3
<i>Natural &amp; physical science</i>	14.9	0.4	1.5	1.7	0.3	0.4	0.6	0.3	1.9
<i>Building &amp; engineering</i>	1.0	1.4	28.6	0.3	0.0	0.9	0.4	0.5	2.7
<i>Civil engineers</i>	0.0	0.0	3.6	0.0	0.0	0.3	0.1	0.0	0.4
<i>Electrical engineers</i>	0.2	0.5	3.8	0.0	0.0	0.2	0.0	0.1	0.4
<i>Mechanical engineers</i>	0.1	0.0	5.0	0.1	0.0	0.1	0.0	0.0	0.4
<i>Other building &amp; engineering</i>	0.7	0.8	16.1	0.2	0.0	0.3	0.2	0.3	1.5
<i>Business &amp; information</i>	4.0	32.2	11.7	0.7	1.7	23.7	7.9	7.5	11.8
<i>Accountants</i>	0.3	0.9	0.2	0.0	0.0	8.2	1.7	0.3	2.4
<i>Sales, marketing &amp; advert</i>	0.8	1.4	1.2	0.1	0.2	4.8	0.8	3.3	1.8
<i>Computing</i>	0.6	24.7	7.4	0.1	0.3	0.9	0.5	1.5	3.1
<i>Other business &amp; information</i>	2.3	5.3	3.0	0.4	1.1	9.8	4.9	2.4	4.5
<i>Health</i>	1.9	0.5	0.4	64.4	1.8	1.1	1.9	0.7	9.7
<i>Medical practitioners</i>	0.3	0.1	0.1	8.7	0.0	0.0	0.4	0.0	1.3
<i>Nursing (division 1)</i>	0.3	0.2	0.1	38.0	1.3	0.6	0.7	0.2	5.6
<i>Dentists</i>	0.0	0.0	0.0	1.1	0.0	0.0	0.0	0.0	0.1
<i>Pharmacists</i>	0.4	0.0	0.0	3.7	0.0	0.1	0.0	0.1	0.6
<i>Optometrists</i>	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0
<i>Physiotherapists</i>	0.1	0.0	0.0	1.1	0.0	0.0	0.0	0.0	0.2
<i>Veterinarians</i>	0.0	0.0	0.0	1.4	0.0	0.0	0.0	0.0	0.2
<i>Other health</i>	0.7	0.2	0.2	10.2	0.4	0.3	0.6	0.3	1.7
<i>Educational</i>	6.3	3.2	2.1	1.5	69.5	2.0	6.4	6.6	11.5
<i>Pre-primary school teachers</i>	0.0	0.0	0.0	0.0	3.2	0.0	0.0	0.1	0.4
<i>Primary school teachers</i>	0.1	0.2	0.0	0.1	28.1	0.1	0.8	0.2	3.5
<i>Secondary school teachers</i>	0.9	0.4	0.1	0.1	27.6	0.2	2.1	2.2	4.0
<i>Other school teachers</i>	0.3	0.2	0.1	0.2	3.8	0.2	0.6	2.5	0.8
<i>University &amp; VET teachers</i>	4.5	2.1	1.6	0.8	4.5	1.4	2.4	1.4	2.2
<i>Other education</i>	0.5	0.4	0.3	0.3	2.3	0.1	0.5	0.2	0.5
<i>Social arts &amp; related</i>	2.5	1.2	7.5	4.0	2.2	1.5	16.7	16.7	6.5
<i>Social welfare</i>	0.3	0.0	0.2	1.2	1.2	0.4	8.5	0.5	2.2
<i>Legal</i>	0.1	0.0	0.1	0.0	0.0	0.3	4.9	0.2	1.1
<i>Artists &amp; related</i>	0.3	0.9	2.3	0.1	0.4	0.2	1.1	15.2	1.6
<i>Other social, arts &amp; misc.</i>	1.8	0.3	5.0	2.6	0.6	0.6	2.1	0.9	1.6
Associate professionals	10.0	13.6	12.6	6.5	2.6	12.1	8.0	6.1	9.0
<i>Building &amp; engineering</i>	0.1	0.3	4.2	0.0	0.0	0.2	0.1	0.0	0.4
<i>Medical &amp; science technical</i>	4.1	0.1	0.7	0.7	0.1	0.2	0.2	0.1	0.6
<i>Finance, business and admin</i>	1.8	9.6	4.5	1.6	0.9	6.5	2.7	2.1	3.8
<i>Managers and supervisors</i>	2.2	3.2	2.7	0.7	0.9	4.2	2.3	2.8	2.5
<i>Others</i>	1.8	0.4	0.5	3.5	0.7	1.1	2.7	1.0	1.7
Trades	1.4	1.4	1.4	0.2	0.2	0.6	0.5	1.5	0.7
Clerical, sales & service	17.5	19.7	9.7	8.2	6.1	25.8	26.0	25.8	18.7
Production, transport & labourers	3.0	6.1	4.2	1.2	1.2	4.0	1.7	3.1	2.9
Total working	64.8	83.9	82.9	90.2	89.4	86.3	73.7	71.8	81.4
Not working (resident in Vic) <sup>a</sup>	35.2	16.1	17.1	9.8	10.6	13.7	26.3	28.2	18.6
All	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
All (number)	3,670	3,430	3,230	5,690	5,010	10,110	8,590	2,800	42,520

Source: Unpublished data from *Graduate Destinations Survey 2006* and *Higher Education Student Data Collection*.

Note: A person is classified to be working if they indicated 1) working more than zero hours per week; 2) described an occupation they were working in; or 3) provided the postcode of their employer. The table includes students who completed a bachelor degree or higher qualification. Excludes records for which there were missing values for international student indicator. The numbers in this table have been rounded to the nearest ten. The row sum may not add to the margin total because of rounding errors.

a Excludes international students.

