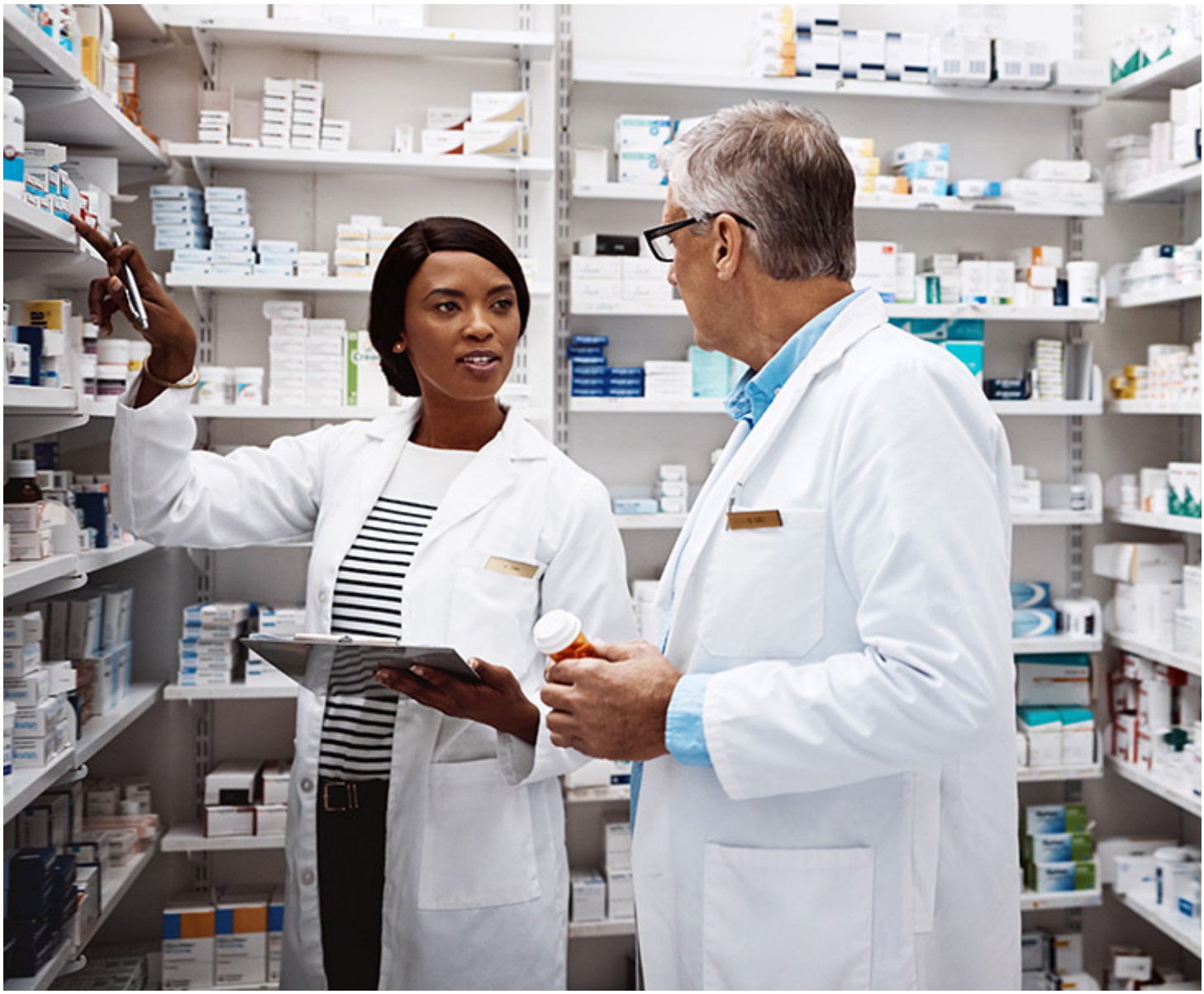
RESEARCH REPORT

NCVER

Prevalence and outcomes of workplace-based delivery in VET

Kristen Osborne

National Centre for Vocational Education Research (NCVER)



INFORMING + INFLUENCING
THE AUSTRALIAN VET SECTOR

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About the research

Prevalence and outcomes of workplace-based delivery in VET

Kristen Osborne, NCVER

Extensive evidence demonstrates a trend of positive outcomes related to learning in the workplace. Despite this, no examination of the outcomes has been undertaken using the available Australian vocational education and training (VET) data.

This publication uses VET administrative data to examine trends in the delivery of workplace-based training, including where entire programs are delivered in this way. Additionally, data from the National Student Outcomes Survey are used to model the effect on employment and achievement outcomes of a student receiving workplace-based delivery. As previous work has extensively examined the role of workplace learning in apprenticeships and traineeships, this publication does not include these students.

Key messages

- Workplace-based delivery was used for about 4.1 million subjects (representing 17.2% of all subjects delivered outside an apprenticeship or traineeship) in 2019, either as the sole mode of delivery or in combination with other modes.
- Around 800 000 students experienced workplace-based delivery as part of their VET journey in 2019, outside an apprenticeship or traineeship.
- The most notable predictor of a student receiving workplace-based delivery when available factors were modelled was the field of education of their study.
- The relationship between mode of delivery and factors such as the field of education studied complicates efforts to understand the effects of workplace-based delivery. As a likely consequence of this, the analysis of the impact of workplace-based delivery using administrative data did not identify a material impact on student outcomes.
- A more conclusive understanding of the extent of the impact exerted by workplace-based delivery on student outcomes may only be possible through a randomised trial, whereby the only difference in the program is the presence of workplace-based delivery.

Simon Walker
Managing Director, NCVER

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Executive summary

Learning on the job can be a valuable and rewarding element of a program of study, with a recent review of evidence in this area finding it to have positive effects on the outcomes of vocational education and training (VET) students (Osborne et al. 2020). The specific benefits of workplace-based education on the long-term outcomes of young people in training have also been identified (Waugh & Circelli 2021). This publication uses administrative data from the National VET Provider Collection to summarise the trends in workplace-based delivery of subjects for VET students, as well as analytic modelling to examine how different factors might predict this type of delivery. The modelling is also used to identify the factors that affect outcomes, and it attempts to quantify the positive effects of workplace-based delivery.

Three modes of delivery are possible for each subject: internal, external and workplace-based or a mix of modes. To summarise the use of workplace-based delivery, subjects were split into three general categories:

- those that were workplace-based
- those that were workplace-based alongside other modes
- those that were not workplace-based at all.

In 2019, over 20% of all subjects were delivered with some degree of workplace-based training, representing more than 5.5 million individual subjects. Of these, just over 74% (or around 4.1 million) were not part of an apprenticeship or traineeship. Around 800 000 students experienced workplace-based delivery as part of their VET journey in 2019 outside an apprenticeship or traineeship.

