

Internet job postings: preliminary skills analysis

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Introduction

Data on internet job postings are sourced from job advertisements (and their descriptions) posted on various websites. These data are collected and coded to provide information on the numbers and types of jobs available, as well as the various attributes of these jobs, including the skills that are required or considered desirable by employers.

This information is not readily available from other sources of data. For example, the Labour Force Survey and the Census of Population and Housing, both conducted by the Australian Bureau of Statistics (ABS), provide robust, accessible and extensive information on the labour market. However, they do not provide information on unmet demand or the skills that employers require or desire.

Internet job-postings data complement the National Centre for Vocational Education Research's (NCVER) comprehensive and extensive data on training activity by providing information about demand in the labour market and the skills being requested by employers. NCVER has licensed access to internet job-postings data covering the Australian labour market; this is provided by Burning Glass Technologies.

NCVER's administrative collections provide authoritative information on the volume and nature of training activity and the characteristics of the students undertaking the training. This is extended by NCVER's surveys (such as the National Student Outcomes Survey and the Survey of Employers' Use and Views of the vocational education and training (VET) System), which provide information on students' satisfaction and employment and further study outcomes, and employers' experiences.

Another source of data on internet job postings is the Internet Vacancy Index, published by the Australian Government Department of Jobs and Small Business. The Vacancy Report (Department of Jobs and Small Business 2018) provides information on the occupation, skill level and location of internet job postings, but does not include information about the skills employers have requested.

This technical report outlines the collection and analyses of internet job-postings data, how they compare with other sources of data and their limitations. This document has been designed to assist in the interpretation and proper use of any NCVER products that use the internet job-postings data provided by Burning Glass Technologies.

Data provided by Burning Glass have been incorporated into the National Industry Insights Report developed by NCVER for the Australian Industry and Skills Committee (2018). The report provides information on the skills being requested and the top occupations, locations and employers for each industry and selected sectors in the 'Industry insights' sections. The report is available at <https://nationalindustryinsights.aisc.net.au/>.

Collection and coding

Internet job-postings data are produced by regularly scanning websites on which job postings are listed, for example, job boards and corporate websites. Copies of the postings are extracted from these sites. The unstructured text extracted from the postings is then analysed and converted into a structured dataset, which can be analysed by conventional means.

A job vacancy can be posted in multiple locations, such as on two different job boards or a job board and the website of the employer. Based on a range of factors, including job title, employer name and location, these duplicate postings are removed to ensure the integrity of the data.

Job postings are coded across a range of attributes, covering characteristics such as the location of the job, occupation, skills required and industry of the employer. A selection of these attributes is listed in table 1. Some of these attributes are coded to a proprietary classification created by Burning Glass and others are coded to Australian standard classifications published by the Australian Bureau of Statistics (ABS).

Table 1 Selection of attributes available in the Burning Glass Labour Insight dataset

Attribute	Classification	Level	Percentage of job postings in 2017 with valid data
Certifications	Proprietary		22%
Education	Proprietary	High school Certificates (levels one to four) Diplomas and associate degrees Bachelors and honours degrees Postgraduate degrees	27%
Experience	Proprietary	No experience required 0–2 years 3–5 years 6–8 years Over 9 years	20%
Industry	Australian and New Zealand Standard Industrial Classification (ANZSIC)	4-digit (class)	50% (at 1-digit divisional level)
Job title	N/A	Searchable plain text	>99%
Job type	Proprietary	Permanent Temporary Internship Apprenticeship Volunteer	
Location of the job	Australian Statistical Geographic Standard (ASGS)	Full-time Part-time Statistical area level 4 (SA4) Regions within major cities aggregated into a single group	90% (at state level)
Name of employer	N/A	Searchable plain text	41%
Occupation	Australian and New Zealand Standard Classification of Occupations (ANZSCO)	6-digit (occupation)	89%
Salary	Proprietary	Less than \$35 000 \$35 000–\$49 999 \$50 000–\$74 999 \$75 000–\$99 999 \$100 000–\$149 999 More than \$150 000	20%
Skills	Proprietary	Organised in skill cluster groups, skill clusters and skills Assigned to baseline, specialised and IT skills	70%

Source: Burning Glass Technologies (2018).

Benchmarking

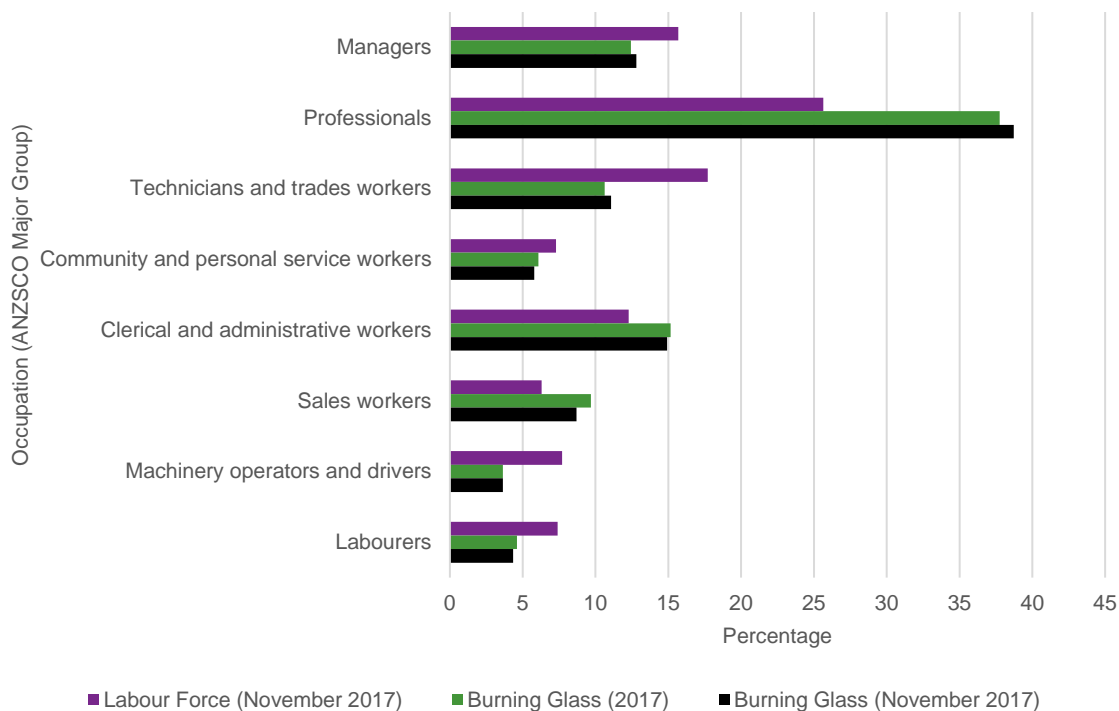
NCVER has benchmarked the Burning Glass data against the ABS Labour Force data (2018a, 2018b) and another source of internet job-postings data (Department of Jobs and Small Business 2018). The aim of this work was to provide some context for the data and explore some of the differences between the data sources, thus enabling users to better understand and interpret the internet job-postings data and analyses conducted with these data.