**Table A9 Field of study of graduates from Australian universities in 2005 who were working in Victoria in 2006 by occupational destination (%)**

Occupation	Field of study								All	
	Sci, agri & environ	IT	Eng, arch & bldg	Health	Edu	Man & comm	Soc & culture	Arts	%	Number
Managers	3.2	6.1	4.3	4.0	7.9	58.2	12.7	3.5	100.0	2,450
Professionals	6.0	7.0	8.9	21.9	20.1	15.9	15.4	4.8	100.0	18,840
<i>Natural &amp; physical science</i>	66.4	1.5	5.9	11.5	1.7	5.4	6.5	1.1	100.0	830
<i>Building &amp; engineering</i>	3.2	4.0	79.8	1.4	0.2	7.7	2.6	1.1	100.0	1,160
<i>Civil engineers</i>	1.0	0.0	76.7	0.0	0.0	16.7	5.6	0.0	100.0	150
<i>Electrical engineers</i>	4.7	10.9	72.8	0.0	0.0	10.3	0.3	0.9	100.0	170
<i>Mechanical engineers</i>	1.4	0.0	87.2	2.5	0.0	8.1	0.0	0.8	100.0	190
<i>Other bldg &amp; engineering</i>	3.9	4.3	80.1	1.8	0.3	4.8	3.3	1.5	100.0	650
<i>Business &amp; information</i>	2.9	21.9	7.5	0.7	1.7	47.5	13.5	4.2	100.0	5,030
<i>Accountants</i>	1.1	2.8	0.5	0.0	0.2	80.5	14.1	0.8	100.0	1,030
<i>Sales, marketing &amp; advert</i>	3.6	6.0	4.9	1.1	1.2	62.2	8.9	12.1	100.0	780
<i>Computing</i>	1.8	65.0	18.5	0.4	1.2	6.7	3.3	3.1	100.0	1,300
<i>Other business &amp; info</i>	4.5	9.4	5.0	1.3	2.9	51.6	21.8	3.5	100.0	1,930
<i>Health</i>	1.7	0.4	0.3	88.3	2.2	2.7	4.0	0.5	100.0	4,150
<i>Medical practitioners</i>	2.3	0.8	0.6	89.4	0.3	0.4	6.2	0.0	100.0	550
<i>Nursing (division 1)</i>	0.5	0.2	0.1	91.0	2.7	2.5	2.6	0.3	100.0	2,370
<i>Dentists</i>	0.0	0.0	0.0	97.5	0.0	0.0	2.5	0.0	100.0	60
<i>Pharmacists</i>	6.7	0.0	0.0	86.5	0.0	4.0	1.3	1.6	100.0	240
<i>Optometrists</i>	0.0	0.0	0.0	82.8	0.0	9.4	7.8	0.0	100.0	20
<i>Physiotherapists</i>	3.1	0.0	0.0	85.1	2.5	5.0	4.4	0.0	100.0	80
<i>Veterinarians</i>	1.3	0.0	0.0	88.4	2.0	4.5	3.8	0.0	100.0	90
<i>Other health</i>	3.3	0.9	0.9	79.2	2.9	4.2	7.4	1.1	100.0	730
<i>Educational</i>	4.7	2.2	1.4	1.8	70.8	4.0	11.3	3.7	100.0	4,910
<i>Pre-primary sch teachers</i>	0.9	0.0	0.0	0.9	95.3	0.0	1.9	1.0	100.0	170
<i>Primary school teachers</i>	0.3	0.4	0.1	0.2	93.4	0.4	4.8	0.5	100.0	1,510
<i>Secondary school teachers</i>	1.9	0.7	0.1	0.4	81.4	1.3	10.6	3.6	100.0	1,700
<i>Other school teachers</i>	3.0	1.7	1.2	2.5	52.9	4.3	15.0	19.4	100.0	360
<i>University &amp; VET teachers</i>	17.4	7.5	5.5	5.0	23.9	14.9	21.6	4.2	100.0	940
<i>Other education</i>	8.4	6.2	3.7	7.7	48.8	6.4	16.9	2.0	100.0	230
<i>Social arts &amp; related</i>	3.3	1.5	8.8	8.1	4.1	5.6	51.7	16.9	100.0	2,770
<i>Social welfare</i>	1.1	0.2	0.6	7.5	6.5	3.9	78.7	1.4	100.0	930
<i>Legal</i>	1.2	0.0	0.5	0.5	0.2	7.2	88.9	1.5	100.0	470
<i>Artists &amp; related</i>	1.4	4.4	10.9	0.6	2.8	3.6	13.9	62.4	100.0	680
<i>Other social, arts &amp; misc.</i>	9.7	1.3	23.5	21.7	4.6	8.9	26.8	3.5	100.0	690
Associate professionals	9.6	12.2	10.6	9.7	3.4	32.0	18.0	4.5	100.0	3,820
<i>Building &amp; engineering</i>	2.4	5.1	74.5	1.4	0.0	11.2	4.7	0.8	100.0	180
<i>Medical &amp; science technical</i>	59.4	1.2	9.1	15.4	1.5	6.7	5.2	1.7	100.0	250
<i>Finance, business and admin</i>	4.0	20.2	8.9	5.6	2.8	40.4	14.5	3.6	100.0	1,630
<i>Managers and supervisors</i>	7.7	10.5	8.1	3.7	4.4	39.8	18.5	7.4	100.0	1,060
<i>Others</i>	9.5	2.0	2.5	28.2	4.6	15.5	33.5	4.1	100.0	700
Trades	16.9	14.9	14.1	3.2	3.4	20.9	12.8	13.7	100.0	310
Clerical, sales & service	8.1	8.5	4.0	5.8	3.8	32.8	28.0	9.1	100.0	7,960
Prod, transport & labourers	9.2	17.2	11.0	5.5	5.1	32.7	12.3	7.1	100.0	1,220
Total working	6.9	8.3	7.7	14.8	12.9	25.2	18.3	5.8	100.0	34,610
Not working (resident in Vic) <sup>a</sup>	16.3	7.0	7.0	7.0	6.7	17.5	28.5	10.0	100.0	7,920
All	8.6	8.1	7.6	13.4	11.8	23.8	20.2	6.6	100.0	42,520

Source: Unpublished data from *Graduate Destinations Survey 2006* and *Higher Education Student Data Collection*.