Many programs use workplace-based delivery for all of their subjects. For example, the Certificate III in Electric Passenger Train Guard and the Advanced Diploma of Competitive Systems each had more than 2000 student enrolments in 2019, all of which were delivered in the workplace. Other programs, such as the Certificate IV and Diploma of Ministry, used workplace-based delivery when combined with other delivery modes. Although the programs that were reliant on workplace-based delivery often had a structure intentionally similar to formal apprenticeships and traineeships, no contract of training was required.

Investigation at the student level shows variation between the proportion of students receiving workplace-based delivery depending on their residential state or territory. For example, higher proportions of non-apprentice or non-trainee students in Tasmania (29.5%) and Queensland (21.3%) received some amount of workplace-based learning when compared with those in other states and territories. There was also significant variation in workplace-based delivery received between non-apprentice and non-trainee students with different study modes: 27.4% of full-time students experienced some amount of workplace-based delivery, compared with 19.9% of part-time students. Other student factors, such as gender and disability status, were also compared, but within these factors there was generally variation of fewer than three percentage points between the different categories.

An analysis of the factors that predict workplace-based delivery reveal that students' field of education is often the most relevant:

- Fields such as radiography and pharmacy increase the likelihood of workplace-based delivery more than 20 times, compared with the benchmark field of business and management.

- Philosophy and religious studies, medical studies, forestry studies and justice and law enforcement are all more than five times more likely than the benchmark to include workplace-based delivery.
- On the other hand, biological sciences, accountancy and behavioural science were all associated with a reduction in the likelihood of workplace-based delivery of four times or more, again compared with the benchmark.

A further analysis focused on outcomes, specifically improvements in employment status following training and the achievement of a student's main reason for training. The analysis compared students who had received any amount of workplace-based delivery with those who had not (once again excluding apprentices and trainees). The analysis demonstrated no conclusive impact on these outcomes resulting from the use of workplace-based delivery in a student's training; however, the model could only account for a limited range of known factors and make a broad assessment of impacts. Nevertheless, previous research has found meaningful positive effects from learning in a workplace during training (Bahl & Dietzen 2019; Billett 2019; Kamaliah et al. 2018). Given the evidence supporting a positive impact on student outcomes from workplace-based delivery, the results from this empirical research should be viewed in the context of the limitations of administrative data.

The lack of material differences in outcomes may be due to the interrelated nature of many of the factors used; for example, workplace-based delivery is often concentrated by field of education and level of education. When these factors are included in the analytic model and are considered, they may also account for the impact of workplace-based delivery and result in no material effect of the delivery mode. However, as factors such as field of education are also outcome predictors, it is important that these are included in outcome modelling.

Furthermore, specific programs tend to include similar amounts of workplace-based delivery across all students, since the mode of delivery and/or assessment are routinely mandated by program rules. This means that for many programs there will be no 'comparison groups' of students – those who did and those who did not experience workplace-based delivery. While historical evidence supports the positive effects of learning in the workplace, ultimately, it may only be possible to distinguish the effects of workplace-based training on student outcomes through a randomised trial, one in which the only difference in the program is the presence of workplace-based delivery. This would provide more reliable data on the degree of effect of workplace-based delivery on student outcomes.

The state of workplace-based VET

Key points

- Workplace-based delivery is VET training conducted in the workplace.
- In 2019, around 17% of all subjects delivered outside an apprenticeship or traineeship were either partially or fully delivered in the workplace.
- More than one-fifth of these subjects were delivered exclusively in the workplace in 2019.

Before an analysis of the data is undertaken, it is important to define the concept of workplace-based VET. Terms such as 'work-based learning', 'work-based education' or 'work-integrated learning' are often used when discussing education that takes place in the workplace as part of VET programs. The format of such programs might include work placements or incorporate a student's existing work. These programs might be referred to as apprenticeships, traineeships or internships. In any case, the key element is the inclusion of learning in a workplace as part of the training program's structure; that is, integrated into its educational approach. The reason for investigating the workplace-based delivery of subjects is simple: there is compelling evidence that work-based education in general can have strong positive effects for students. For a broad synthesis of this evidence, see Osborne et al. (2020), *Work-based education in VET*.

The term 'workplace-based VET' is used here because it relates directly to how subjects are delivered to students. The Australian Vocational Education and Training Management Information Statistical Standard (AVETMISS), which covers the national VET data collections, classifies subject delivery mode in the following way:

- internal delivery (for example, classroom-based), where the student and the trainer attend a training delivery location. This includes when the training is delivered using video or internet links in real time
- external delivery (for example, online), where the student does not primarily attend a delivery location but instead undertakes training in their own time and location using training materials provided online or by correspondence. Contact with the trainer is usually limited to feedback on submitted work
- workplace-based delivery, where the training is conducted in the workplace (irrespective of whether it is conducted by the training organisation or the employer). This includes industrial/work experience, field placement, fully on-the-job training or structured workplace training delivered at a place of employment (NCVER 2019).

Training can use any combination of these modes. For example, a student who attends classes for a subject at their local TAFE (technical and further education) institute two days a week and has one day of work placement is experiencing a mixed internal and workplace-based delivery mode. A student studying an entirely online course from home would be experiencing external delivery. Finally, a worker studying on the job with an enterprise registered training organisation (ERTO) might train entirely on the job, resulting in exclusively workplace-based delivery.

Just as subjects can be delivered using any combination of delivery modes, a program may similarly comprise a range of modes across subjects (and a student experiences a variety of modes). For this reason, this research analyses either the characteristics of particular subjects, or of the program of which the subject was part.