Labour force

As internet job postings are coded to the Australian standard classifications for occupation, industry and geography, the distribution of job postings within these attributes can be compared with statistics on the labour force published by the ABS. The following figures compare internet job postings in 2017 and November 2017 with employed persons according to the November 2017 quarter of the Labour Force Survey (figures 1–4).

Compared with the labour force, the occupations of Professionals, Clerical and administrative workers and Sales workers were over-represented in internet job postings as a percentage of the total. The under-representation of Technicians and trades workers should be noted, considering that much vocational education and training (VET) is linked with these occupations. Around 11% of internet job postings could not be coded to an occupation; these have been excluded from the data in figure 1.

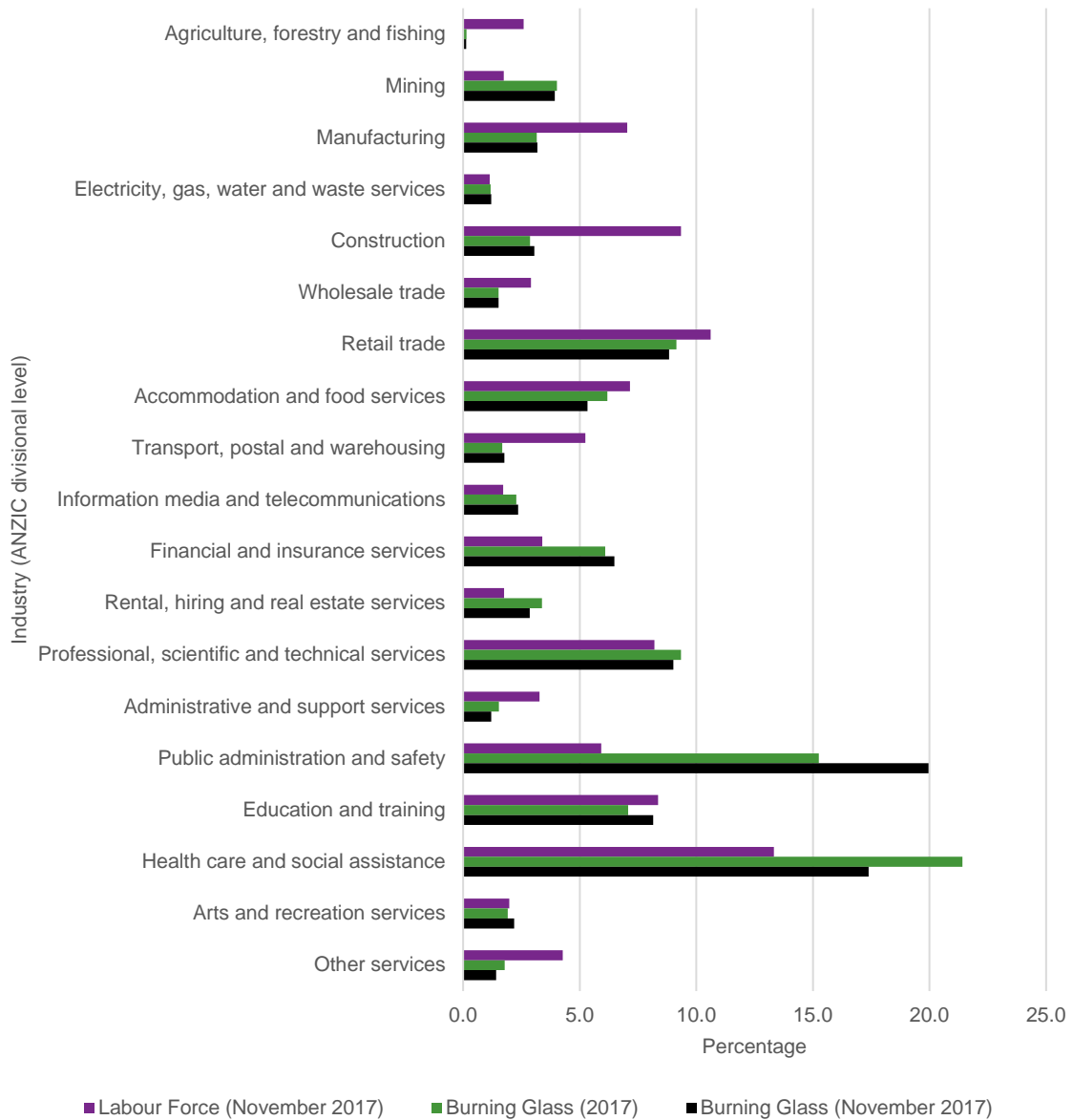
Figure 1 Internet job postings and employed people by occupation (ANZSCO major group) (%)



Source: ABS (2018b); Burning Glass Technologies (2018).