Note: A person is classified to be working if they indicated 1) working more than zero hours per week; 2) described an occupation they were working in; or 3) provided the postcode of their employer. The table includes students who completed a bachelor degree or higher qualification. Excludes records for which there were missing values for international student indicator. The numbers in this table have been rounded to the nearest ten. The column sum may not add to the margin total because of rounding errors.

a Excludes international students.

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## Appendix 7 Stakeholder consultations

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### **CPA Australia**

CPA Australia does not generally conduct its own modelling of future supply and demand for accountants and associate professionals, and utilises government and university reports to assist it in forecasting. However, it has detailed knowledge about the emerging industry trends and their likely impact on the demand for personnel.

There is currently a shortage of accountants in Australia, which has emerged from a number of demand and supply issues.

#### ***Demand issues***

Factors that are driving a growth in demand for accountants and associate professionals include:

- Need for high-level accountancy skills and a greater professionalisation of the workforce to deal with increasingly complex issues (e.g. global accounting standards and international reporting requirements, financial services reforms and company law reform).
- Recent corporate collapses has made business and industry realise the importance of a professional accountancy workforce.
- Increasing funds management services, compulsory superannuation and other factors are contributing to higher demand for investment services, thus affecting the demand for financial advisors.
- The recognition and licensing of associate professionals in the areas of financial services, tax agents and BAS service providers will see work historically performed by professional accountants with higher education qualifications shift to occupations requiring VET-level qualifications. There are concerns by government, however, that there is insufficient rigor in the training of some of these occupations and there will be an increased emphasis on training standards.
- The experience of other jurisdictions suggests there is a possibility that more accounting work will be outsourced overseas, especially the less complex aspects of accounting work, creating additional pressures for small to medium sized accounting practices. These practices are already being challenged, with much of their standard work now performed by less qualified accounting technicians.
- Concern exists that medium to large employers are not investing in staff induction and on-the-job training and are expecting education programs will deliver ‘job ready’ graduates.

#### ***Supply issues***

Factors influencing the supply of accountants and associate professionals include:

- The ‘traditional’ image of the accounting profession is not seen as a highly attractive choice by domestic school leavers, which leads to an opportunity to educate school leavers about the variety of roles performed by finance, accounting and business professionals and the associated career opportunities. The large accounting firms have recently resorted to offering scholarships to school leavers. .
- A high proportion of CPA Australia’s membership is in the 45-64 year age group, indicating a significant potential loss of knowledge and experience to the sector in the future and a need to ensure there is planning for replacement. There is also increasing interest by qualified accountants in this age group to return to the accounting workforce, with many preferring to take up part-time positions.

- Increasing numbers of females are entering the accounting profession. It is unclear at this stage how this might influence future supply trends, given the differing of patterns of females entering, leaving and re-entering the workforce.
- Through the skilled migration program, accountants score extra points. While qualified accountants are gaining entry to work in Australia, the take-up by employers has not been as strong as anticipated. CPA Australia is working closely with its equivalent professional bodies in a range of countries to establish mutual recognition arrangements. It is hoped this will reduce barriers to employment for qualified accountants from overseas.
- International mobility of the accounting workforce will increase significantly in the future due to the shift to global accounting and reporting standards.

#### ***Response to preliminary projections of higher education demand***

CPA Australia indicated that preliminary projections had face validity and agreed in broad terms with the skills deepening assumptions. The figures on higher education completions are consistent with the new memberships recorded by CPA Australia. CPA Australia will provide its figures on higher education completions for comparison purposes.

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#### **Department of Education and early Childhood Development**

The Department's *Data and Evaluation Division* develops projections of teacher demand and the Victorian Institute of Teaching provides estimates of teacher supply for Departmental workforce planning purposes. The projections indicate that while supply and demand for the total number of school teachers will broadly be in balance, significant imbalances may occur at some levels, geographic locations and in some subject areas. The Department projects a significant surplus of primary teachers and shortage of secondary teachers to 2010. In this period, a shortage of approximately 500 secondary teachers a year is anticipated.

School census data on teacher recruitment difficulties for 2007 indicates that secondary teachers are needed over the whole range of school subjects with the areas in greatest demand, including: mathematics, general science, physics, Languages Other Than English (LOTE), information technology and technology subjects. Primary teachers with qualifications in LOTE, physical education or music are also in demand as is the need for appropriately qualified special education teachers.

#### ***Demand issues***

A number of factors are likely to influence the future demand for teachers:

- The Department is currently assessing the impacts of a possible significant reform to its teaching delivery model. The model will aim to:
  - make better use of the expertise of teachers and enhance the professionalisation of the teacher workforce
  - introduce an associate professional workforce to support teachers and to undertake some the tasks currently assigned to teachers that do not require teaching skills.

If such a policy were to be adopted by the government, it would have significant implications for workforce projections and planning in the period under analysis (especially 2010-2022).

- The trend towards professionalisation of early childhood teaching will increase demand for teachers with higher education qualifications.

#### ***Supply issues***

There are a number of factors influencing the future supply of teachers:

- While there is a surplus of primary teachers and undersupply of secondary teachers, university students continue to prefer to choose primary teaching in preference to secondary teaching.

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Universities tend to focus more on meeting the market demands of university students than the needs of teacher employers.

- The provision of additional university places will not address the above issue unless they are targeted towards graduating secondary teachers and to particular subject areas.
- Challenges being experienced by universities to find student practicum placements and the perceived under-funding of the practicum component by the Commonwealth government (e.g. practicum supervisor rates have remained static for many years).
- With regard to the shortage of secondary teachers, the Department has identified the following possible sources of teachers and has introduced associated initiatives in some areas:
  - registered teachers not currently teaching
  - teachers within the existing casual and relief teacher pool
  - overseas teachers
  - interstate teachers.

Another strategy considered is to allow primary-trained teachers to teach up to Year 8 in secondary schools.

- The Victorian Government has committed to a Maths and Science Education Strategy which will help strengthen the supply, distribution and quality of maths and science (general science, physics and chemistry) teachers. Strategies include a new Maths and Science teaching scholarship which offers incentives for final year Maths and Science students to move on to teaching qualification.

