

## TRAINEESHIP COMPLETION: COMPARING SCHOOL-BASED AND POST-SCHOOL PROVISION IN AUSTRALIA

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*The impact of VET in Schools on transition outcomes is currently receiving considerable policy attention in Australia. Almost 50% of Australian senior secondary students participate in VET in Schools, either by taking VET subjects, engaging in structured workplace learning, or enrolling in school-based apprenticeships and traineeships. School-based traineeships are of particular interest because these relatively compact programs contribute to a senior secondary certificate, provide students with considerable workplace exposure and lead to qualifications recognised under the Australian Qualifications Framework. What has remained unclear is whether school-based traineeships have a positive impact on training completion compared with post-school workplace-based traineeships. While there is much support for VET in Schools programs, the effectiveness of school-based compared with post-school vocational programs is of policy interest as school-based VET programs have been criticised as not leading to productive employment outcomes. This paper uses data from the Apprentice and Trainee Destinations Survey, administered by the National Centre for Vocational Education Research, to examine whether students who commence a school-based traineeship exhibit higher completion rates when compared to similar young people who undertake a traineeship post-school. We find that school-based traineeships have higher completion rates than post-school traineeships, especially for females.*

**Key words:-**Traineeships; completion; school-based traineeships; vocational education and training (VET); school-based VET; propensity score matching (PSM);

## INTRODUCTION

We present this comparison of school-based and post-school traineeships against a background of two broad and related policy issues. The first is the effectiveness of vocational education and training in schools (VET in schools) and the second is the role of traineeships as pathways in youth transitions between schooling and the labour market. VET in schools continues to be a central element of policy intentions to encourage school retention and to facilitate successful transitions from school to further education, training and employment (COAG 2012; MCEETYA 2008). The second policy issue is the effectiveness of traineeships as pathways to employment. A challenging problem for policy-makers and the VET system is the high non-completion rate (about 50%) of traineeships (NCVER 2011b).

An important question is whether school-based traineeships have a positive effect on training completion when compared to their post-school equivalents. The purpose of this paper is to examine whether students who commence a school-based traineeship exhibit higher completion rates compared to young people who commence their traineeship after leaving school.

## Literature Review

### *The policy context and research evidence*

The VET system in Australia is a complex one. This is due in part to training being, under the terms of Australia's constitution, a state responsibility while taxation revenues are the responsibility of the national government. Although concerted efforts have been made since the early 1990s to achieve national consistency in the VET system, some vestiges of disparate state regulatory differences remain. The complexity of VET also arises because it is an amalgam of different forms of education and training. It includes a traditional apprenticeship model, a system of tertiary, sub-university courses that are not based on the apprenticeship model, and a community education component. These complexities are especially true of school-based VET, as schooling lies within the purview of states. Moreover, VET in schools programs serve several purposes, including enhancing school retention, broadening the senior secondary curriculum, and providing vocationally relevant training. Traineeships make up one component of this complexity and are offered under a post-school apprenticeship model and within the school systems.

Knight (2012) outlined the history of apprenticeships and traineeships since European settlement in Australia, noting that the major changes to the system have occurred since 1973. Traditional apprenticeships are characterised by having a three-party contract between the apprentice, an employer, and a training provider (NCVER2011c) under which arrangements the employer provides authentic work experience and on-the-job training and the training provider delivers off-the-job training leading to a recognised vocational qualification. Traineeships were introduced in 1985, having been recommended in the Kirby Report (Commonwealth of Australia, 1984), and this occurred at a time of particularly high youth unemployment. Traineeships were introduced as labour market programs and were designed to provide students with authentic employment experiences (Cully, 2006) and with quite limited off-the-job training. Initially, traineeships were targeted at 16- and 17-year-old early school leavers, a low-skill group experiencing particularly high unemployment, although other disadvantaged groups were recognised in the Kirby Report. The Kirby Committee envisaged having 75,000 trainees in the first year of operation growing to over 100,000 within the first three years of operation. These targets were not met; there was very limited uptake of traineeships so that in 1988 only 9,200 trainees were in training (Knight, 2012, Table 1, p.20). During the 1990s, several important policy changes occurred that led to rapid growth in traineeship participation. These changes included expanding the age range of trainees, introducing part-time traineeships, the provision of subsidies to employers, permitting existing workers to become trainees and, importantly in this study, introducing school-based apprenticeships and traineeships (Karmel, 2017; Nelms, Yuen, Pung, Farooqui, & Walsh, 2017). Over time, traineeships have become structurally similar to traditional apprenticeships.