Compared with the labour force, the industries of Mining, Financial and insurance services, Rental, hiring and real estate services, Public administration and safety, and Health care and social assistance were particularly over-represented in internet jobs postings. Around 50% of internet jobs postings could not be coded to an industry; these have been excluded from the data in figure 2.

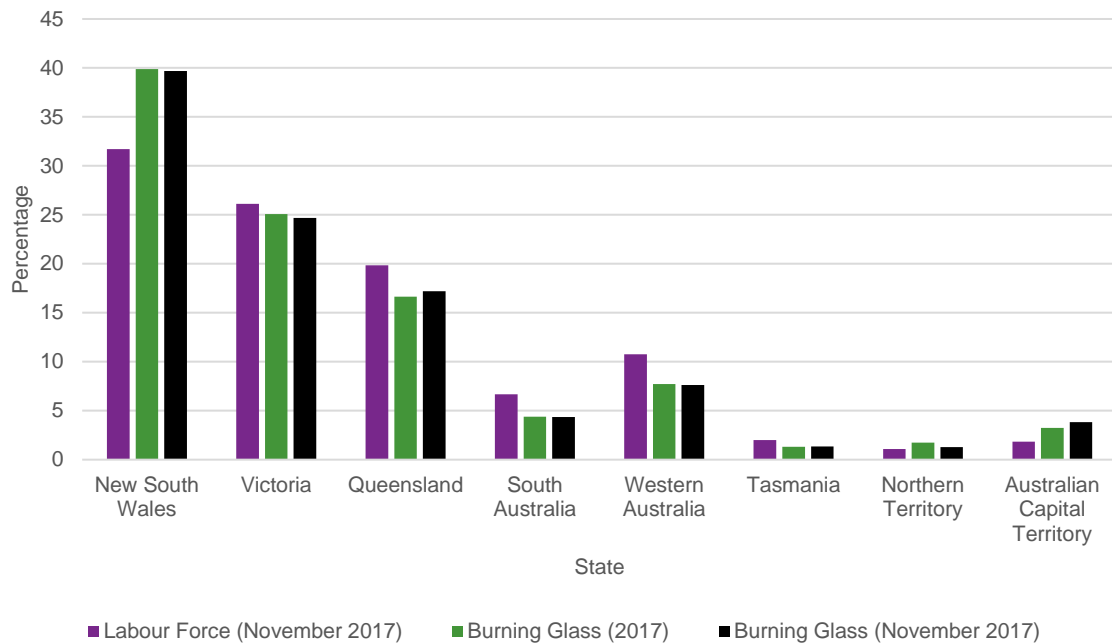
Figure 2 Internet job postings and employed people by industry (ANZSIC divisional level) (%)



Source: ABS (2018b); Burning Glass Technologies (2018).

Compared with the labour force, New South Wales was particularly over-represented in job postings. Queensland, South Australia and Western Australia were particularly under-represented in internet job postings. Around 10% of internet job postings could not be coded to a location; these have been excluded from the data in figure 3.

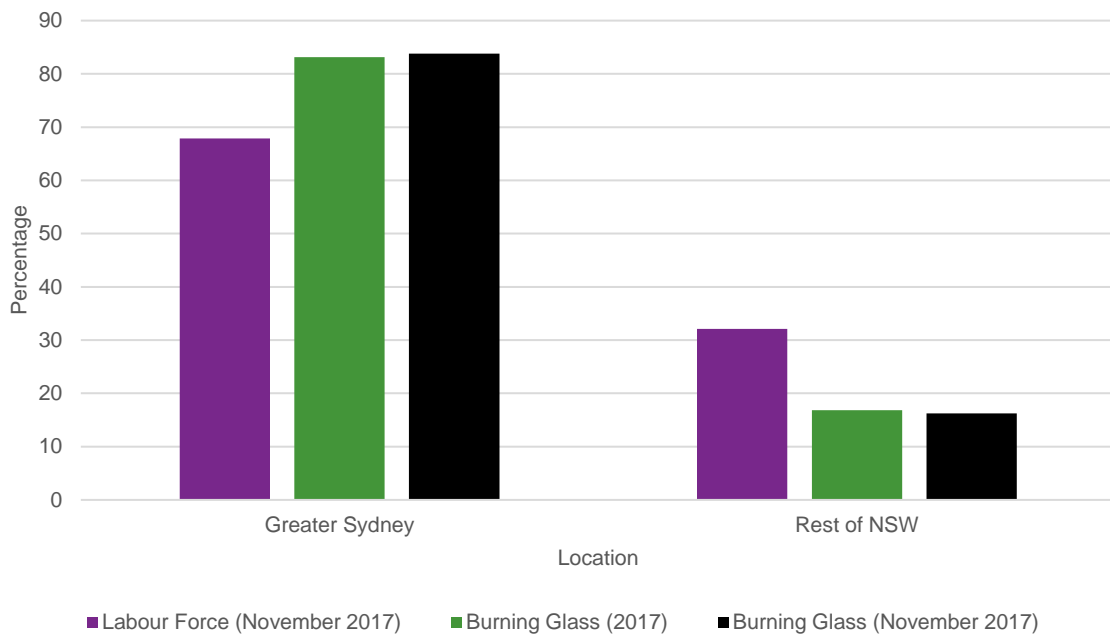
Figure 3 Internet job postings and employed people by state and territory (%)



Source: ABS (2018a); Burning Glass Technologies (2018).