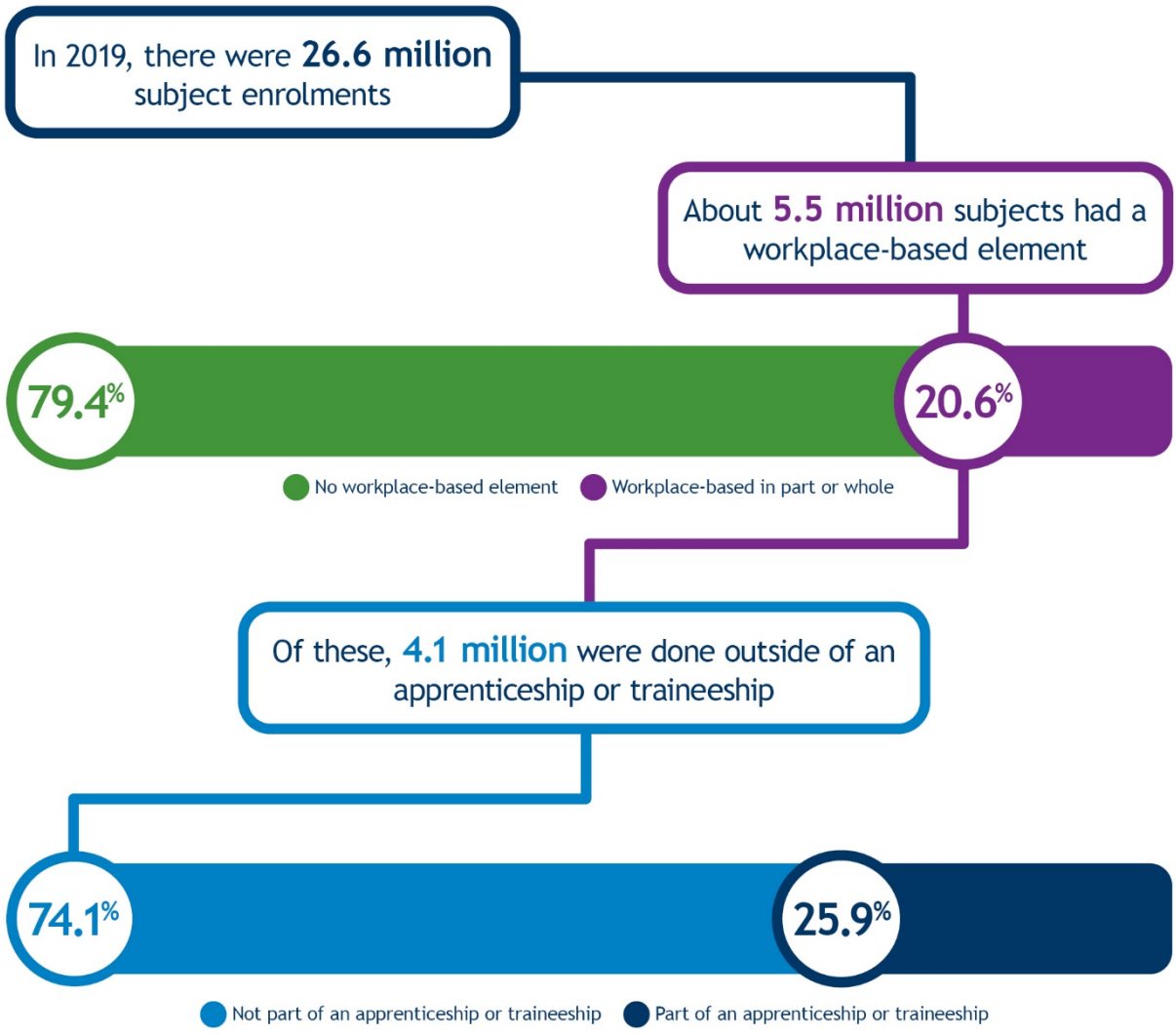
Patterns of workplace-based VET

Any investigation of the outcomes of workplace-based training needs to begin with an understanding of the patterns in the use of workplace-based training itself. Any significant differences in location or other delivery characteristics will potentially translate into differences in outcomes. The trend analysis begins at the most granular – the subject level. It then moves to the program and student levels.

Subject-level trends

Figure 1 provides a brief overview of the volume and proportion of workplace-based delivery in 2019, including, in this instance, the extent of this type of delivery in apprenticeships and traineeships.

Figure 1 Summary of all workplace-based training in 2019



Note: All figures exclude subjects with no valid delivery mode, such as recognition of prior learning or credit transfer.
Source: National VET Provider Collection, 2019.

A more detailed breakdown by subject delivery mode is presented in Table 1. Excluding subjects delivered as part of an apprenticeship or traineeship, 17.2% of subjects included some amount of workplace-based delivery, while 4.1% of subjects supported only this type of delivery in 2019. This means that more than one-fifth of subjects with any workplace-based delivery were *exclusively* workplace-based (23.7%).

Table 1 Subject enrolments by delivery mode, 2019

Delivery mode	N ('000)	%
Any workplace-based delivery	**4 061.8**	**17.2**
Workplace-based only	963.6	4.1
External and workplace-based	940.1	4.0
Internal and workplace-based	880.2	3.7
Internal, external and workplace-based	1 277.9	5.4
No workplace-based delivery	**19 531.2**	**82.8**
External only	2 528.5	10.7
Internal only	14 280.5	60.5
Internal and external	2 722.2	11.5
Total	**23 593.0**	**100.0**

Notes: Excludes subjects delivered as part of an apprenticeship or traineeship, and those with no applicable delivery mode (such as subjects completed through recognition of prior learning or credit transfer).
Source: National VET Provider Collection, 2019.

When examining the modes of delivery that different types of training tend to use, two trends stand out. Subjects not part of a nationally recognised program had the highest rate of workplace-based delivery only (5.2%; figure 2, table 2). Figure 2 shows that training package qualifications contained the highest rate of any workplace-based delivery; that is, only workplace-based plus mixed workplace-based (18.2%).

Figure 2 Subject enrolments by type of training and delivery mode, 2019 (%)

Notes: Excludes subjects delivered as part of an apprenticeship or traineeship and those with no applicable delivery mode (such as subjects completed through recognition of prior learning or credit transfer).
Source: National VET Provider Collection, 2019.

A strong divide in the proportion of workplace-based delivery is seen between qualifications at certificate I and II, and those at certificate III and above (figure 3): proportionally, many more subjects

had a workplace-based delivery element at certificate III and above. On average, 20.8% of subjects at certificate III and above included workplace-based delivery, compared with an average of 4.8% of subjects at certificate II and below.

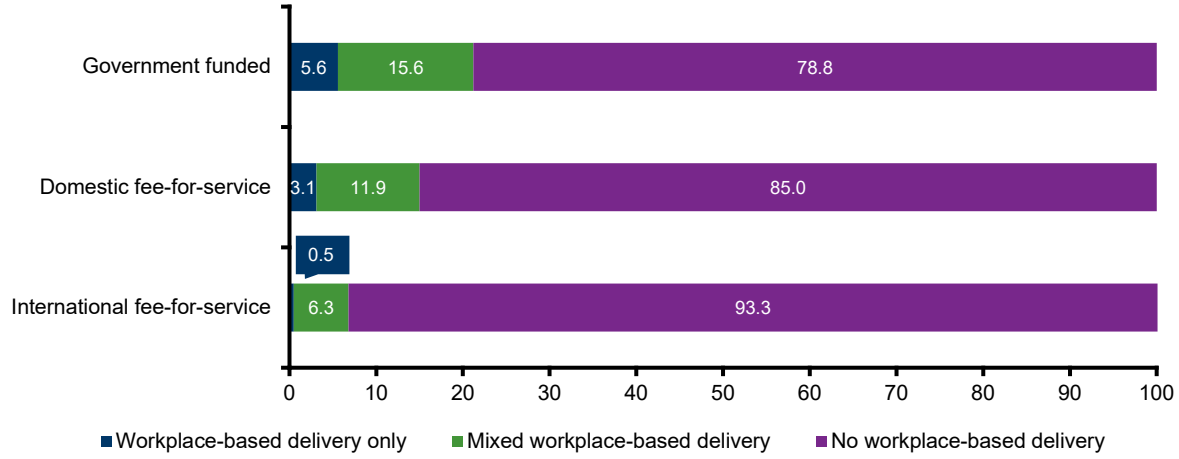
Figure 3 Subject enrolments by level of associated qualification, 2019 (%)

Notes: Excludes subjects delivered as part of an apprenticeship or traineeship, and those with no applicable delivery mode (such as subjects completed through recognition of prior learning or credit transfer).