### ***Response to preliminary projections of higher education demand***

The preliminary CEET projections are at the level of ‘school teachers’ and do not differentiate between different levels of schooling. They also include early childhood teachers, whereas the Department’s projections do not. Therefore, the Department was reluctant to agree to the reasonableness of the projections given that future enrolments are likely to decrease, noting that the total number of school teachers projected for 2022 (100,000) may be higher than expected.

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### **Law Institute of Victoria**

The Law Institute does not generally conduct its own modelling of future supply and demand for law professionals and associate professionals. The Institute reports, however, that there is currently a shortage of law professionals in Australia.

#### ***Demand issues***

There are a number of factors influencing the current and future demand for law professionals:

- There is a massive growth in the sector, with larger law firms moving into Asia and India to capitalise on the growth opportunities in those markets.
- There is growing demand from government for legally trained professionals.
- Significant demand also exists for combined law/accounting qualifications.

#### ***Supply issues***

There are a number of factors influencing the future supply of law professionals:

- A substantial percentage of law graduates never practise law – the exact percentage is not known.
- With Australian legal training highly regarded in the US and UK, there is an increasing loss of law graduates to overseas countries.
- The College of Law Victoria will shortly introduce a 16 weeks intensive fee-paying program to train law graduates ready for the workplace. This will be an alternative to the traditional

‘articles’ graduate pathway that is anticipated will be popular with graduates and with Law Firms. The program is delivered largely online and participants can work and study simultaneously. Completion of the College of Law program will act as a guide to employability.

- RMIT has recently opened a new law school and law university enrolments continue to grow.
- While females make up the majority of law graduates, many choose to leave the profession. Possible factors include a lack of flexibility in working conditions (e.g. it is difficult to find part-time positions in law), job design and organisational cultures.
- The industry has not focused on skilled migration as a possible source of law professionals.
- Specialised law skills and knowledge have traditionally been acquired on the job and then assessed through examinations conducted by the Law Institute allowing on completion the use of the nominal Accredited Specialist. Participants in this program are required to have had at least five years in the workplace. Younger law professionals, however, prefer to acquire their specialist training by completing a masters degree and their preference seems to be a more continuous period of study.

### ***Response to preliminary projections of higher education demand***

The preliminary projections are at the level of ‘Miscellaneous social professionals’ which includes law professionals, and hence it is difficult for the Law Institute to comment in any detail. However, it was agreed that assumptions in relation to skills deepening are appropriate. Skills deepening in areas such as mediation, negotiation and collaboration are evident within the Continuing Professional Development Program. Whilst this is a relatively new program, uptake of short-course and specific skills training has been widespread, leading to the reflection that current practitioners are prepared to undertake a range of extra training.

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## **AusBiotech**

AusBiotech does not conduct its own modelling of workforce development. It maintains close relationships with the industry and receives ongoing advice from its constituents about supply and demand issues.

### ***Demand issues***

Key factors influencing workforce demand in the biotechnology industry include:

- Significant growth is projected in the industry, particularly in the industrial, biological and human biotechnology fields. Growth in agricultural biotechnology is restricted by the GM ban in some states, but this could also be a growth sector if bans were lifted.
- The industry will enjoy long-term sustainability due to Australia’s established capability in medical research and related fields. In addition, the government is committing resources to national infrastructure development and has identified the medical devices sector as a priority area for development.
- The biotechnology industry relies on a comprehensive mix of professionals, including science-based researchers with higher qualifications, engineers, industrial designers, technicians, intellectual property lawyers, accountants and business professionals with commercialisation skills.
- There is a growing trend for Australian companies to outsource aspects of their operations (e.g. non-human clinical trials, toxicology) to China, India and other countries, as it is judged more cost-effective. The reverse is also occurring, with other countries outsourcing aspects of their processes to Australia.

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### ***Supply issues***

Factors influencing workforce supply in the biotechnology industry include:

- Shortages currently exist across many of the professional areas, including:
  - o science graduates
  - o engineers
  - o experienced quality assurance managers, including those with knowledge of international regulatory requirements
  - o people with experience (including international experience) in the commercialisation of IP.
- The medical devices sector reports a severe shortage of professionals required within the sector.
- There is continuing need for government support for the industry. For example, the Commonwealth Department of Industry, Tourism and Resources is developing a national Medical Devices Industry Action Agenda, and has commissioned studies to examine the skill needs of the industry.
- While the industry has not to date been relying on skilled migration as a mechanism for recruiting staff, there is a growing trend to search overseas for higher level jobs in selected areas (e.g. commercialisation skills, engineers).
- AusBiotech has established student associations, which are playing an active role in running residential programs for high school students to introduce them to science and the career opportunities it offers.

### ***Response to preliminary projections of higher education demand***

While AusBiotech has no data of its own to verify the study's base and projected data, the preliminary projects are judged as having face validity. In particular, there is agreement that there will be increasing demand for scientists with postgraduate qualifications.

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### **Engineers Australia (Victorian division)**

Engineers Australia does not conduct its own modelling for the purposes of assessing projected supply and demand of engineers and associate professionals. Through its role in accrediting university engineering courses, however, Engineering Australia (Victorian division) has a good understanding of trends in higher education. It also works closely with its constituent industry sectors within the state to develop workforce strategies. It also undertakes professional recognition processes on behalf of the government for skilled migration purposes.

The ten-year review of engineering education is currently being conducted and this will provide useful insights into the national higher education context.

Based on its ongoing interactions with Victorian employers and industry groups, Engineers Australia (Victorian division) offered a number of observations about engineering workforce demand and supply within the state.

### ***Demand issues***

Factors influencing workforce demand include:

- Demand for civil engineers emerging from large infrastructure developments. IT engineering and mechatronics are also judged future growth areas.
- The government outsourcing of public utilities within Victoria has resulted in a gap in recruitment and training for particular engineering specialisations and significant skill shortages are predicted in power rail and water.

- The growing globalisation of the engineering profession is resulting in more Australian companies winning large overseas infrastructure projects, further increasing demand for qualified professionals.
- There is also a trend to outsource some functions to other countries (e.g. design), as it is more cost-effective. There are concerns this will lead to a weakening of capability within Australia.
- There is increasing demand for building and engineering associate professionals (e.g. technologists) to supplement the work of professional engineers.