The geographic coding of internet job postings is detailed enough to enable comparisons of the internet job postings in major cities and in other areas. By way of example, the internet job postings in Greater Sydney can be compared with those in the remainder of New South Wales (figure 4). Compared with the labour force, Greater Sydney was over-represented in internet job postings. Around 10% of internet job postings in New South Wales could not be coded at this level of detail; these have been excluded from the data in figure 4.

Figure 4 Internet job postings and employed people across New South Wales (%)



Source: ABS (2018a); Burning Glass Technologies (2018).

There are many possible explanations for the observed differences between internet job postings and the labour force across occupations, industries and regions.

- Job postings (posted online or otherwise) are a ‘flow’ measure rather than a ‘stock’ measure; that is, they represent the jobs being replaced or created in a period of time rather than all of the currently held jobs (like the Labour Force Survey). Job postings will tend to reflect the jobs being created (such as those concerned with implementing new technology and those in expanding sectors) and the jobs being frequently replaced (such as hospitality and seasonal workers).
- Some occupations and industries may be more likely to advertise and fill job vacancies by advertising online, whereas others will use methods such as word-of-mouth, advertisements in local newspapers and use of pools of temporary or contract workers. While jobs are recorded in the labour force no matter how they were filled, collections of internet job postings cannot reflect jobs that were never posted online.
- Larger employers with dedicated human resources divisions may be more likely to advertise online than smaller employers, even within the same industry or sector. This may also explain differences between the states and territories and metropolitan and regional areas: there may be a greater number of larger employers in major cities or more populous states.
- Not all job postings (posted online or otherwise) specify all information and some of those that do cannot be coded. For example, the classification of the industry relating to the job posting relies on data about the employer, which is not available in all postings. Around 50% of internet job postings could not be coded to an industry, and this may introduce bias into the results.

These points should be considered when interpreting the results and findings based on internet job-postings data. These are issues inherent to the nature of the data source from which these data are drawn. In particular, the unstructured nature of internet job postings (that is, plain text rather than a

structured dataset with unit records and distinct fields or variables) makes it difficult to extract data from them.

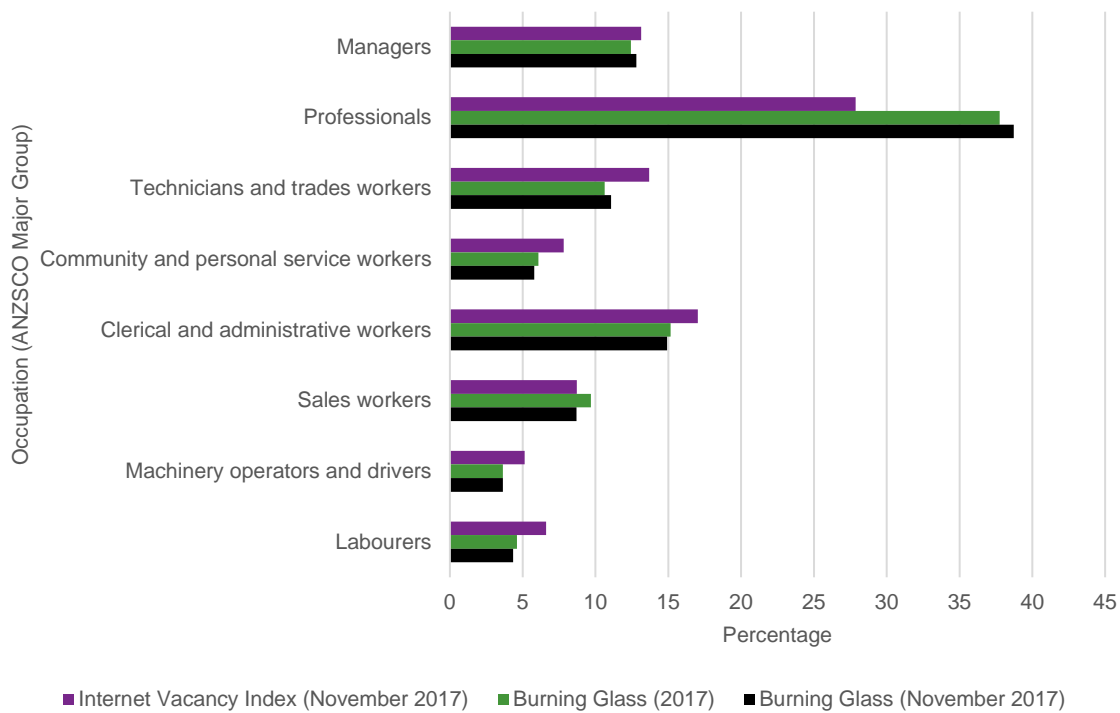
Internet Vacancy Index

The Australian Government Department of Jobs and Small Business also collects and codes internet job postings and publishes the Internet Vacancy Index. The index is based on vacancies posted on SEEK, CareerOne and Australian JobSearch – unlike the Burning Glass data which are drawn from a wider variety of sources, including employers’ websites.

Data in the Internet Vacancy Index is available according to occupation and region. The following figures compare Burning Glass job postings in 2017 and November 2017 with Internet Vacancy Index job postings in November 2017.

Compared with the Internet Vacancy Index data, the occupation Professionals is over-represented in the Burning Glass data. The two sources of internet job postings are reasonably similar across the other occupations (figure 5).