Indeed, formally, both are recognised as 'Australian apprenticeships' but almost all researchers distinguish between trade-based apprenticeships (e.g. plumbing) and non-trade traineeships (e.g. child care). The distinction between apprenticeships and traineeships is based on the occupation for which the training is undertaken. Occupations that are classified within the Australian and New Zealand Standard Classification of Occupations (ANZSCO) Major Group 3, Technicians and Trades Workers (ABS, 2005) are regarded as trades while others are non-trade occupations. The off-the-job training component of school-based traineeships is typically at a lower Australian Qualification Framework (AQF) level (typically Level II) than apprenticeships (typically Level III) and to be of shorter duration (less than one year compared with 3-4 years for apprenticeships), although these characteristics are changing (NCVER, 2015).

### *The effectiveness of VET in schools*

Based on participation, VET in schools has been a highly successful innovation. Approximately 50% of students undertaking senior secondary (Years 11 and 12) study enrol in VET subjects and programs. Further, 95% of schools offering senior secondary education provide at least some VET studies (Blomberg & Vnuk, 2011). However, VET in schools is variable (Lamb & Vickers, 2006), from minimal to substantial exposure: students may enrol in a single subject classified as a VET subject; they may undertake a VET course, but without a substantial work experience component; they may enrol in VET that has a structured and assessed work placement; or they may participate in a school-based apprenticeship or traineeship (SBAT). SBATs differ from the other types of VET in schools programs in that they combine a contract of training with paid part-time employment. In this paper, we compare the completion rates of students undertaking school-based traineeships with similar students who commence post-school traineeships.

VET in schools has attracted considerable criticism. This criticism includes a lack of alignment with labour market requirements (Clarke, 2012, 2014; Clarke & Polesel, 2013; Wheelahan, Buchanan, & Yu, 2015) and that VET in schools is a residual program for low-SES and 'non-academic' students (Polesel, 2010; Polesel & Clarke, 2011; Polesel & Keating, 2011). It is necessary, however, to distinguish between levels of VET engagement. SBATs are distinguished

from other forms of VET in schools by requiring a three-way contract between the apprentice or trainee, an employer, and a training provider. The employment component of the contract means that the trainee is employed, earns a wage, receives on-the-job training, and gains work experience in the occupation related to the training. Work experience and on-the-job training are important in promoting completion and enhancing employment once training has been completed (Gemici & Curtis, 2012; Polidano & Tabasso, 2013). SBATs, however, are diverse with some differences between states and territories (Clarke, 2012; Clarke & Volkoff, 2012) and differences in the provision of off-the-job training. In our analyses, we find that 62% of the training for school-based traineeships is delivered by private and community Registered Training Organisations (RTOs), 35% by government operated Technical and Further Education (TAFE) institutes, with the remainder being delivered by the schools themselves. For post-school traineeships, private and community RTOs deliver 81% of the training with TAFE institutes providing 19%.

### ***Traineeships and their completions***

Much of the literature on traineeships exists as an adjunct to investigations into apprenticeships, so there is a limited body of work specifically about traineeships. For example, in their examination of the influence of training wages on the probability of completing an apprenticeship or traineeship, Karmel and Mlotkowski (2011) found that low training wages had little impact on completion for trade apprentices, but they played a more critical role in the completion decision for non-trade trainees. In a related investigation, Karmel and Oliver (2011a) examined the effect of the economic downturn following the global financial crisis on training completion in Australia. The authors found an increase in completion rates for both apprentices and trainees. Of those who did not complete their training, non-completion was often related to involuntary job loss, especially so after 2008 (NCVER, 2015).

Two related studies have examined the effect of participating in so-called pre-vocational training courses. In essence, pre-vocational training courses help individuals to bridge basic skills gaps and prepare them to become successful apprentices or trainees. Participation in pre-vocational courses modestly increased the likelihood of completing an apprenticeship in the construction, food and electro-technology trades, yet had negative completion effects in the automotive and engineering trades, and hairdressing (Karmel & Oliver, 2011b). With respect to traineeship completion, positive effects of pre-vocational courses were found for lower-skilled occupational categories and clerical/administrative occupations, whereas completion effects were negative for higher-skilled occupational categories and in the community/personal services sectors (Oliver & Karmel, 2011).

More generally, unmet expectations of employers' contributions to training and training methods have been identified as an important factor that leads to attrition among apprentices and trainees (Walker, Smith, & Brennan Kemmis, 2012). Training quality, in particular, plays a pivotal role with respect to attrition (Smith, Comyn, Brennan Kemmis, & Smith, 2009; Snell & Hart, 2007). Quality of training is a particular concern in school-based VET and industry scepticism about the quality of VET in schools is widely reported (Barnett & Ryan, 2005; Clarke, 2012; Service Skills Australia, 2010; Wheelahan & Moodie, 2010). Thus, we set out to compare completion rates of school-based and post-school traineeships for young people. We note that completion is only part of the story and that employment outcomes following training are of greater importance, although we do not investigate them in this paper.