### ***Supply issues***

- While the government has made more places available for engineering courses, student demand has not been sufficiently strong on a national basis to fill them.
- There is a difficulty in attracting students with the appropriate entry standards in maths and science, which extends back to issues in primary and secondary schooling.
- There are indications that students undertaking combined engineering/commerce degrees initially focus their careers on the commerce side due to increased earning capacity. However, some return to engineering after spending time in private sector companies outside of engineering.
- Universities are closing down technology courses through lack of demand. This goes against the international trend of a growth in associate professionals.
- A national approach is required to ensure that courses are being offered in key niche areas (e.g. power, rail and water).
- Based on qualitative feedback, skilled migration and temporary work permits (457 visas) are not succeeding in addressing the Victorian skills shortage to the extent anticipated by governments. Migrants admitted under the skilled migration scheme (who are often Australian-trained) are not necessarily finding employment. Language and cultural barriers, together with lack of practical experience, are contributing factors. With respect to temporary work permits, employers wish to recruit staff with a high probability of longevity in the job and the costs of recruiting with 457 visas are quite high. It is not clear if this is also the experience in other states and territories.
- Despite the shortage of engineers, there has not been a re-emergence of industry cadetships, scholarships and other schemes aimed at addressing the shortage.
- While some companies have a strong culture of developing and mentoring staff, a greater investment by industry in developing its human capital would pay dividends in terms of addressing skill shortages over the longer term. The costs of staff turnover and recruitment are not universally understood.
- Once the resources boom subsides, there may be scope to assist mining engineers to acquire the specialist skills required to move into civil engineering.

### ***Response to preliminary projections of higher education demand***

Engineers Australia (Victorian division) did not raise any questions or concerns in relation to the preliminary projections.

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### **Association of Professional Engineers, Scientists and Managers, Australia (APESMA)**

The Association represents a broad range of professionals, including engineers, IT professionals, scientists, pharmacists, architects and surveyors.

While the Association does not undertake modelling on workforce supply and demand, it conducts regular remuneration surveys for its various membership groups and these provide considerable insight into supply and demand issues through tracking salary trends. The Association also

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commissions occasional studies in relevant areas. For example, it has recently commissioned a study in relation to civil engineering enrolment and completion trends.

### ***Demand issues***

Factors influencing current and future demand for professionals represented by APESMA include:

- There is currently a very strong labour market for engineers, in particular for:
  - o civil engineers
  - o mining engineers
  - o structural engineers
  - o environmental engineers and scientists
  - o biomedical engineers.
- There is also strong demand for:
  - o geophysical scientists (e.g. geology, metallurgy)
  - o physicists
- Demand for IT professionals, including multimedia professionals, is recovering after a dramatic drop after Y2K.
- Employers will increasingly be looking for scientists with postgraduate qualifications. A basic science degree is not sufficient to guarantee employment and a career in a hands-on science role.

### ***Supply issues***

Factors influencing the current and future supply of APESMA professional groups include:

- A cutback in recruitment of engineers in the 1980s and early 1990s has resulted in an age profile within the profession that is not consistent across all age groups. When the ‘baby boomers’ retire, there will be a significant shortage of experienced engineers to fill their shoes. This trend will be partially balanced by older workers staying in the workforce for longer, often on a part-time basis.
- The significant cut back in civil engineering higher education places over the last 15 years has resulted in a significant shortage within the profession. This is predicted to have a substantial impact on Australia’s capacity to deliver the upcoming program of national infrastructure projects on time.
- The relatively low completion rate for engineering students is of concern. Factors perceived as contributing to attrition include workload and high numbers of contact hours, corresponding difficulty in taking up part-time work to support their studies, mathematics capability and engineer salaries reaching a plateau early in careers. Students are choosing commerce and law in preference due to greater long term earning capacity.
- There is a need for a more diverse set of pathways into engineering (e.g. a science degree followed by an engineering PG qualification). The Melbourne Model, for example, will provide a number of pathways.
- Low demand for science courses and the low percentage of science graduates who choose to work in a science role. This issue extends back to student engagement with science in secondary school. There are opportunities, with the right government policies, to encourage the retraining of engineers as teachers when they choose to leave the engineering profession.
- The increasing globalisation of the engineering workforce will continue to see an increasing leakage of Australian engineers to overseas countries.
- With the exception of some specific sectors such as mining, industry is not relying heavily on international recruitment or skilled migration to address skill shortages. Engineers from overseas entering through skilled migration are encountering difficulties in finding jobs due to

perceived weaknesses in English language skills. Companies with offshore operations are becoming more likely to attract migrants as they have greater opportunities to ‘talent search’ overseas.

- The Association has recently been working with the Department of Victorian Communities and has successfully placed 30 migrants into employment, with additional training and support in language and culture.
- The engineering profession and associated industries do not have strong ‘family friendly’ policies, and there is a high attrition of female engineers from the workforce especially after they have had children.
- The Association is promoting the introduction of cadetship or similar programs, whereby the employer pays the student’s HECS fees. Fringe benefit tax requirements, however, act as a disincentive to employers.

***Response to preliminary projections of higher education demand***

The Association supports the skills deepening assumptions contained within the CEET model.

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**Australian Institute of Management (AIM) (Victoria)**

AIM members are drawn from a wide diversity of professions and organisations. In responding to the preliminary projections of higher education demand, AIM Victoria made a number of observations:

- In labour force surveys, the term ‘manager’ is often used somewhat loosely. There is a trend in organisations to designate a wide range of positions as being management positions (often as a staff retention strategy) when they do not entail the full range of responsibilities typically associated with management. Information about the size of the organisation and the organisational unit being managed is needed to make valid judgements about the accuracy of the job title and description.
- It is consequently difficult for the AIM to confirm the face validity of the forward estimates of the number of managers in employment.
- While the AIM supports the skills deepening assumptions within the CEET model in principle, it observes that managers are requiring and are seeking progressive skills enhancement. This can occur in a variety of ways (e.g. on-the-job technical specialisation) and does not always involve the acquisition of qualifications per se.
- There is strong demand for people with management skills, especially in finance and marketing.
- The AIM observes there are significant workforce shortages in engineering, science and medicine. Government needs to intervene to create a more robust career path for scientists.

