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Abstract

In OECD countries, 'real world' upper-secondary vocational education and training (VET) programs are used to engage less academically oriented youth in learning, while helping to prepare them for post-school work and/or further training. In general terms, VET programs with high employer involvement, such as apprenticeship schemes, are considered to be superior to classroom-based VET programs that are typically found in many English-speaking countries. In this study, we examine outcomes from a potential 'third way': classroom-based VET with a short-term structured workplace learning component. Using propensity score matching and PISA data linked to information from the Longitudinal Survey of Australian Youth, we find this model is associated with higher school completion rates and better employment transitions.

JEL classification: I20, J01

Keywords: Educational economics, vocational education and training, workplace learning

1. Introduction

Youth unemployment in OECD countries has consistently remained around twice the rate of that in the working-age population as a whole over the last two decades. In 2010, 18% of 15-29 year olds who had left school in the OECD area were unemployed, compared to 10% for the working age population as a whole (OECD 2010a). To deal with youth unemployment, governments around the world have focussed on improving engagement in education, especially for students at risk of dropping out of school and becoming long-term unemployed.[1] In English-speaking countries where the focus is on general upper-secondary education, a key measure to improve engagement in school has been to integrate vocational education and training (VET) courses into the upper-secondary school curriculum.[2] In the main, the training in these VET courses is predominantly classroom rather than workplace based. Understanding the outcomes of these programs and how they vary across different models of provision is important in designing effective youth transition policies.

To meet this end, in this study, we estimate the school and post-school impacts of taking upper-secondary VET subjects in Australia, including the benefits from taking courses with a short, structured workplace learning component included within classroom-based programs. Structured workplace learning (also called work-based learning) involves on-the-job training to acquire prescribed job-specific and general skills and contrasts with work experience where the main objective is to familiarise students with work. Studies to date, mainly from the United States, have found generally positive school completion and labour market outcomes for those who take predominantly classroom-based upper-secondary VET courses, relative to those who take only general education courses (Kang and Bishop 1989, Bishop and Mane 2004, Meer 2007). We build on these studies in two important ways. First we examine a larger range of outcomes, including post-school education outcomes, to gain a more nuanced picture of the outcomes from school VET programs. Considering impacts on post-school education is important because it sheds light on whether vocational training in school complements or substitutes post-school education. If in-school courses substitute post-school

[1] For example, a key objective of the European Commission's 2020 Agenda to revive the European economy is to reduce early school leavers to less than 10% of youth and to ensure at least 40% of 18-24 year olds have a tertiary qualification or equivalent (European Commission 2011). In the United Kingdom from 2013, youth will be required to remain in education or training until age 18, up from 16. In Australia, the Government has a target of 90% secondary school completion (or equivalent) for 20 to 24 year olds by 2015.

[2] For example, the number of vocational qualifications attained in secondary school (level 1 and 2) in England has increased by around 50-fold between 2003/04 and 2009/10 (Wolf 2011). In the United States, access to career and technical education in schools is mandated in national legislation (Carl Perkins Act of 1984 and subsequent amendments), with the objective of meeting the needs of disadvantaged communities.

courses, then the benefit of these courses in the upper-secondary school curriculum is diminished, while the opposite is true if they are complements.

The second major contribution of this study is in examining whether including a short, structured workplace learning component in classroom-based upper-secondary VET courses improves student outcomes.[3] In several country reviews, the OECD has recommended greater use of workplace learning in upper-secondary VET courses, see for example country reports for Australia (Hoeckel, et al. 2008) and the United States (Kis 2011 and Kuczera 2011). The OECD (2010b) claim that the use of workplace learning helps develop work-relevant technical and general skills that cannot be learnt in the classroom, while providing opportunities for employers and students to connect (OECD 2010b).

To date, evidence on the benefits of workplace learning is limited to studies that compare outcomes of those who complete an apprenticeship to those who do some form of general study (see Ryan 2001 and Wolter and Ryan 2011 for reviews). While this evidence is positive, especially in terms of initial employment outcomes, it does not suggest that there should be benefits from incorporating workplace learning into classroom-based VET courses. First, unlike an apprenticeship, a workplace learning component typically does not involve an employment contract, which means employers may not have the same vested interest to provide quality training. Second, to accommodate the academic demands of a general upper-secondary education curriculum, the amount of time spent in workplace learning is relatively short compared to time spent as part of an apprenticeship.[4] Third, time in the workplace may have a disruptive effect on the student's academic performance, especially if it comes at the expense of time in other classes. Fourth, benefits from completing an apprenticeship over general study may not be indicative of benefits compared to other forms of VET study.