## **Method**

### ***Sample***

We use data from the 2008 and 2010 Apprentice and Trainee Destinations surveys (A&T Destinations, NCVER 2009; 2010), which collected information on the outcomes of apprentices and trainees approximately nine months after leaving their training. A total of 5,319 and 6,228 eligible individuals were interviewed for the 2008 and 2010 survey administrations respectively. Samples were drawn from the National Apprentice and Trainee Collection (NCVER 2011a) and designed to be representative of the population of apprentices and trainees in the respective target years. In this study, survey data from 2008 and 2010 are used jointly to ensure sufficiently large sample sizes for data analysis. After removing trade apprentices, the combined sample contains records of 5,966 trainees, including both school-based and post-school trainees.

The identification of trainees was complicated by the fact that training type in the A&T Destinations surveys is based on respondents' own interpretations of whether they undertook an apprenticeship or a traineeship. Data on training type were therefore checked against training duration to ensure the plausibility of responses. Moreover, given that school-based traineeships are naturally limited to school-age youth, the sample was restricted to respondents between 15 and 19 years of age. Existing workers were excluded from the analysis because respondents with existing pre-training employment relationships are generally more likely to complete their training compared to those who begin their traineeship as a new employee. The final sample consisted of 398 school-based and 954 post-school trainees. Descriptive data are provided in Table 1 (characteristics of trainees) and Table 2 (characteristics of traineeships).

The final sample contained a small amount (5.13%) of missing data across the variables used for analysis. Small amounts of missing data can be addressed via listwise deletion without unduly biasing the analysis (Enders, 2010). In the analysis reported below, cases with missing data were deleted listwise.

**Table:-1.Demographic characteristics of trainees by traineeship status (unweighted)**

Variables	Categories	School-based (n=398)		Post-school (n=954)	
		n	%	n	%
Sex	Male	168	42.2	335	35.1
	Female	230	57.8	619	64.9
Indigenous status	Indigenous	12	3.0	44	4.6
	Not Indigenous	386	97.0	910	95.4
Language background	LBOTE	36	9.0	59	6.2
	English	362	91.0	895	93.8
Disability status	Disability	3	0.8	16	1.7
	No disability	395	99.2	938	98.3
Highest school level	Year 10 or below	294	73.9	324	34.0
	Year 11	83	20.9	170	17.8
	Year 12	21	5.3	460	48.2
Location	Metropolitan	217	54.5	501	52.5
	Regional	161	40.5	418	43.8
	Remote	20	5.0	35	3.7
State/Territory	NSW	12	3.0	170	17.8
	VIC	156	39.2	282	29.6
	QLD	135	33.9	149	15.6
	SA	52	13.1	111	11.6
	WA	6	1.5	49	5.1
	TAS	17	4.3	82	8.6
	NT	3	0.8	28	2.9
	ACT	17	4.3	83	8.7

Notes: Indigenous status includes respondent who reported being of Aboriginal or Torres Strait Islander heritage  
LBOTE: Language Background Other than English

**Table:-2.Characteristics of traineeship (AQF level and industry) by traineeship status (unweighted)**

Variables	Categories	School-based (n=398)		Post-school (n=954)	
		n	%	n	%
AQF level	Certificate 2 or below	9	2.3	35	3.7
	Certificate 3	140	35.2	562	58.9
	Certificate 4 or above	249	62.6	357	37.4
Industry	Agriculture, forestry, fishing	7	1.8	22	2.3
	Mining	1	0.3	3	0.3
	Manufacturing	11	2.8	56	5.9
	Electricity, gas, water, waste	0	0.0	4	0.4
	Construction	8	2.0	25	2.6
	Wholesale trade	2	0.5	19	2.0
	Retail trade	78	19.6	157	16.5
	Accommodation and food services	176	44.2	314	32.9
	Transport, postal, warehousing	7	1.8	9	0.9
	Information media, telecom	2	0.5	18	1.9
	Financial, insurance services	1	0.3	23	2.4
	Rental, hiring, real estate services	7	1.8	23	2.4
	Professional, scientific, technical services	8	2.0	32	3.4
	Admin, support services	10	2.5	36	3.8
	Public admin and safety	8	2.0	37	3.9
	Health care and social assistance	20	5.0	99	10.4
	Arts and recreational services	18	4.5	37	3.9
Other services	14	3.5	19	2.0	
Survey year	2008	207	52.0	431	45.2
	2010	191	48.0	523	54.8

Note: Industry groups are based on the Australian and New Zealand Standard Industrial Classification (ANZSIC, ABS 2013).