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**Department of Human Services**

The Department undertakes extensive modelling of supply and demand for all personnel in health sector, including the key professional groups of medical practitioners and nurses. It is working closely with Treasury and the Department of Premier and Cabinet to implement strategies to address the state’s future workforce needs.

***Demand issues***

Factors influencing the future demand for professionals within the human services professions include:

- The health sector is expected to grow faster than other sectors, with health expenditure rising faster than GDP. Growth is attributed to a range of environmental drivers, including:

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- o population ageing
  - o increase in average income driving demand for services
  - o technology.
  - Future projections of skill needs in nursing should consider government policy to utilise more fully the skills of university-qualified nurses (division 1), whilst increasing the numbers of VET qualified enrolled nurses (division 2). Similar policies will apply in the allied health fields.

### ***Supply issues***

Factors influencing the future supply of professionals within the human services professions include:

- up to 40% of the nursing workforce is expected to retire over the next 10 years
- the new medical school at Deakin University and the growth in medical places will increase future supply of medical practitioners.

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### **Australian Information Industry Association**

The Association is currently undertaking work on a workforce demand model, as part of a wider analysis of industry skills issues including industry practices and trends in relation to up-skilling and training, the reasons why Year 8-10 students turn away from science, maths and technology and promoting the attractiveness of careers in ICT. The modelling is taking into account a range of factors, including technology development, global capital markets and demographics. The Association also conducts regular remuneration surveys, which provides it with insights in relation to workforce supply and demand.

The Association supports all efforts by governments to develop and maintain workforce models that produce robust information. The capacity to develop these models is encouraged.

The Association has found from its own analyses that a very high correlation exists between investment in IT and the number of IT staff employed, and judges this helpful for modelling purposes.

### ***Demand issues***

Factors influencing the future demand for computing professionals include:

- The pool of people that can be drawn upon for workforce participation is projected to be getting smaller (i.e. there are projected to be more jobs than people to fill them by 2015).
- The situation for the IT industry is particularly exacerbated by the fact that computing professionals will be in demand across all industries and hence it will be competing with those industries for access to the talent pool. With a shortage of labour, industry will turn to ICT as a solution, driving up workforce demand for computing professionals even further.
- A pertinent example concerns the health industry – the impact of ICT on healthcare will continue to be extremely significant. This will drive up investment in ICT and the demand for ICT skills. The management of climate change is similarly predicted to create an increased demand.
- Global mobility is changing the workforce dynamics within the industry.

### ***Supply issues***

Factors influencing the future supply of computing professionals include.

- The Association is concerned that future demand will outstrip supply for IT professionals.
- In particular, there is a concern there will be an insufficient supply of talented professionals to take up ICT research roles. The labour market for IT professionals is tightening (as demonstrated by emerging growth in salaries). This will encourage more graduates to take up

jobs on completion rather than continue on to postgraduate study (the reverse has been happening since 2001).

- The Association has identified five workforce supply channels into IT:
  - education to work (noting that not all jobs in the industry require ICT qualifications)
  - up-skilling/re-skilling
  - professionals moving into the industry from other industries
  - overseas professionals coming to work in Australia
  - staff sourced from overseas and employed in overseas posts by Australian companies (a relatively new source).
- National higher education statistics may underestimate the number of enrolments and completions in IT, due to the popularity of double degrees. The statistics only report one of the double degree specialisations.
- The IT industry has typically only hired staff with IT qualifications above a TAFE Diploma. There has also been a tendency to recruit IT graduates into positions that do not necessarily require IT skills. There is a growing willingness to consider filling some categories of jobs with VET-level computing graduates.
- Female participation in the industry has declined from approximately 26 per cent to 20 per cent over recent years, highlighting the need to continue to look for strategies to attract and retain female computing professionals.
- The rate of change in technology necessitates the ongoing training and up-skilling of IT professionals. Vendor and in-house training is becoming more significant within the industry though this is rarely captured in national education and training statistical collections.

#### ***Response to preliminary projections of higher education demand***

The Association indicates that the skills deepening assumptions within the model are appropriate. It notes, however, that the projected percentage increase in employees with postgraduate qualifications may not necessarily translate into a higher percentage with postgraduate IT qualifications. The Association has noted that IT graduates progressing directly into postgraduate study tend to undertake further study in IT, while those that have been in the workforce for a period tend to undertake postgraduate study in other areas (e.g. management).

The Association agrees that the modelling assumptions and outcomes relating to the number of computing professionals employed in 2007 and 2022 have face validity.

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#### **Multimedia Victoria (Department of Innovation, Industry and Regional Development)**

Multimedia Victoria (MMV) works to grow the ICT sector, and drive economic growth through access to and use of sophisticated ICT.

In general, MMV is currently observing an imbalance in the ICT labour market, with demand higher than supply. It predicts severe shortages of ICT professionals in future when the pipeline impact of the drop in commencements in recent years is fully realised.

#### ***Demand issues***

- There is strong demand for high-level skills, especially where ICT skills are combined with other skills in demand in the workforce (e.g. business, communication, management). There are also skill shortages in selected niche areas.
- While higher education qualifications may not always be a job requirement, employers generally prefer to employ university graduates because they believe them to possess high-level analytical skills.

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- While employers put an emphasis on skills, they also rate work attitudes and motivation as critical factors. Employers are dissatisfied with the work readiness of graduates and there is industry debate concerning the extent that employers need to play a role in inducting graduates into the workforce.
  - There is a trend to outsource lower level ICT work to other countries.

### ***Supply issues***

- As noted above, the drop in domestic university ICT commencements over recent years is a concern to the industry.
- A large percentage of ICT graduates do not enter the workforce as ICT professionals, or enter the workforce as ICT professionals within other industries.
- Overseas students comprise a very high percentage of ICT enrolments and the government's expectations that its migration policies will lead to overseas student graduates staying to work productively in Australia have not been realised. While many graduates obtain permanent residency, this is not necessarily leading to employment in the industry. Language skills in particular have been a barrier. Despite misperceptions to the contrary, ICT professionals require excellent communication skills.
- A pattern is emerging of overseas students completing courses to assist them to gain permanent residency without necessarily intending to work in those areas.
- Skilled migration has proven more successful when it involves the entry of professionals trained overseas with prior work experience.
- The ICT industry has also been relying on temporary 457 work permits to attract professionals into Australia, particularly in niche areas. Many entrants are progressing to permanent residency.
- As the market demand for ICT graduates has recovered, there has been a marked decline in the number of graduates continuing into postgraduate study. The financial return on investment of postgraduate study is quite small, especially when graduate salaries are high. This suggests a potential shortage in the future of the higher level skills sought by employers.