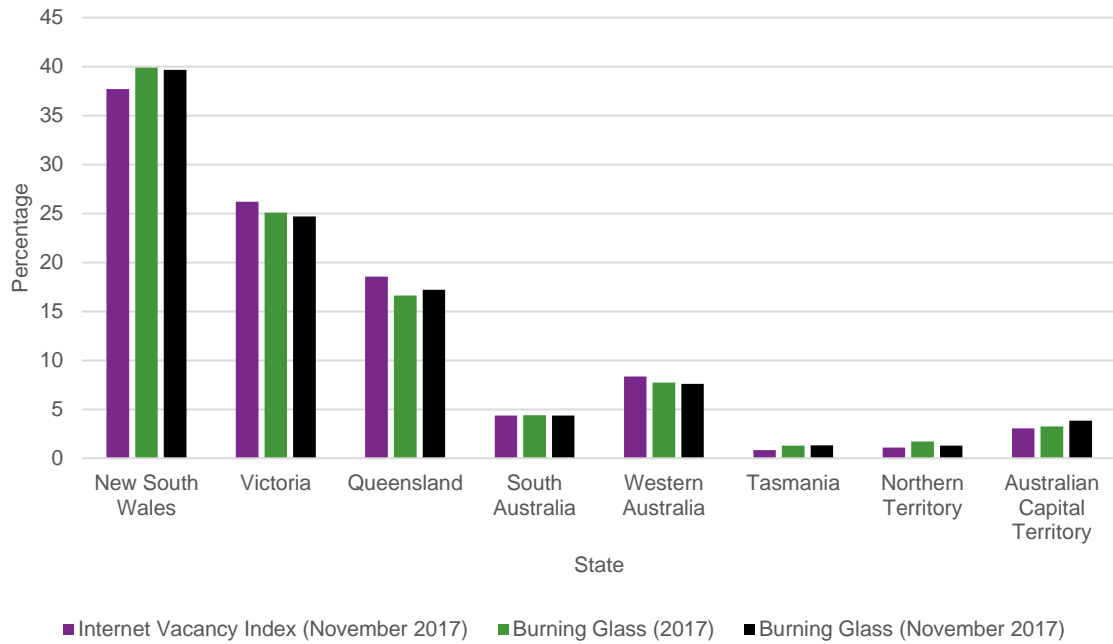
Figure 5 Internet job postings by occupation (ANZSCO major group) (%)



Source: Burning Glass Technologies (2018); Department of Jobs and Small Business (2018).

The Internet Vacancy Index and the Burning Glass data have reasonably similar percentages of internet job postings across the states and territories (figure 6).

Figure 6 Internet job postings by state and territory (%)



Source: Burning Glass Technologies (2018); Department of Jobs and Small Business (2018).

The main advantage of the Burning Glass data over the Internet Vacancy Index data is that they include information on other attributes, such as the skills requested. The Burning Glass data may also capture a wider range of job activity, as they cover other sources of internet job postings such as employers' websites.



Considerations for use and interpretation

Other issues need to be considered when using and interpreting the data and results gleaned from internet job-postings data, in addition to those noted above.

Frequency and importance

When examining attributes such as skills, the analysis can only consider the frequency with which the skills are mentioned. It cannot distinguish what skills are essential and what skills are desirable or beneficial. The skills that are mentioned most frequently may not be the most important skills or the main criteria upon which the successful applicant is chosen. For example, first aid skills are mentioned most frequently for child carers, but this is a relatively easy requirement to fulfil as it is part of the relevant VET qualification.

Time series analysis

As Burning Glass adds sources of internet job postings to its data collection and makes improvements to its classification processes, it is not possible to conduct reliable analyses of the number of internet job postings over time. To observe changes over time, relative comparisons (using percentages) must be made, instead of directly comparing the number of postings. For example, comparisons can be made between the postings for plumbers as a percentage of all postings for trades workers at various points in time, rather than directly comparing the number of postings for plumbers.

Proprietary taxonomies

Burning Glass has used Australian standard classifications where possible – ANZSCO for occupation, ANZSIC for industry and ASGS for location, as listed in table 1 – which enhances the usability and comparability of the data. However, no comparable classification currently exists for skills, which has prompted Burning Glass to devise its own proprietary taxonomy. This means that there is no direct concordance between the skills requested in internet job postings and the skills specified in content of VET subjects.

Assumed criteria

While it is in employers' interests to specify the skills and other criteria required for the job in postings (posted online or otherwise), these criteria may be stated implicitly or explicitly. The coding by Burning Glass relies on the criteria being explicitly stated in internet job postings.

Some postings do not specify any skills (as such) at all. For example, there are postings for Electricians that merely state that a certified Electrician is required for work on house construction. There is a common and shared understanding of the actual requirements for this job between the applicants and the employer (that is, the qualification required to be certified, experience working on a house construction site) without it being explicitly stated.

Some postings specify skills implicitly and make assumptions about the type of person who would be applying for that role. A posting for the job of a Manager may not state that communication and writing skills are required, but these would be expected from someone employed in that role.

Incomplete specification

Also related to assumed criteria is the incomplete specification of attributes in job postings. Not all job postings specify attributes like salary, and postings obtained through recruitment agencies often omit the name of the employer. This is generally more of an issue for certain attributes, as seen in the percentage of postings with valid data in table 1. For example, the name of the employer could only be determined in 41% of internet job postings in 2017, but for the same year the 6-digit ANZSCO occupation of the job could be determined in 89% of postings.

Attachments and other information

On occasions, information about the job is not included in the text of the job posting. Postings can contain links to other documents (such as a full position description in PDF format) or information on the employers' websites. These external sources are not included in the data collected by Burning Glass, so the data may lack this additional information.

Phrasing and meaning

Two employers may use the same words or phrases in their job postings, but they may mean very different things in each context. Communication and writing skills may be requested in job postings for Managers and Labourers, but the actual requirements would be substantially different.

There are also circumstances in which the context of the phrase cannot be reliably assumed. For example, mentoring was identified as a skill in two postings for the same occupation; however, in one posting it was used to mean that the applicant would need to mentor other staff and in the other it meant that the applicant would receive mentoring.