### Propensity score matching

The ‘gold standard’ method for evaluating the effect of an intervention is a randomised control trial (Shadish, Cook, & Campbell, 2002). Random assignment of individuals to a particular treatment or intervention is not usually possible in the context of VET research, and non-random survey data are often used for quantitative analysis. However, the use of non-random survey data raises the issue of selection bias, which occurs when individuals either self-select into an intervention or are subject to external assignment based on some underlying rationale (Dehejia & Wahba, 2002). It is not feasible to determine the effect of a given intervention in the presence of selection bias because individuals who choose to participate in the intervention may be systematically different from those who do not. In this study, we compare students who undertook a traineeship while at school with those who had left school and undertook a traineeship. Students who remained at school may be quite different from those who chose to leave and subsequently participated in a traineeship. A number of background characteristics have been associated with participation in VET in schools, of which school-based traineeships are an important part. Specifically, participation in VET in schools has been associated with students who have demonstrated lower academic achievement, are less engaged with school, have lower career aspirations, live in regional or remote areas, have parents without tertiary education, and come from English-speaking backgrounds (Anlezark, Karmel, & Ong, 2006; Coates & Rothman, 2008; Curtis, 2008; Fullarton, 2001). Thus, some selection bias is evident in VET in schools participants.

While the A&T Destinations Surveys contain limited information on student characteristics, they do provide data on several important background traits. School-based trainees in the sample exhibited statistically significant differences on six out of 11 relevant variables available in the A&T Destinations Survey when compared to their post-school counterparts (see Table 3). Therefore, it is necessary to find similar school-based and post-school traineeship participants in order to compare the effects of school-based and post-school traineeships.

**Table:-3. Initial differences between school-based and post-school trainees on relevant variables**

Variable	Mean		t	df
	School-based (n=398)	Post-school (n=954)		
Sample weight <sup>a</sup>	14.69	12.50	4.13***	1350
Sex	1.58	1.65	-2.46*	1350
Indigenous status	1.97	1.95	1.34	1350
Language background	1.91	1.94	-1.88	1350
Disability status	1.99	1.98	1.31	1350
Highest school level	1.31	2.14	-17.08***	1350
AQF level	2.60	2.34	8.21***	1350
Industry	9.65	9.82	-0.66	1350
Location	1.51	1.51	-0.19	1350
State/ Territory	3.08	3.38	-2.51*	1350
Survey year <sup>b</sup>	0.48	0.55	-2.30*	1350

Notes a sampling weight for each respondent was included in the analysis. B A dummy variable indicating the survey year (i.e., 2008 or 2010) was included in the analysis.

P values: \*, p<.05; \*\*\* p<.001

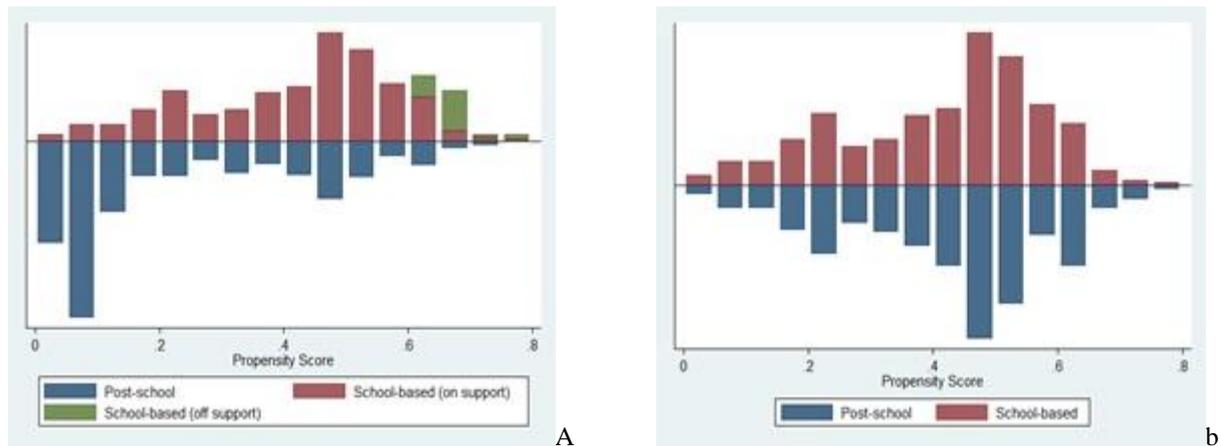
Propensity score matching (PSM) was used to balance the sample across observed and potentially confounding characteristics. PSM creates equivalent comparison groups from observational data by matching individuals on their probability of participation in a given intervention. This probability is calculated through logistic regression based on a number of observed background characteristics that are known to influence the participation decision and the outcome of interest. The propensity score is expressed as:

$E(X) = \text{pr}(z = 1 | X)$  where  $X$  denotes the vector of covariates for the propensity score model, and the binary variable  $z$  indicates exposure to treatment (Rosenbaum & Rubin, 1985). The propensity  $e(X)$  for each individual is estimated through logistic regression of  $z$  on  $X$ , where  $z$  equals 1 for treatment group participants and 0 for control group participants. Once treatment and control cases are matched on the propensity score, the treatment effect can be estimated free of overt selection bias.