Source: National VET Provider Collection, 2019.

When analysing the level of workplace-based delivery by the funding source of a subject, a clear trend emerges (figure 4). More than one-fifth (21.2%) of government-funded subjects were at least partially workplace-based, with 5.6% using only workplace-based delivery. This compares with 15% of domestic fee-for-service subjects, and only 6.3% of international fee-for-service subjects.

Figure 4 Subject enrolments by funding source and delivery mode, 2019 (%)



Notes: Excludes subjects delivered as part of an apprenticeship or traineeship, and those with no applicable delivery mode (such as subjects completed through recognition of prior learning or credit transfer).

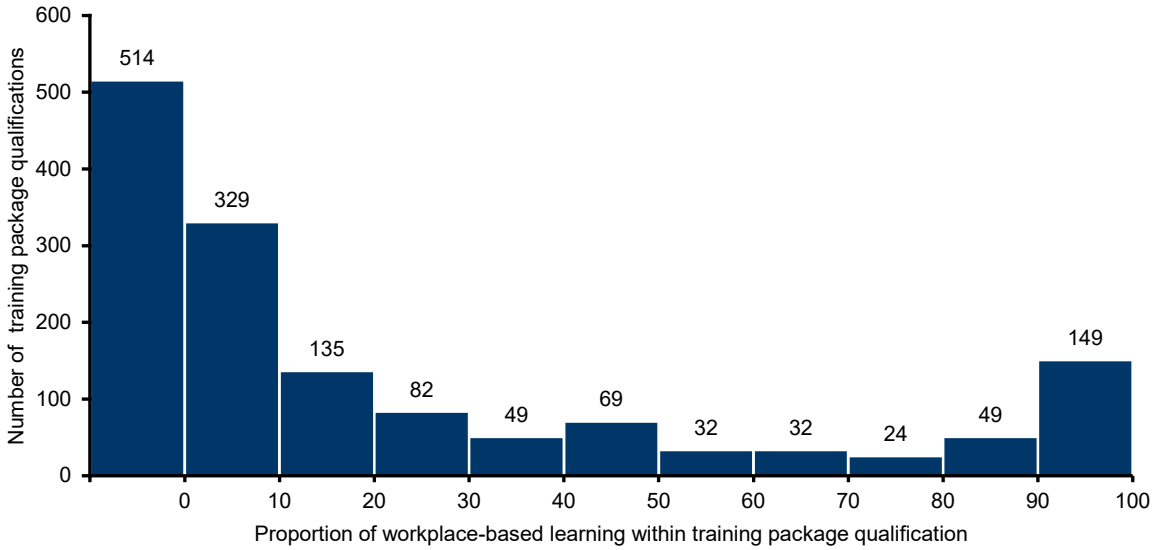
Source: National VET Provider Collection, 2019.

Program-level trends

Delivery mode is observable at the subject level, with aggregation used to translate this to a program level. This was done by calculating the proportion of subjects associated with a program that supported some amount of workplace-based delivery. For example, a program in which half of the subject enrolments (across all program enrolments and students) were delivered in the workplace and half were delivered in the classroom would have a workplace-based delivery rate of 50%. Given the much higher proportions of workplace-based delivery in training package qualifications and skill sets than in the other types of programs (figure 2), the analysis here is concentrated on these two types of training.

Figure 5 shows the relationship between the numbers of training package qualifications and proportions of workplace-based learning as either a total or partial delivery mode in 2019. This gives a perspective on the distribution of workplace-based learning across different qualifications.

Figure 5 Proportion of any workplace-based delivery within a training package qualification, 2019



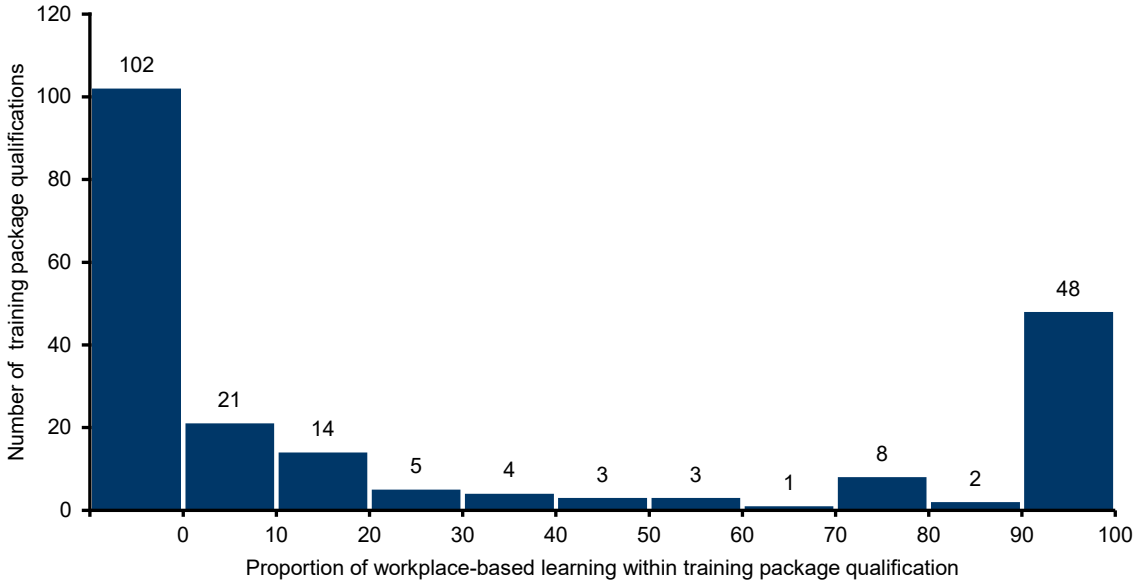
Notes: Only includes training package qualifications with one of more associated subject enrolments not part of an apprenticeship or traineeship, or with no applicable delivery mode (such as subjects completed through recognition of prior learning or credit transfer). N = 1464.

Source: National VET Provider Collection, 2019.

Of the 1464 training package qualifications counted in figure 5, 35.1% (514) included no workplace-based delivery at all in 2019. The distribution demonstrates that, when workplace-based delivery is included, it is most often either a small (<10) or large (>90) proportion of all subjects associated with that qualification in a year. This suggests an 'all or nothing' approach to the use of workplace-based delivery for this category of training.

This divide is even more pronounced for training package skill sets (figure 6). Of 211 skill sets, 48.3% (102) had no workplace-based delivery in 2019, and 22.7% (48) had workplace-based delivery in every associated subject, either exclusively or mixed with other delivery modes.