Irrelevant words and phrases

Similar to the example of mentoring above, in some instances words and phrases are taken out of context when the internet job postings are coded. In one case, the directive 'Contact us on Facebook' on the employer's website (which formed part of the basic layout of the page and not the posting itself) meant that the job was coded as requiring 'Facebook' skills. This miscoding generally only has a noticeable impact upon the results when several filters have been applied and the number of job postings is small and dominated by one or two employers. When relying on a small number of employers, the way in which they normally write their job postings can have a substantial effect.

Postings in multiple locations

Internet job postings are often posted in multiple locations to increase the pool of potential applicants. This is particularly the case for high-level jobs (such as Chief executive officers) and some jobs with high levels of regional demand (such as some health care jobs). In these cases, the jobs are counted for every location in which they are advertised. For example, high-level jobs in federal government departments are commonly advertised in the capital city of each state and territory (and counted eight times), even though they are based in one city, such as Canberra.

Multiple jobs within a single posting

Sometimes more than one job is advertised within a single posting. Employers may be seeking several people to fill identical or similar positions (for example, multiple positions for waiting staff at a new café) or different positions (for example, a Senior manager and a Team leader in a new division at a company). The collection and coding of the postings does not consider multiple positions within a single posting: it is treated as a single job.

Other means of recruitment

McDonald's Australia provides an example of other means of recruitment. Because McDonald's maintains an open recruitment process via application on its website, there are very few jobs posted online (see <<https://apply.mcdonalds.com.au>>). This is presumably because they are well known and established enough to attract applicants in this way, whereas a smaller company may have to advertise online. Depending on turnover of staff, an employer may regularly upload the same posting or leave the posting open indefinitely.

Conclusion

Mindful of the considerations above, internet job postings are a novel data source that provide valuable real-time insights into both job openings and the skills required for jobs as expressed by employers. Using this data source, NCVET has conducted three analyses as a complement to this technical analysis and an example of the insights that can be gained from the data.

The analyses have been published as three infographics (available at <https://www.ncver.edu.au/publications/publications/all-publications/internet-job-postings-preliminary-skills-analysis>):

- *Internet job postings: employability skills* compare how frequently employability skills were requested in internet job postings from 2014 to 2017. It shows that communication skills were by far the most frequently requested employability skill across all internet job postings. It also compares the emphasis employers placed on different skills across occupations and industries.
- *Internet job postings: trending and emerging skills* provides information on trending and emerging skills requested in internet job postings across different occupations and industries from 2014 to 2017. These trending and emerging skills are not necessarily new skills, but are an indication of what has been increasingly requested by employers in internet job postings over the last four years. They may also indicate areas of employment in which there is an increasing number of job postings. This product focuses on specialised skills – that is, skills specific to an occupation.
- *Internet job postings: personal care and support skills* focuses on the skills requested for jobs involving personal care and support. It shows that the relevant qualification (the Certificate III in Individual Support) covers most of the top specialised skills requested by employers in internet job postings for Personal care assistants and Aged or disabled carers in 2017.



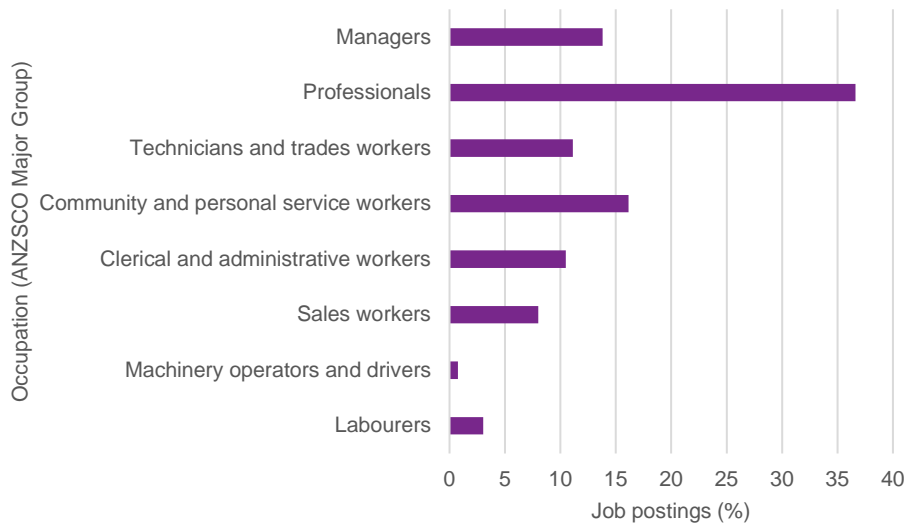
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Appendix

The infographics *Internet job postings: employability skills* and *Internet job postings: trending and emerging skills* show the skills required in industries relevant to the VET sector. To aid the interpretation of those data, the following figures show the percentage of job postings in 2017 by occupation for each of the included industries.

Figure 7 Internet job postings by occupation for the Arts and recreation services industry, 2017 (%)



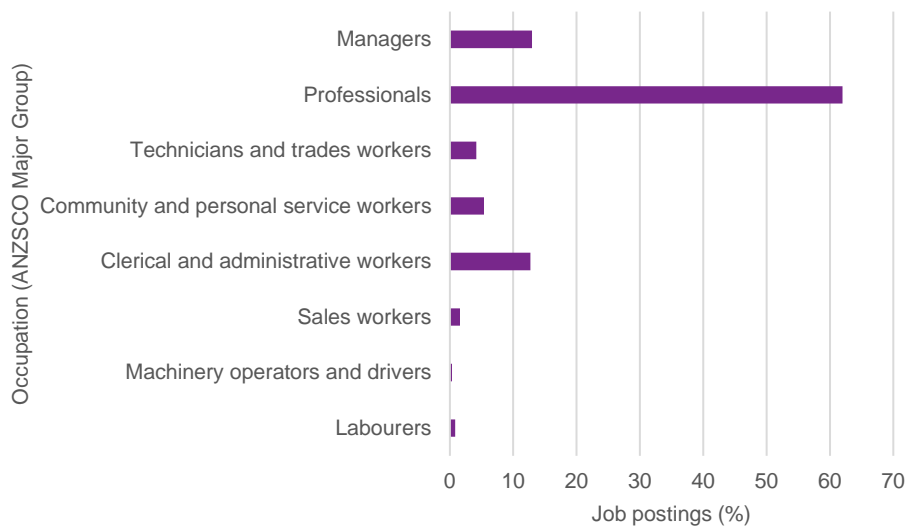
Source: Burning Glass Technologies (2018).