The statistic of interest for measuring traineeship effects on completion rates was the average treatment effect on the treated (ATT),  $ATT = E(Y1 - Y0 | T = 1)$  where  $T$  represents the dichotomous treatment variable.  $Y1$  and  $Y0$  are the potential outcomes (traineeship completion) for treatment (school-based) and control (post-school) conditions respectively. Matching was performed using 1:1 nearest-neighbour matching without replacement. Nearest-neighbour matching, a well-established algorithm, was chosen because it efficiently balanced the sample across the vector of covariates, and it was particularly well-suited to conducting post-matching sensitivity analysis (Becker & Caliendo, 2007). Sensitivity analysis is desired in order to evaluate the robustness of the matching given that some unobserved variables may be influential in the decision to undertake a school-based or a post-school traineeship. PSM was carried out using the `psmatch2` module (Leuven & Sianesi, 2003, 2015) for Stata (StataCorp, 2013).

Measures aimed at ensuring matching quality included the enforcement of common support and the use of callipers. Observations falling outside of the common support region were discarded, as bias for such cases is undefined (Heckman, Ichimura, Smith, & Todd, 1998). A calliper size of 0.5 was used, which equalled .25 times the standard deviation of propensity scores (Rosenbaum & Rubin, 1985).

PSM successfully balanced the trainee sample across all relevant observed covariates. Figure 1 illustrates the distribution of propensity scores for school-based and post-school trainees (a) before and (b) after matching.



**Figure 1 Distribution of propensity scores across comparison groups before and after matching**

The matching process removed any pre-existing differences in relevant observed student background characteristics that might otherwise have confounded the impact of participating in school-based rather than post-school traineeships on training completion (Table 4).

**Table 4 Covariate balance across the sample after PSM**

Variable	Mean		t	df
	School-based	Post-school		
Weight	13.82	13.82	0.01	710
Sex	1.59	1.58	0.23	710
Indigenous status	1.97	1.96	0.20	710
Language background	1.91	1.92	-0.55	710
Disability status	1.99	1.99	0.38	710
Highest school level	1.35	1.32	0.64	710
AQF level	2.58	2.57	0.07	710
Industry	9.30	9.42	-0.39	710
Location <sup>a</sup>	1.53	1.49	0.90	710
State/ Territory	3.14	3.17	-0.16	710
Survey year	0.53	0.54	-0.38	710

a Despite the deterioration in covariate balance for the variable Location, this deterioration did not lead to a statistically significant difference between comparison groups after the match.

## Results

Youth who undertook a school-based traineeship experienced a notable completion advantage over equivalent peers who undertook a traineeship after leaving school. In the matched sample, 56% of school-based trainees completed their training compared to 44% of postschool trainees. This resulted in a statistically significant average treatment effect on schoolbased trainees of 13%. Results are summarised in Table 5. The estimates of completion reported here should not be taken as estimates of traineeship completions for all traineeships. We compare individuals who undertake school-based traineeships with matched individuals who undertook post-school traineeships, thus ours is not an analysis of all traineeship participants. NCVER (2011a, p.16) reported the rate of non-trade traineeship completions across all ANZSCO groups as being 53.1% for commencements in 2007 and 2008.

**Table-5. Average treatment effect on the treated (ATT)**

	Point Estimate		Mean difference	se	t
	School-based	Post-school			
Unmatched Sample	0.58	0.47	0.11	0.03	3.63
Matched Sample	0.56	0.44	0.13	0.04	3.47

The statistically significant result raised the question of whether positive completion effects from school-based traineeships were similar for both male and female youth. Prior research on outcomes from vocational training provides strong evidence that the effects of vocational training programs are different for males and females (Karmel & Liu, 2011). In order to investigate differential effects by gender, propensity score analysis was carried out separately for male and female trainees. Results shown in Table 6 reveal that there was no statistically significant difference in traineeship completion rates by traineeship mode for males. For females, however, school-based training showed a strong positive

treatment effect of 16% over post-school training. That is, there is a 16% greater likelihood of completion among females undertaking VET in school traineeships compared with those undertaking a postschool traineeship.