Figure 6 Proportion of any workplace-based delivery within a training package skill set, 2019



Notes: Only includes skill sets with one of more associated subject enrolments not part of an apprenticeship or traineeship, or with no applicable delivery mode (such as subjects completed through recognition of prior learning or credit transfer). N = 211.

Source: National VET Provider Collection, 2020.

To give a more detailed perspective on the programs relying on workplace-based delivery, table 2 shows the most popular programs where all the subjects included some element of workplace-based delivery. Once again, this table excludes programs that were part of an apprenticeship or traineeship.

A general trend in table 2 is the presence of programs that are normally undertaken by existing workers. For example, those studying the Certificate III in Electric Passenger Train Guard or the Certificate IV in Swimming Pool and Spa Building are likely to need workplace experience to learn and practise the relevant skills. Similarly, training package skill sets and accredited courses are appropriate for the upskilling of existing workers: it is unlikely that the opportunity and motivation will be present for a student to enrol in and complete the skill set 'SIFSS00004 – Safe Gravedigging' outside an existing work context. Additionally, training providers require 'evidence of a relevant professional role' for many of the health-related accredited courses, such as the Course in Ear and Hearing Health.

The most popular accredited qualifications using workplace-based delivery in all associated subjects in 2019 were the Certificate IV, Diploma and Advanced Diploma of Ministry. These qualifications all emphasise workplace opportunities to apply knowledge and are normally undertaken in the context of a student's role in a relevant religious organisation. In fact, these courses are similar in structure to a traineeship, but accredited qualifications are not typically offered as apprenticeships or traineeships.

Table 2 The five most populated programs in which all subjects included some element of workplace-based delivery by type of training, 2019

Type of training (associated program)	Workplace-based delivery only	Mixed workplace-based delivery	Total
Training package qualifications			
TLI32315 - Certificate III in Electric Passenger Train Guard	2 953	0	2 953
MSS60316 - Advanced Diploma of Competitive Systems and Practices	2 384	0	2 384
TLI32318 - Certificate III in Electric Passenger Train Guard	1 940	0	1 940
CPC40808 - Certificate IV in Swimming Pool and Spa Building	2	1 477	1 479
LGA40404 - Certificate IV in Local Government (Operational Works)	399	399	798
Training package skill sets			
AVISS00053 - Aerodrome Reporting Officer Skill Set	0	518	518
SIFSS00004 - Safe Gravedigging	126	301	427
SIRSS00012 - Community Pharmacy Dispensary	0	308	308
AHCSS00052 - Pork Industry Stockperson Skill Set	18	245	263
RIISS00036 - Underground Shotfiring - Metalliferous Skill Set	196	16	212
Accredited qualifications			
10669NAT - Certificate IV in Ministry	0	11 137	11 137
10670NAT - Diploma of Ministry	0	5 583	5 583
10671NAT - Advanced Diploma of Ministry	0	2 673	2 673
10797NAT - Graduate Certificate in Applied Pharmacy Practice	0	2 494	2 494
10454NAT - Diploma of Nutrition and Dietetics for Personal Trainers	0	957	957
Accredited courses			
10630NAT - Course in Ear and Hearing Health	0	2 682	2 682
10754NAT - Course in Immunisation Practice in Primary Healthcare	0	760	760
10762NAT - Course in Wound Closure	0	531	531
10637NAT - Course in Tympanometry	0	323	323
10532NAT - Course in Selection and Installation of Child Restraints	0	149	149

Notes: Only includes programs with one of more associated subject enrolments not part of an apprenticeship or traineeship, or with no applicable delivery mode (such as subject completed through recognition of prior learning or credit transfer).

Source: National VET Provider Collection, 2019.

Overall, it seems that the programs that always use work-based delivery are largely designed to be undertaken in conjunction with work in the relevant industry. This includes many programs where the student is likely to have an established career (such as accredited courses requiring potential students to be existing employees in the health field). Note that the programs in table 2 exclude those being undertaken as part of an apprenticeship or traineeship, despite the amount of workplace-based delivery taking place. Interestingly, the delivery mode patterns of these programs are similar to an apprenticeship model in terms of the quantum of workplace-based training but lack a formal contract of training. Further work may investigate the structure and nature of these programs and how they differ from formal apprenticeships and traineeships.

Student trends

While understanding the use of workplace-based delivery at the subject and program levels is important, it is equally important to understand how this translates to the student training experience. For this element of the analysis, students were divided into those who had received no workplace delivery, those with a mixture of workplace-based and other modes of delivery, and those whose only delivery mode was workplace-based.

Table 3 compares the proportion of workplace-based delivery within the subjects studied by a student in 2019 by various factors.

Table 3 Student attributes by workplace-based delivery, 2019 (%)

Attribute	Workplace-based delivery only	Mixed workplace-based delivery	No workplace-based delivery
Gender			
Female	3.7	17.4	78.9
Male	3.9	14.6	81.5
Not known	6.1	38.6	55.3
Disability status			
Without a disability	3.7	18.1	78.2
With a disability	2.4	16.8	80.8
Not known	5.5	8.1	86.4
Indigenous status			
Non-Indigenous	3.2	16.9	79.9
Indigenous	2.5	19.0	78.6
Not known	9.4	15.5	75.1
Study mode			
Full-time	2.1	25.2	72.6
Part-time	4.1	15.9	80.1
State/territory of residence			
New South Wales	2.8	16.7	80.5
Victoria	4.5	13.9	81.6
Queensland	6.5	14.8	78.7
South Australia	2.4	11.6	86.0
Western Australia	3.1	15.6	81.3
Tasmania	5.3	24.2	70.5
Northern Territory	3.8	12.6	83.7
Australian Capital Territory	2.9	12.1	84.9
Offshore	1.8	9.0	89.2
Not known	2.3	40.5	57.1
Total ('000)	**149.9**	**649.1**	**3 061.7**

Notes: Students with no valid delivery mode and apprentices/trainees were excluded. N = 3 860 904.
Source: National VET Provider Collection, 2019.

The factor with the most variation in table 3 is the state or territory of student residence. States such as Queensland and Tasmania had the highest rates of students receiving workplace-based delivery only in 2019 (6.5% and 5.3%, respectively). Students from Tasmania and New South Wales experienced higher rates of mixed workplace-based delivery (24.2% and 16.7%, respectively), while students residing offshore or in South Australia had the lowest rates of workplace-based only delivery (1.8% and 2.4%, respectively).

What are students saying?

One insight into the student perspective on workplace-based learning is available through the National Student Outcomes Survey, which asks students to provide suggestions for improvement. These verbatim comments were analysed for any combination of the following broad keywords that qualification completers used to reference work-based learning:

- work placement
- internship
- apprentice or apprenticeship
- trainee or traineeship
- work experience.

While not a definitive list, it provides insight into students' experiences with work-based learning.