Figure 8 Internet job postings by occupation for the Construction industry, 2017 (%)



Source: Burning Glass Technologies (2018).

Figure 9 Internet job postings by occupation for the Education and training industry, 2017 (%)



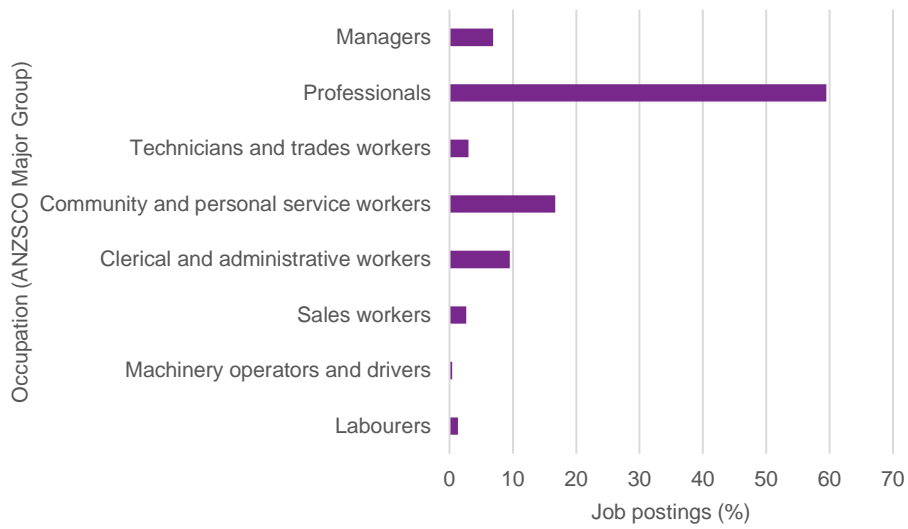
Source: Burning Glass Technologies (2018).

Figure 10 Internet job postings by occupation for the Financial and insurance services industry, 2017 (%)



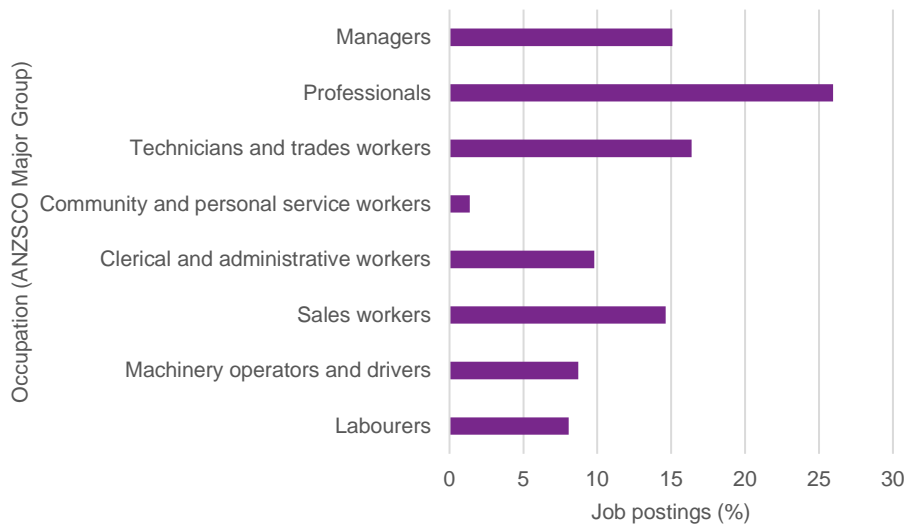
Source: Burning Glass Technologies (2018).

Figure 11 Internet job postings by occupation for the Health care and social assistance industry, 2017 (%)



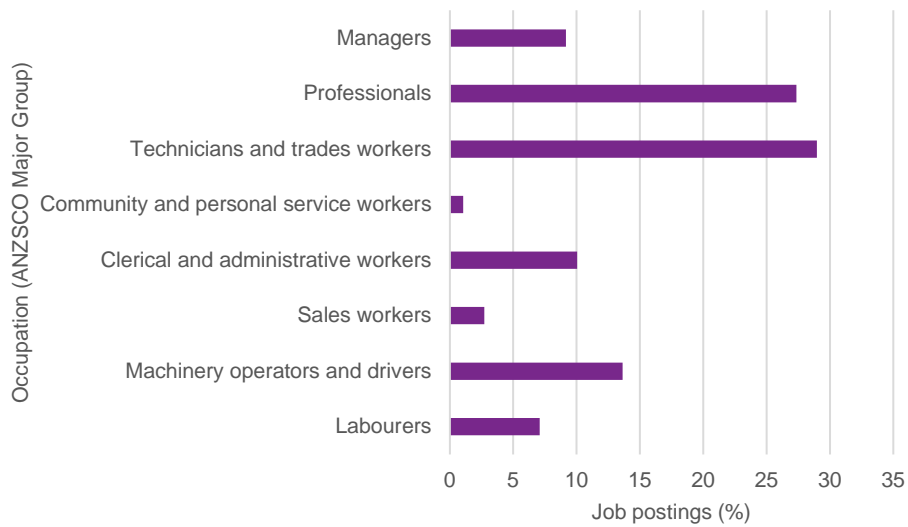
Source: Burning Glass Technologies (2018).