### ***Response to preliminary projections of higher education demand***

The skills deepening assumptions within the CEET projection model are broadly consistent with MMV's observations of employer demand.

The DEST information technology higher education commencements, enrolments and completions figures utilised in the CEET model differ from the DEST figures held by MMV. The differences are accounted for by the fact that the CEET model excludes courses at the sub-degree level.

## Appendix 8 List of occupations—ASCO 4-digit

**Table A10 List of occupations—ASCO 4-digit**

Code	Occupation title	Code	Occupation title
<b>1000</b>	<b>Managers &amp; administrators</b>	2325	Registered mental health nurses
1111	Legislators & government appointed officials	2326	Registered developmental disability nurses
1112	General managers	2381	Dental practitioners
1191	Building and construction managers	2382	Pharmacists
1192	Importers, exporters and wholesalers	2383	Occupational therapists
1193	Manufacturers	2384	Optometrists
1211	Finance managers	2385	Physiotherapists
1212	Company secretaries	2386	Speech pathologists
1213	Human resource managers	2387	Chiropractors and osteopaths
1221	Engineering managers	2388	Podiatrists
1222	Production managers	2391	Medical imaging professionals
1223	Supply and distribution managers	2392	Veterinarians
1224	Information technology managers	2393	Dieticians
1231	Sales and marketing managers	2394	Natural therapy professionals
1291	Policy and planning managers	2399	Other health professionals
1292	Health services managers	2411	Pre-primary school teachers
1293	Education managers	2412	Primary school teachers
1294	Commissioned officers (management)	2413	Secondary school teachers
1295	Child care coordinators	2414	Special education teachers
1296	Media producers and artistic directors	2421	University lecturers and tutors
1299	Other specialist managers	2422	Vocational education teachers
1311	Mixed crop and livestock farmers	2491	Extra-systemic teachers
1312	Livestock farmers	2492	English as a second language teachers
1313	Crop farmers	2493	Education officers
1314	Aquaculture farmers	2511	Social workers
<b>2000</b>	<b>Professionals</b>	2512	Welfare and community workers
2111	Chemists	2513	Counsellors
2112	Geologists and geophysicists	2514	Psychologists
2113	Life scientists	2515	Ministers of religion
2114	Environmental & agricultural science prof.	2521	Legal professionals
2115	Medical scientists	2522	Economists
2119	Other natural & physical science professionals	2523	Urban and regional planners
2121	Architects and landscape architects	2529	Other social professionals
2122	Quantity surveyors	2531	Visual arts and crafts professionals
2123	Cartographers and surveyors	2532	Photographers
2124	Civil engineers	2533	Designers and illustrators
2125	Electrical and electronics engineers	2534	Journalists and related professionals
2126	Mechanical, production & plant engineers	2535	Authors and related professionals
2127	Mining and materials engineers	2536	Film, television, radio and stage directors
2128	Engineering technologists	2537	Musicians and related professionals
2129	Other building & engineering professionals	2538	Actors, dancers and related professionals
2211	Accountants	2539	Media presenters
2212	Auditors	2541	Air transport professionals
2213	Corporate treasurers	2542	Sea transport professionals
2221	Marketing and advertising professionals	2543	Occupational and environmental health prof.
2222	Technical sales representatives	2549	Other professionals
2231	Computing professionals	<b>3000</b>	<b>Associate professionals</b>
2291	Human resource professionals	3111	Medical technical officers
2292	Librarians	3112	Science technical officers
2293	Mathematicians, statisticians and actuaries	3121	Building, architectural & surveying associate prof.
2294	Business and organisation analysts	3122	Civil engineering associate professionals
2295	Property professionals	3123	Electrical engineering associate professionals
2299	Other business and information professionals	3124	Electronic engineering associate professionals
2311	Generalist medical practitioners	3125	Mechanical engineering associate professionals
2312	Specialist medical practitioners	3129	Other building and engineering associate prof.
2321	Nurse managers	3211	Branch accountants & managers (fin. institution)
2322	Nurse educators and researchers	3212	Financial dealers and brokers
2323	Registered nurses	3213	Financial investment advisers
2324	Registered midwives	3291	Office managers