Of approximately 55 800 valid comments, 1418 comments contained one or more of the selected keywords. Many of these (614) suggested either introducing some work-based learning or increasing the volume of work-based learning hours. Very few (19) suggested that the number of work placement hours should be reduced.

Although these comments came from only a small subset of qualification completers who took part in the survey, it is telling that, when they make the effort to comment on work-based learning, they ask for more rather than less.

Comments critical of the way their training provider had handled work-based learning were also received, but these generally asked for more support or better organisation rather than the removal of the work-based learning component of the course.

Overall, these findings suggest that students see learning in the workplace as a valuable component of their training.

Predicting workplace-based delivery

Key points

- Many varied factors contribute to predicting whether a student receives some workplace-based delivery during training.
- Certain fields of education, such as those related to health and social care, were the strongest predictors of workplace-based delivery.

Many of the factors relevant to workplace-based delivery are likely to also be related to each other. For example, students in Tasmania are more likely to enrol in certain qualifications *and* be more likely to receive workplace-based delivery. Separating these dependencies requires an analysis that accounts for many factors simultaneously.

To better understand which factors are particularly important in predicting workplace-based delivery for a student, a logistic regression model was fitted to the data. This allowed the factors to be modelled independently from one another. The model outputs are provided in the appendix.

The following factors (predictors) were included in the regression model, which used data from the 2019 National VET Provide Collection: major field of education

- major level of education
- type of training
- disability status
- Indigenous status
- labour force status
- gender
- age group
- student residential state/territory
- highest previous education level
- apprenticeship/traineeship status
- full-time/part-time study status
- socioeconomic status (IRSD)
- student remoteness region

The analysis is focused on the relationship between the selected factors and whether the student received any workplace-based delivery at the student level. This is represented by a binary variable, where 1 meant a student experienced some workplace-based delivery and 0 meant they had not. These results do not relate to the receipt of workplace-based delivery at the subject or program level. Every overall factor used in the model was determined to be statistically significant in predicting workplace-based learning, but this is likely to be due to the size of the dataset used (greater than 4.2 million students).

A key output of the logistic analysis used is the odds ratio. The odds ratio is a statistic that measures the strength of the association between a factor and an outcome. Here, the association is between factors such as a student's field of education or residential location and the outcome of workplace-based delivery being included in a student's training. The odds ratio always involves a comparison with a 'baseline' factor. For example, if individuals studying business were twice as likely as those studying creative writing to receive workplace-based delivery, business students would have an odds ratio of 2. If individuals studying business were half as likely to receive workplace-based delivery as those studying creative writing, business students would have an odds ratio of 0.5. Standard benchmarks for odds ratios have been used (Table 4; Ferguson 2009).

Table 4 Examples of odds ratio effect sizes

Effect type	Small effect	Moderate effect	Strong effect
Positive effects (more likely)	2.0−2.9	3.0−3.9	4.0 or more
Negative effect (less likely)	0.50−0.34	0.33−0.26	0.25 or less

Notes: Odds ratios of less than two are generally considered to be too small to have a materially significant effect. Categories are guides for interpretation only.
Source: Ferguson (2009).

Significance and odds ratios were calculated for all values of all factors. However, many showed very small associations between the value of the factor and the presence of workplace-based delivery or were for values relating to 'missing' or 'other' responses and are therefore not presented in the following tables.

Of the factors used in the regression analysis, it was field of education that had the strongest effect on the likelihood of workplace-based delivery. All fields of education were compared with a selected benchmark − business and management. This field was chosen as it is a popular field, is broad in scope and includes a range of qualification levels. The fields of education that most reduced the likelihood of workplace-based delivery are presented in table 5.

Table 5 Lowest 10 odds ratio for fields of education by comparison with business and management, 2019

Field of education compared with business and management	Odds ratio point estimate	95% confidence limits	
Biological sciences	0.13	0.02	0.97
Accountancy	0.23	0.22	0.24
Behavioural science	0.25	0.08	0.80
Computer science	0.27	0.24	0.30
Architecture and urban environment	0.30	0.27	0.33
Other society and culture	0.31	0.29	0.33
Language and literature	0.33	0.30	0.37
General education programmes	0.34	0.33	0.36
Chemical sciences	0.35	0.15	0.79
Electrical and electronic engineering and technology	0.36	0.35	0.37

Notes: Excludes those which were not significant (P>0.05) in chi-square test of maximum likelihood estimates.
Source: National VET Provider Collection, 2019.

Studying biological sciences, accountancy, behavioural science and computer science all had a strong negative effect on the likelihood of students' receiving workplace-based delivery, compared with business and management. Students in these fields are more than four times less likely to receive workplace-based learning than business and management students (as they have odds ratios of 0.25 or less). Table 5 shows a general trend of lower probabilities in the fields of education related to professional white-collar jobs such as accountant (in Accountancy in table 5) and programmer/network administrator (in Computer science in table 5).

Table 6 shows the alternative: those fields of education associated with the highest relative likelihood of workplace-based delivery. Students in these fields are at least three times more likely than business and management students to receive some workplace-based delivery.

Table 6 Highest 10 odds ratio for fields of education by comparison with business and management, 2019

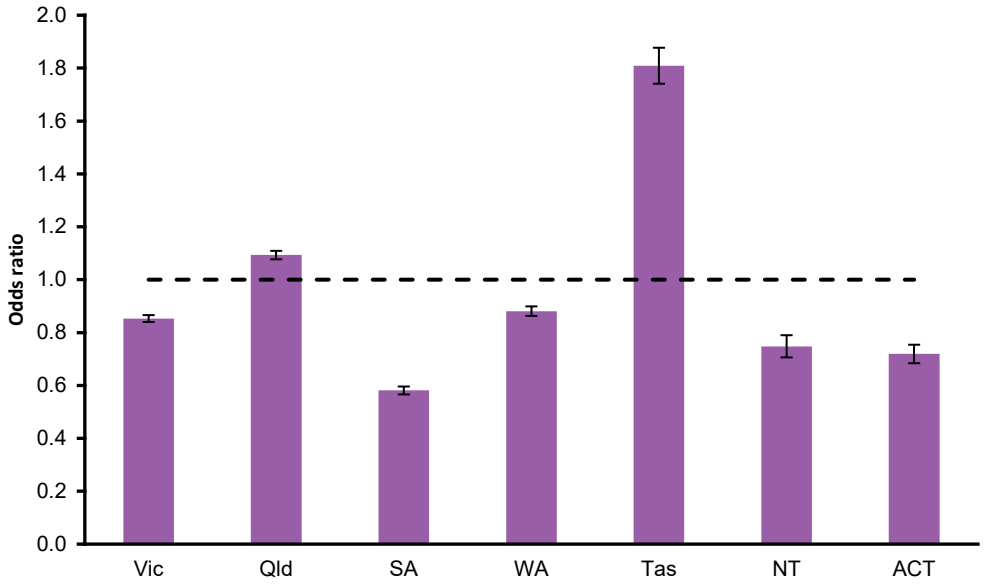
Field of education compared with business and management	Odds ratio point estimate	95% confidence limits	
Radiography	26.2	7.0	98.0
Pharmacy	23.7	19.7	28.6
Philosophy and religious studies	7.8	7.3	8.3
Medical studies	5.8	4.9	7.0
Forestry studies	5.5	4.9	6.2
Justice and law enforcement	5.1	4.9	5.3
Other education	4.7	4.6	4.8
Human welfare studies	4.2	4.1	4.3
Tourism	3.9	3.7	4.1
Other natural and physical sciences	3.5	3.4	3.7

Notes: Excludes those which were not significant (P>0.05) in chi-square test of maximum likelihood estimates.
Source: National VET Provider Collection, 2020.