**Table:-6. Average treatment effect on the treated (ATT) by gender**

	Point Estimate		Mean Difference	se	t
	School-based	Post-school			
<b>Males</b>					
Unmatched Sample	0.52	0.44	0.08	0.05	1.74
Matched Sample	0.51	0.46	0.05	0.06	0.81
<b>Females</b>					
Unmatched Sample	0.62	0.49	0.13	0.04	3.46
Matched Sample	0.60	0.44	0.16	0.05	3.09

**Sensitivity to unobserved bias**

One potential limitation of PSM is its inability to account for bias from unobserved, yet causally relevant, covariates. The exclusion of influential covariates may lead to hidden bias, for two individuals with identical observed covariates could have different odds of being assigned to the treatment condition. The strength of hidden bias is captured by the parameter  $\Gamma$ , and where  $\Gamma = 1$ , no hidden bias is present. Increasing values of  $\Gamma$  reflect growing uncertainty about the impact of unobserved covariates on the parameter estimate. Sensitivity analysis (Rosenbaum, 2002) was conducted using the mhbounds module (Becker & Caliendo, 2007) for Stata.

Results in Table 7 indicate that the PSM model was insensitive to hidden bias up to the point where the odds of differential treatment assignment equalled 1.30 (pmh+ = .052). This means that the estimates of the average treatment effect of school-based traineeships were somewhat sensitive to unobserved variables. Given the relatively limited range of relevant background variables in the A&T Destinations Surveys such sensitivity is unsurprising.

**Table:-7. Results from sensitivity analysis**

$\Gamma$	Q <sub>mh+</sub>	pmh+
1.00	3.371	0.000
1.05	3.048	0.001
1.10	2.738	0.003
1.15	2.442	0.007
1.20	2.160	0.015
1.25	1.889	0.029
1.30	1.629	0.052
1.35	1.379	0.084
1.40	1.138	0.128
1.45	0.905	0.183
1.50	0.681	0.248

Note:  $\Gamma$ : Odds of differential assignment due to unobserved factors Q<sub>mh+</sub>: Mantel-Haenszel statistic (over-estimation of treatment effect)

p<sub>mh+</sub>: Significance level (under-estimation of treatment effect)

**Discussion**

We find that traineeship completion rates are 13% higher for school-based than post-school trainees, with a non-significant effect for males but a 16% higher rate for females. We did not propose any hypotheses about the outcome in advance of the study, suspecting that immersion the post-school workplace might provide an advantage of training authenticity while the school context may provide higher levels of pastoral support coupled with the benefit of the traineeship counting towards the senior secondary school certificate in most jurisdictions. Mentoring and pastoral support have a strong positive influence on the likelihood of completion (Buchanan, Raffaele, Glozier, & Kanagaratnam, 2016). Our findings, however, do not provide unequivocal support for these possible mechanisms promoting completion. School-based trainees must participate in paid work and therefore are subject to some exposure to authentic work contexts. Post-school work environments may well provide social support, either formally as part of the training provided by the employer or informally through workplace peers and mentors. The research on apprentice and trainee completions reveals that a complex set factors operate, some having to do with the work, some with expectations about the work and training, and some with remuneration (Curtis, 2008; Karmel & Mlotkowski, 2011; Karmel & Oliver, 2011b; Walker et al., 2012). Given the complex interactions of factors that are likely to influence decisions to complete training, it seems probable that there is some inter-individual difference in the influences of these factors and that there are substantial differences between industry sectors. It would be useful to investigate reasons for non-completion by industry sector using robust quantitative measures and qualitative methods.

**Limitations**

In contrast to post-school VET for which there is national consistency, differences in the policies that govern VET in schools practices differ considerably by jurisdiction (Clarke, 2012; Clarke & Volkoff, 2012). It seems very likely that these jurisdictional differences may influence participation in and completion of school-based VET programs, including traineeships. We did not have enough cases to be able to subdivide our sample by jurisdiction or industry sector and

therefore to explore differences in completion. We plan to address this limitation in a forthcoming study in which we use a much larger administrative data set in which we expect to model these differences.

We investigate completion of traineeships, but not the longer term outcomes of this form of training. Completion is an important issue, as low completion rates are of concern to policymakers since non-completion signals limited skills development and may contribute to skills shortages. However, more important are the subsequent education and labour market trajectories of participants. If school-based traineeships are as effective as post-school ones, completers should find opportunities to gain employment or to pursue higher level vocational or other studies. Some doubt has been cast on this, as numerous observers have reported sceptical views by industry about the credibility of school-based VET (e.g. Clarke, 2012). Such findings support our call for more detailed investigations of the factors that either facilitate or inhibit traineeship completions.