**Table A10 Contd.**

Code	Occupation title	Code	Occupation title
3292	Project and program administrators	4431	Plumbers
3293	Real estate associate professionals	4511	Meat tradespersons
3294	Computing support technicians	4512	Bakers and pastrycooks
3311	Shop managers	4513	Cooks
3321	Restaurant and catering managers	4519	Other food tradespersons
3322	Chefs	4611	Farm overseers
3323	Hotel and motel managers	4612	Shearers
3324	Club managers (licensed premises)	4613	Wool, hide and skin classers
3325	Caravan park and camping ground managers	4614	Animal trainers
3329	Other hospitality and accommodation managers	4621	Nurserypersons
3391	Sport and recreation managers	4623	Gardeners
3392	Customer service managers	4911	Graphic pre-press tradespersons
3393	Transport company managers	4912	Printing machinists and small offset printers
3399	Other managing supervisors (sales and service)	4913	Binders and finishers
3411	Enrolled nurses	4914	Screen printers
3421	Welfare associate professionals	4921	Wood machinists and turners
3491	Ambulance officers and paramedics	4922	Cabinetmakers
3492	Dental associate professionals	4929	Other wood tradespersons
3493	Aboriginal & Torres Strait Islander health workers	4931	Hairdressers
3494	Massage therapists	4941	Clothing tradespersons
3911	Police officers	4942	Upholsterers and bedding tradespersons
3991	Primary products inspectors	4943	Footwear tradespersons
3992	Safety inspectors	4944	Leather goods, canvas goods & sail makers
3993	Sportspersons, coaches & related support workers	4981	Marine construction tradespersons
3994	Senior non-commissioned defence force officers	4982	Glass tradespersons
3995	Senior fire fighters	4983	Jewellers and related tradespersons
3996	Retail buyers	4984	Florists
3997	Library technicians	4985	Fire fighters
3999	Other miscellaneous associate professionals	4986	Drillers
<b>4000</b>	<b>Tradespersons</b>	4987	Chemical, petroleum and gas plant operators
4111	General mechanical engineering tradespersons	4988	Power generation plant operators
4112	Metal fitters and machinists	4991	Defence force members not elsewhere included
4113	Toolmakers	4992	Performing arts support workers
4114	Aircraft maintenance engineers	4999	Other miscellaneous tradespersons
4115	Precision metal tradespersons	<b>5000</b>	<b>Advanced clerical &amp; service</b>
4121	General fabrication engineering tradespersons	5111	Secretaries and personal assistants
4122	Structural steel and welding tradespersons	5911	Bookkeepers
4123	Forging tradespersons	5912	Credit and loans officers
4124	Sheetmetal tradespersons	5991	Advanced legal and related clerks
4125	Metal casting tradespersons	5992	Court and hansard reporters
4126	Metal finishing tradespersons	5993	Insurance agents
4211	Motor mechanics	5994	Ins. risk surveyors, investigators & loss adjusters
4212	Automotive electricians	5995	Desktop publishing operators
4213	Panel beaters	5996	Travel attendants
4214	Vehicle painters	5999	Other misc. advanced clerical & service workers
4215	Vehicle body makers	<b>6000</b>	<b>Intermediate clerical, sales &amp; service</b>
4216	Vehicle trimmers	6111	General clerks
4311	Electricians	6121	Keyboard operators
4312	Refrigeration & air-conditioning mechanics	6131	Receptionists
4313	Electrical distribution tradespersons	6141	Accounting clerks
4314	Electronic instrument tradespersons	6142	Payroll clerks
4315	Electronic & office equipment tradespersons	6143	Bank workers
4316	Communications tradespersons	6144	Insurance clerks
4411	Carpentry and joinery tradespersons	6145	Money market and statistical clerks
4412	Fibrous plasterers	6151	Production recording clerks
4413	Roof slaters and tilers	6152	Transport and despatching clerks
4414	Bricklayers	6153	Stock and purchasing clerks
4415	Solid plasterers	6191	Inquiry and admissions clerks
4416	Wall and floor tilers and stonemasons	6192	Library assistants
4421	Painters and decorators	6193	Personnel clerks
4422	Signwriters	6194	Intermediate inspectors and examiners
4423	Floor finishers	6199	Other intermediate clerical workers

**Table A10 Contd.**

Code	Occupation title	Code	Occupation title
6211	Sales representatives	8211	Sales assistants
6212	Motor vehicle & related products salespersons	8291	Checkout operators & cashiers
6213	Retail & checkout supervisors	8292	Ticket salespersons
6311	Education aides	8293	Street vendors
6312	Children's care workers	8294	Telemarketers
6313	Special care workers	8295	Sales demonstrators & models
6314	Personal care & nursing assistants	8296	Service station attendants
6321	Hotel service supervisors	8297	Sales & service trainees
6322	Bar attendants	8299	Other elementary sales workers
6323	Waiters	8311	Guards & security officers
6324	Hospitality trainees	8312	Ushers, porters
6391	Dental assistants	8313	Domestic housekeepers
6392	Veterinary nurses	8314	Caretakers
6393	Prison officers	8315	Laundry workers
6394	Gaming workers	8319	Other elementary service workers
6395	Personal care consultants	<b>9000</b>	<b>Labourers</b>
6396	Fitness instructors	9111	Cleaners
6397	Travel & tourism agents	9211	Engineering production process workers
6399	Other intermediate service workers	9212	Product assemblers
7000	Intermediate production & transport	9213	Meat & fish process workers
7111	Mobile construction plant operators	9214	Other food factory hands
7112	Forklift drivers	9215	Wood products factory hands
7119	Other mobile plant operators	9219	Other process workers
7121	Engine & boiler operators	9221	Hand packers
7122	Crane, hoist & lift operators	9222	Packagers & container fillers
7123	Engineering production systems workers	9911	Mining support workers & driller's assistants
7124	Pulp & paper mill operators	9912	Earthmoving labourers
7129	Other intermediate stationary plant operators	9913	Paving & surfacing labourers
7211	Sewing machinists	9914	Survey hands
7212	Textile & footwear production machine operators	9915	Railway labourers
7291	Plastics production machine operators	9916	Construction & plumber's assistants
7292	Rubber production machine operators	9917	Concreters
7293	Chemical production machine operators	9918	Electrical & teleco. trades assistants
7294	Wood processing machine operators	9919	Other mining, construction & related labourers
7295	Paper products machine operators	9921	Farm hands
7296	Glass production machine operators	9922	Nursery & garden labourers
7297	Clay, stone & concrete processing machine ops.	9929	Other agricultural & horticultural labourers
7298	Photographic developers & printers	9931	Kitchenhands
7299	Other intermediate machine operators	9932	Fast food cooks
7311	Truck drivers	9933	Food trades assistants
7312	Bus & tram drivers	9991	Garbage collectors
7313	Automobile drivers	9992	Freight & furniture handlers
7314	Delivery drivers	9993	Handypersons
7315	Train drivers & assistants	9999	Other miscellaneous labourers
7911	Miners		
7912	Blasting workers		
7913	Structural steel construction workers		
7914	Insulation & home improvements installers		
7991	Motor vehicle parts & accessories fitters		
7992	Product quality controllers		
7993	Storepersons		
7994	Seafarers & fishing hands		
7995	Forestry & logging workers		
7996	Printing hands		
<b>8000</b>	<b>Elementary clerical, sales &amp; service</b>		
8111	Registry & filing clerks		
8112	Mail sorting clerks		
8113	Switchboard operators		
8114	Messengers		
8115	Betting clerks		
8116	Office trainees		
8119	Other elementary clerks		

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