Many of the fields in table 6 are in the health and social care area. This includes pharmacy, radiography, medical studies and human welfare studies. These areas routinely require competency to be assessed in either a workplace environment or simulated equivalent, and/or for students to complete a specified minimum number of hours of work placement.[1]

The results also show differences in the likelihood of workplace-based delivery across the states and territories (figure 7). Here the point of comparison was the chance of a student residing in New South Wales receiving some amount of workplace-based delivery by comparison with other states and territories. The black line in figure 7 indicates an odds of 1; that is, no increase or decrease in the likelihood of workplace-based delivery.

Figure 7 Odds ratios for state/territories, compared with NSW, 2019



Notes: Error bars show 95% confidence limits.
Source: National VET Provider Collection, 2019.

1 For details of the structure of these programs, see <https://training.gov.au/Home/Tga>.

Figure 7 shows that residing in Tasmania or Queensland slightly increases the likelihood of workplace-based delivery relative to residing in New South Wales. Residing in New South Wales makes workplace-based delivery more likely than residing in any of the remaining other states and territories, although these effects are all very small.

The analysis of the impact of different factors on the likelihood of workplace-based delivery is key to understanding outcomes. If students are likely to receive certain outcomes for the same reason(s) they are likely to have their training delivered in the workplace, these factor(s) need to be controlled. For example, these results clearly show that certain fields of study are strongly connected to workplace-based delivery, meaning that outcome analyses need to be controlled for the student's field of education. An ideal scenario would be the random assignment of students studying the same program (and therefore the same field of education) to either undergoing workplace-based delivery or not. In the absence of this logistically difficult task, analytical techniques can be used to understand better the effects of workplace-based delivery on outcomes.

Outcomes from workplace-based delivery

The key question remains: does workplace-based delivery improve student outcomes? As in the previous section, a logistic model was fitted to the data to understand the relationship between the presence of workplace-based delivery and specific target factors that represent possible student outcomes. Model outputs are provided in the appendix and further model details are available on request.

Key points

- Factors other than workplace-based delivery account for significantly more of the variation in student outcomes.
- Analysis of the impact of workplace-based delivery using administrative data did not identify a material impact on student outcomes.

The following were used in each model as the predictive factors on data from the 2020 National Student Outcomes Survey:

- major field of education
- disability status
- Indigenous status
- labour force status before training
- delivery mode (with or without workplace-based delivery)
- apprenticeship/traineeship status
- socioeconomic status (IRSD)
- student remoteness region.

Two models were run – one predicting improved employment status and one predicting whether a student had wholly or partially achieved their main reason for training. The aim was to account for the (known and documented) effects of factors such as socioeconomic status or field of education and isolate the effects of including workplace-based delivery. Once again, odds ratios were the main means of comparison between the effects of different factors (see page 16 for explanation of this measure).

The presence of workplace-based delivery gave an odds ratio of 1.23, by comparison with no workplace-based delivery (table 7). This means, all other factors being equal, a student receiving workplace-based delivery was slightly more likely to have an improved employment status after training. However, a value this size is unlikely to have a material effect or impact. This value must be placed in the context of the predicted effects of other factors, seen in table 7.

The business and management field of education was once again used as the comparison benchmark. With other factors being equal, students studying computer science were less likely to improve their employment status than those studying business and management. Those studying electrical and electronic engineering and technology were more likely to have an improved employment status than those studying business and management.

Table 7 Odds ratios, likelihood of improved employment post training, qualification completers, 2020

Estimate factor	Comparison factor	Odds ratio point estimate	95% confidence limits	
Any workplace-based delivery	No workplace-based delivery	1.23	1.20	1.26
Apprenticeship/traineeship	Not an apprenticeship or traineeship	2.46	2.36	2.56
Field of education: Electrical and electronic engineering and technology	Field of education: Business and management	1.62	1.50	1.76
Field of education: Computer science	Field of education: Business and management	0.40	0.34	0.47
Not employed before training	Employed before training	0.41	0.40	0.42

Notes: Further detail of the model are available in tables A3 and A4 in the appendix.
Source: National Student Outcomes Survey, 2020.

The effects of other factors were included to underline the relatively minimal impact that workplace-based delivery had in this model. The presence of workplace-based learning in a student's training exerted a very small positive effect on post-training employment status. A similar effect was seen when modelling to determine whether a student achieved their main reasons for training (table 8).

Table 8 Odds ratios, likelihood of achieving main reason for training, qualification completers, 2020

Estimate factor	Comparison factor	Odds ratio point estimate	95% confidence limits	
Any workplace-based delivery	No workplace-based delivery	1.24	1.18	1.31
Apprenticeship/traineeship	Not an apprenticeship or traineeship	3.24	2.97	3.53
Field of education: Electrical and electronic engineering and technology	Field of education: Business and management	0.74	0.64	0.85
Field of education: Computer science	Field of education: Business and management	0.77	0.61	0.99
Not employed before training	Employed before training	0.66	0.63	0.68

Note: Further details of the model are available in the tables A5 and A6 in the appendix.
Source: Student Outcomes Survey, 2020.

The effect of workplace-based delivery appears to have a very small positive effect (although it is still statistically significant). Materially, the results from this analysis indicate that the effect of workplace-based delivery is too small to be considered as a meaningful influence on whether a student achieves their main reason for training.

These results do not mean there were no students who experienced a strong positive effect from the workplace-based delivery of a subject and who had a better employment outcome or achieved their reasons for training as a direct result; rather, these results only outline the predicted effects in the context of the data available and in cases where other factors are being controlled.

One possible scenario to explain the results is that the effects of field of education are strongly interlinked with those of workplace-based delivery. The analysis in earlier sections (tables 5 and 6) showed that field of education was often the best predictor of workplace-based delivery, and it is possible that once the effect of field of education is removed, any effects of workplace-based delivery are also removed. Many cases of workplace-based delivery are either the norm within a field, or compulsory (education, health, hospitality, trade etc.). Given the limited number of instances of a program being delivered without any workplace-based delivery, it is impossible for the model to disentangle the effect with the available data. The same effect may also be occurring with other

variables that are both related to the provision of workplace-based delivery and to the outcome a student achieves.