## References

- [1]. Anlezark, A., Karmel, T., & Ong, K. (2006). *Have school vocational education and training programs been successful?* Retrieved from Adelaide: <http://www.ncver.edu.au/research/core/cp0302.pdf>
- [2]. Australian Bureau of Statistics, & Statistics New Zealand. (2005). *ANZSCO – Australian and New Zealand Standard Classification of Occupations. Information paper.* Canberra: Australian Bureau of Statistics and Statistics New Zealand.
- [3]. Australian Bureau of Statistics, & Statistics New Zealand. (2013). *Australian and New Zealand Standard Industrial Classification (ANZSIC) 2006 (Revision 2.0).* Canberra: Australian Bureau of Statistics and Statistics New Zealand.
- [4]. Barnett, K., & Ryan, R. (2005). Vocational education and training in Australian schools: Issues for practitioners *International Education Journal*, 5(5), 89-104.
- [5]. Becker, S. O., & Caliendo, M. (2007). *mhbounds - Sensitivity analysis for average treatment effects.* Retrieved from Bonn:
- [6]. Blomberg, D., & Vnuk, M. (2011). *An investigation of the current state of VET delivered in schools.* Retrieved from Adelaide: <http://www.ncver.edu.au>
- [7]. Buchanan, J., Raffaele, C., Glozier, N., & Kanagaratnam, A. (2016). *Beyond mentoring: social support structures for young Australian carpentry apprentices.* Adelaide: NCVER.
- [8]. Clarke, K. (2012). *Entry to vocations: the efficacy of VET in schools.* Retrieved from Adelaide: <http://www.ncver.edu.au>
- [9]. Clarke, K. (2014). *Entry to vocations: building the foundations for successful transitions (2678).* Retrieved from Adelaide: <http://www.ncver.edu.au>
- [10]. Clarke, K., & Polesel, J. (2013). Strong on retention, weak on outcomes: the impact of vocational education and training in schools. *Discourse: Studies in the Cultural Politics of Education*, 34(2), 259-273.
- [11]. Clarke, K., & Volkoff, V. (2012). *Entry to vocations: current policy trends, barriers and facilitators of quality in VET in Schools (2536).* Retrieved from Adelaide: <http://www.ncver.edu.au>
- [12]. Coates, H., & Rothman, S. (2008). *Participation in VET in Schools.* Retrieved from Melbourne: <http://www.acer.edu.au>
- [13]. Commonwealth of Australia. (1984). *Report of the Committee of Inquiry into Labour Market Programs (P Kirby, Chair).* Canberra: Australian Government.
- [14]. Council of Australian Governments. (2012). *National Education Agreement.* Retrieved from Canberra: <http://www.federalfinancialrelations.gov.au/content/npa/education/nationalagreement.pdf>
- [15]. Cully, M. (2006). *Kirby comes of age: the birth, difficult adolescence, and future prospects of traineeships.* Retrieved from Sydney: [http://www.dsf.org.au/papers/185/DSFFINALCULLY\\_0.pdf](http://www.dsf.org.au/papers/185/DSFFINALCULLY_0.pdf)
- [16]. Curtis, D. D. (2008). *VET pathways taken by school leavers (52).* Retrieved from Melbourne: <http://www.acer.edu.au>
- [17]. Dehejia, R. H., & Wahba, S. (2002). Propensity score-matching methods for nonexperimental causal studies. *The Review of Economics and Statistics*, 84(1), 151-161.
- [18]. Enders, C. K. (2010). *Applied missing data analysis.* New York: Guilford Press.
- [19]. Fullarton, S. (2001). *VET in schools: Participation and pathways (21).* Retrieved from Melbourne: <http://www.acer.edu.au>
- [20]. Gemici, S., & Curtis, D. D. (2012). Senior secondary workplace learning and transition success in Australia. *Education + Training*, 54(1), 36-49. doi:10.1108/00400911211198887
- [21]. Heckman, J., Ichimura, H., Smith, J., & Todd, P. (1998). Characterizing selection bias using experimental data. *Econometrica*, 66(5), 1017-1098.
- [22]. Karmel, T. (2017). *Factors affecting apprenticeships and traineeships, Part 2 (Research Report 3/2017).* Retrieved from Melbourne:
- [23]. Karmel, T., & Liu, S.-H. (2011). *Which paths work for which young people? (57).* Retrieved from Adelaide:
- [24]. Karmel, T., & Mlotkowski, P. (2011). *The impact of wages and the likelihood of employment on the probability of completing an apprenticeship or traineeship.* Retrieved from Adelaide: <http://www.ncver.edu.au>
- [25]. Karmel, T., & Oliver, D. (2011a). *Effect of the downturn on apprentices and trainees.* Retrieved from Adelaide: <http://www.ncver.edu.au>
- [26]. Karmel, T., & Oliver, D. (2011b). *Pre-apprenticeships and their impact on apprenticeship completion and satisfaction.* Retrieved from Adelaide: <http://www.ncver.edu.au>