Figure 12 Internet job postings by occupation for the Manufacturing industry, 2017 (%)



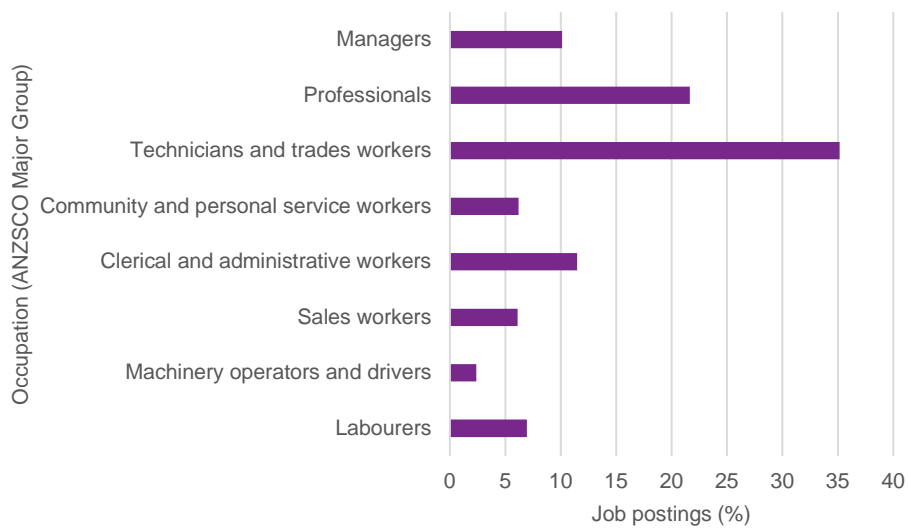
Source: Burning Glass Technologies (2018).

Figure 13 Internet job postings by occupation for the Mining industry, 2017 (%)



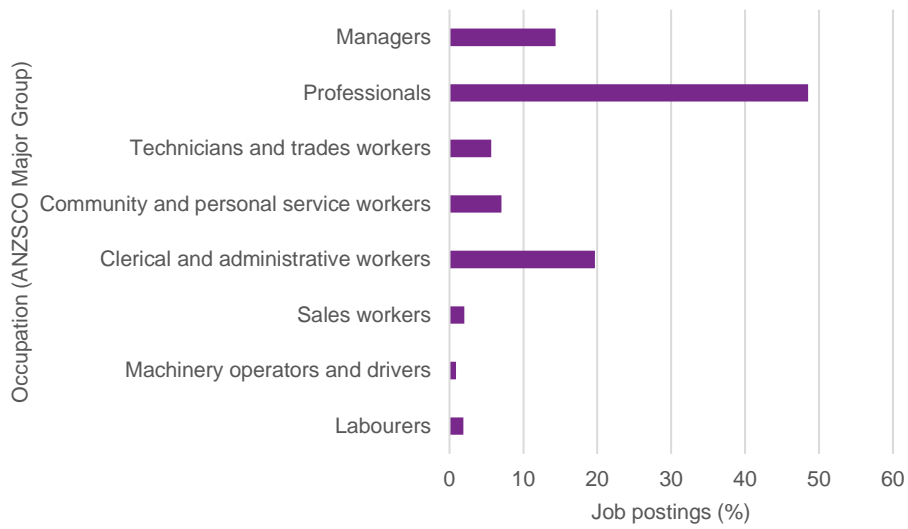
Source: Burning Glass Technologies (2018).

Figure 14 Internet job postings by occupation for the Other services industry, 2017 (%)



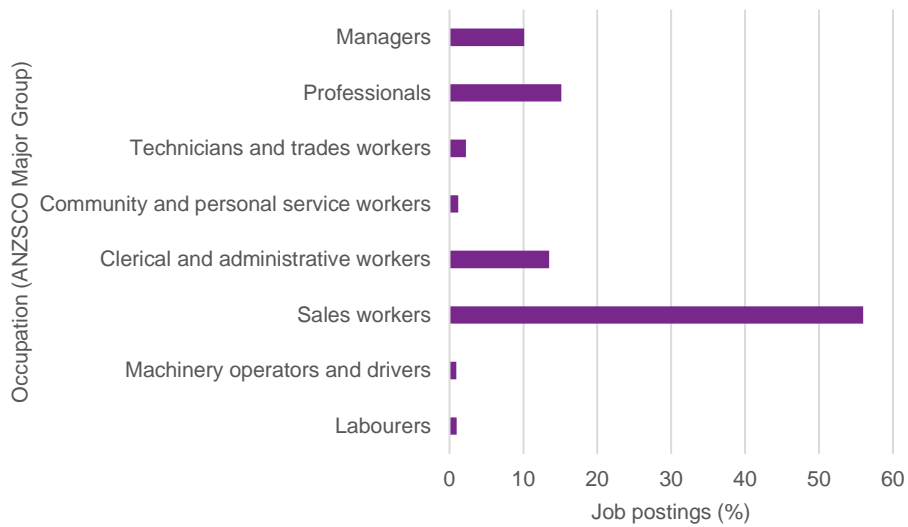
Source: Burning Glass Technologies (2018).

Figure 15 Internet job postings by occupation for Public administration and safety industry, 2017 (%)



Source: Burning Glass Technologies (2018).

Figure 16 Internet job postings by occupation for Rental, hiring and real estate services industry, 2017 (%)



Source: Burning Glass Technologies (2018).



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