Ultimately, it may only be possible to distinguish the effects of workplace-based training on student outcomes through a randomised trial, one in which the only difference in the program is the presence of workplace-based delivery. This would provide more reliable data on the degree of effect of workplace-based delivery on student outcomes.

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Appendix – Technical details

The analysis presented in this report includes logistic regression modelling to better understand factors that affect the likelihood of:

- a student receiving workplace-based delivery
- improved employment following training (qualification completers)
- achieving the main reason for training (qualification completers)

Tables A1-A6 provide the model outputs of these logistic regression analyses.

Table A1 Model information – logistic regression predicting workplace-based delivery, 2019

Response variable	Workplace-based delivery mode		
Response levels	1 = any workplace-based delivery 0 = no workplace-based delivery		
Response profile	**1**	**0**	
	975 127	3 197 995	
Model	Binary logit		
Optimisation technique	Fisher's scoring		
Number of observations read	4 173 122		
Number of observations used	4 173 122		
Model convergence status	Convergence criterion (GCONV = 1E-8) satisfied		
Testing global null hypothesis:			
Test	**Chi-square**	**Degrees of freedom**	**Pr > Chi-square**
Likelihood ratio	701 313.707	135	<.0001
Score	709 590.424	135	<.0001
Wald	549 421.769	135	<.0001
Model fit statistics			
Criterion	**Intercept only**	**Intercept and covariates**	
AIC	4 537 613.9	3 836 570.2	
SC	4 537 627.2	3 838 371.4	
-2 Log L	4 537 611.9	3 836 298.2	
Association of predicted probabilities and observed responses (for odds ratios)			
Per cent concordant	75.6	**Somers' D**	0.512
Per cent discordant	24.4	**Gamma**	0.512
Per cent tied	0	**Tau-a**	0.192
Pairs	3.32E+12	**c**	0.756

Table A2 Type 3 analysis of effects – logistic regression predicting workplace-based delivery, 2019

Effect	Degrees of freedom	Wald Chi-square	Pr > Chi square
Major field of education	69	153 926.20	<.0001
Major level of education	9	5 173.80	<.0001
Disability status	2	25 853.18	<.0001
Indigenous status	2	331.41	<.0001
Labour force status	3	10 080.51	<.0001
Gender	2	14 684.99	<.0001
Age group	12	13 746.36	<.0001
Student residential state	8	17 837.38	<.0001
Highest previous education level	13	15 312.47	<.0001
Apprenticeship/traineeship status	1	86 695.71	<.0001
Full-time/part-time study status	1	1 026.42	<.0001
Socioeconomic status (IRSD)	5	7 203.20	<.0001
Remoteness score	6	48 635.16	<.0001
Type of training	2	2 863.82	<.0001

Note: Type of training = Unknown was set to 0 as it is a linear combination of other variable.

Table A3 Model information – logistic regression predicting improved employment status, 2019

Response variable	Improved employment status	
Response levels	1 = improved employment status 2 = no improved employment status	
Response profile	**1**	**2**
	80 729	65 045
Model	Binary logit	
Optimisation technique	Fisher's scoring	
Number of observations read	150 773	
Number of observations used	145 774	
Number of strata	6	
Weight variable	SOS survey weights	
Finite population correction	Used	
Model convergence status	Convergence criterion (GCONV = 1E-8) satisfied	

Testing global null hypothesis:

Test	F value	Num DF	Den DF	Pr > F
Likelihood ratio	360.28	95.9 915	13 992 488	<.0001
Score	356.88	96	145 673	<.0001
Wald	274.8	96	145 673	<.0001

Model fit statistics

Criterion	Intercept only	Intercept and covariates
AIC	689 300.56	605 246.32
SC	689 311.69	606 325.5
-2 Log L	689 298.56	605 052.32

Association of predicted probabilities and observed responses (for odds ratios)

Per cent concordant	72.5	**Somers' D**	0.453
Per cent discordant	27.2	**Gamma**	0.454
Per cent tied	0.3	**Tau-a**	0.2247
Pairs	5 251 017 805	**c**	0.727

Table A4 Type 3 analysis of effects – logistic regression predicting improved employment status, 2019

Effect	F Value	Num DF	Den DF	Pr > F
Delivery mode	249.28	1	145 768	<.0001
Apprenticeship/traineeship status	993.3	2	145 767	<.0001
Socioeconomic status (IRSD)	54.66	5	145 764	<.0001
Remoteness score	107.34	5	145 764	<.0001
Labour force status before training	3 304.76	2	145 767	<.0001
Indigenous status	14.03	2	145 767	<.0001
Disability status	391.04	2	145 767	<.0001
Major field of education	90.58	65	145 704	<.0001
Funding source	99.5	1	145 768	<.0001
State/territory of residence	28.61	7	145 762	<.0001
Qualification level	313.18	4	145 765	<.0001

Table A5 Model information – logistic regression predicting achieved main reason for training, 2019

Response variable	Achieved main reason for training			
Response levels	1 = Did achieve main reason for training 2 = Did not achieve main reason for training			
Response profile	**1**	**2**		
	132 795	10 196		
Model	Binary logit			
Optimisation technique	Fisher's scoring			
Number of observations read	148 175			
Number of observations used	142 991			
Number of strata	6			
Weight variable	SOS survey weights			
Finite population correction	Used			
Model convergence status	Convergence criterion (GCONV = 1E-8) satisfied			
Testing global null hypothesis:				
Test	**F Value**	**Num DF**	**Den DF**	**Pr > F**
Likelihood ratio	67.25	95.9952	13 725 872	<.0001
Score	60.76	96	142 890	<.0001
Wald	304.8	96	142 890	<.0001
Model fit statistics				
Criterion	**Intercept only**	**Intercept and covariates**		
AIC	244 860.86	229 153.5		
dSC	244 871.97	230 231.06		
-2 Log L	244 858.86	228 959.5		
Association of predicted probabilities and observed responses (for odds ratios)				
Per cent concordant	68.5	**Somers' D**	0.384	
Per cent discordant	30.1	**Gamma**	0.39	
Per cent tied	1.4	**Tau-a**	0.052	
Pairs	1 237 358 980	**c**	0.692	

Table A6 Type 3 analysis of effects – logistic regression predicting achieved main reason for training, 2019

Effect	F Value	Num DF	Den DF	Pr > F
Delivery mode	75.44	1	142 985	<.0001
Apprenticeship/traineeship status	354.99	2	142 984	<.0001
Socioeconomic status (IRSD)	16.76	5	142 981	<.0001
Remoteness score	23.76	5	142 981	<.0001
Labour force status before training	197.46	2	142 984	<.0001
Indigenous status	0.39	2	142 984	0.679
Disability status	143.84	2	142 984	<.0001
Major field of education	381.18	65	142 921	<.0001
Funding source	248.85	1	142 985	<.0001
State/territory of residence	27.27	7	142 979	<.0001
Qualification level	106.3	4	142 982	<.0001

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