- [27]. Knight, B. (2012). *Evolution of apprenticeships and traineeships in Australia: an unfinished history*. Adelaide: NCVER.
- [28]. Lamb, S. P., & Vickers, M. (2006). *Variations in VET provision across Australian schools and their effects on student outcomes* (48). Retrieved from Melbourne: <http://www.acer.edu.au/research/projects/lsay/documents/LSAY48VET.pdf>
- [29]. Leuven, E., & Sianesi, B. (2003, 2015). psmatch2: Stata module to perform full Mahalanobis and propensity score matching, common support graphing, and covariate imbalance testing. Retrieved from <http://econpapers.repec.org/software/bocbocode/s432001.htm>
- [30]. Ministerial Council on Education Employment Training and Youth Affairs. (2008). *Melbourne Declaration on Educational Goals for Young Australians*. Retrieved from Melbourne:
- [31]. [http://www.mcetya.edu.au/verve/resources/National\\_Declaration\\_on\\_the\\_Educational\\_Goals\\_for\\_Young\\_Australians.pdf](http://www.mcetya.edu.au/verve/resources/National_Declaration_on_the_Educational_Goals_for_Young_Australians.pdf)
- [32]. National Centre for Vocational Education Research. (2009). *Australian vocational education and training statistics. Apprentice and trainee destinations 2008*. Retrieved from Adelaide: <http://www.ncver.edu.au>
- [33]. National Centre for Vocational Education Research. (2010). *Australian vocational education and training statistics. Apprentice and trainee destinations 2010*. Retrieved from Adelaide: <http://www.ncver.edu.au>
- [34]. National Centre for Vocational Education Research. (2011a). *Australian vocational education and training statistics. Apprentices and trainees 2010*. Retrieved from Adelaide: <http://www.ncver.edu.au>
- [35]. National Centre for Vocational Education Research. (2011b). *Australian vocational education and training statistics. Completion and attrition rates for apprentices and trainees*. Retrieved from Adelaide: <http://www.ncver.edu.au>
- [36]. National Centre for Vocational Education Research. (2011c). *Overview of the Australian apprenticeship and traineeship system*. Retrieved from Adelaide: <http://www.ncver.edu.au>
- [37]. National Centre for Vocational Education Research. (2015). *Australian vocational education and training statistics. Apprentices and trainees, 2014*. Retrieved from Adelaide: <http://www.ncver.edu.au>
- [38]. Nelms, L., Yuen, K., Pung, A., Farooqui, S., & Walsh, J. (2017). *Factors affecting apprenticeships and traineeships, Part 1* (Research Report 3/2017). Retrieved from Melbourne:
- [39]. Oliver, D., & Karmel, T. (2011). *Pre-vocational programs and their impact*. Retrieved from Adelaide: <http://www.ncver.edu.au>
- [40]. Polesel, J. (2010). Vocational education and training (VET) and young people. The pathway of the poor? *Education + Training*, 52(5), 415-426.
- [41]. Polesel, J., & Clarke, K. (2011). The marginalisation of VET in an Australian secondary school. *Journal of Vocational Education and Training*, 63(4), 525-538.
- [42]. Polesel, J., & Keating, J. (2011). School completion targets and the 'equivalence' of VET in the Australian context. *Oxford Review of Education*, 37(3), 367-382.
- [43]. Polidano, C., & Tabasso, D. (2013). *Making it real: the benefits of workplace learning in upper-secondary VET courses* (7633). Retrieved from Bonn: <http://hdl.handle.net/10419/90018>
- [44]. Rosenbaum, P. R. (2002). *Observational studies* (2nd ed.). New York: Springer.
- [45]. Rosenbaum, P. R., & Rubin, D. B. (1985). Constructing a control group using multivariate matched sampling methods that incorporate the propensity score. *American Statistician*, 39(1), 33-38.
- [46]. Service Skills Australia. (2010). *Services Industries. VET in Schools Project*. Retrieved from <https://www.serviceskills.com.au>
- [47]. Shadish, W. R., Cook, T. D., & Campbell, D. T. (2002). *Experimental and quasi experimental designs for generalized causal inference* (2nd ed.). Boston, MA: Houghton Mifflin.
- [48]. Smith, E., Comyn, P., Brennan Kemmis, R., & Smith, A. (2009). *High-quality traineeships: Identifying what works*. Retrieved from Adelaide: <http://www.ncver.edu.au>
- [49]. Snell, D., & Hart, A. (2007). Vocational training in Australia: is there a link between attrition and quality? *Education + Training*, 49(6), 500-512.
- [50]. StataCorp. (2013). *Stata* (Version 13). College Station, TX: StataCorp.
- [51]. Walker, A., Smith, E., & Brennan Kemmis, R. (2012). The psychological contract in apprenticeships and traineeships. *International Employment Relations Review*, 18(1), 66-81.
- [52]. Wheelahan, L., Buchanan, J., & Yu, S. (2015). *Linking qualifications and the labour market through capabilities and vocational streams*. Adelaide: NCVER.
- [53]. Wheelahan, L., & Moodie, G. (2010). *The quality of teaching in VET: final report and recommendations*. Retrieved from <http://www.lhmartinstitute.edu.au>