To try and estimate causal impacts of taking upper-secondary VET subjects, including the causal impacts from incorporating workplace learning into classroom-based VET, we use propensity score matching and a rich dataset to control for self-selection bias. Self-selection bias occurs when factors that affect both enrolment into upper-secondary VET subjects and

[3] Workplace learning involves on-the-job training to acquire prescribed job-specific and general skills. It is different to work experience where the main objective is to familiarise students with work, rather than acquire skills.

[4] In Australia for example, among classroom-based upper-secondary VET subjects that last a year, those that involve a workplace learning component involve on average 15 days of training in the workplace; compares to at least 96 days of training in the workplace per year for apprentices. Data are from 2003 and 2006 Longitudinal Survey of Australian Youth.

outcomes of interest are uncontrolled for (Bishop and Mane 2004; Meer 2007).[5] The data used includes school, family and individual-level information from 2003 and 2006 PISA cohorts linked to data from the Longitudinal Survey of Australian Youth (LSAY) (Department of Education, Employment and Workplace Relations (DEEWR) 2011). LSAY is one of only a handful of longitudinal surveys that can be linked to PISA cohorts. Most important in dealing with selection are available controls for academic performance, education and occupation aspirations and school programs and resources.

Not only are the data novel, but the Australian context is important. First, the highly accessible nature of post-school VET courses means that Australia is an ideal setting for observing the relationship between participation in upper-secondary VET programs and participation in post-school VET programs. Second, upper-secondary VET programs in Australia, known as 'VET-in-schools', provide a unique opportunity to examine benefits from workplace learning. In almost all schools in Australia, upper-secondary students have the opportunity to enrol in VET subjects that have prescribed general and job-specific competency levels to be met for attainment of credits towards a nationally accredited certificate. Importantly, there is no requirement that these prescribed competencies be attained through workplace. In practice, if the course competencies are not attained through workplace learning, they are attained by simulating workplace conditions in the classroom.

We find that taking an upper-secondary VET subject improves the chances of school completion and the chance of successful transition from school to work. While taking an upper-secondary VET subject is estimated to have no effect on overall enrolments, it is estimated to increase enrolments in post-school VET courses at the expense of higher education. Importantly, we find that both the benefits to school completion and initial labour market success are greater for VET courses that incorporate a workplace learning component. These results add weight to the OECD recommendations for increasing the use of short-term workplace learning in classroom-based VET programs in English-speaking countries.

The remainder of the paper is structured as follows. Section 2 sets out the Australian VET-in-schools system, sections 3 and 4 are overviews of the data and methodology respectively, section 5 is a discussion of the results and section 6 is the conclusion.

[5] To the extent that lower ability youth are more likely to select into school VET courses, failure to control for selection is likely to lead to an underestimation of the benefits from VET programs (Meer 2007).

2. VET-in-schools

VET-in-schools was introduced in upper-secondary school (the last two years of secondary school) in the mid-1990s to retain less academic youth in school and to prepare students for work and further training (Ministerial Council on Employment Education and Training and Youth Affairs (MCEETYA) 1999). Today, VET-in-schools programs are highly integrated into the school curriculum, with over 95% of secondary schools offering VET subjects (MCEETYA 2003) and around 40% of all upper-secondary students undertaking at least one subject (NCVER 2011a).

A feature of the VET-in-schools model is that almost all VET subjects count, in part or in full, towards both a nationally accredited VET certificate and a secondary school certificate (NCVER 2011a).[6] Most of the training (around 80%) is for foundation level courses, equivalent to International Standard Classification of Education (ISCED) 2C (NCVER 2011b). In Australia, the attainment of a VET certificate is based on demonstration of workplace (job-specific and generic) competencies stipulated in nationally endorsed training packages.[7] The selection of suitable training packages and associated upper-secondary VET subjects (around which VET-in-schools programs are designed) is determined by the state boards of curriculum in consultation with industry groups.

VET-in-schools subjects may be part of an apprenticeship/traineeship where students enter into a training contract with an employer and spend at least 15 hours per week in the workplace. Enrolments in VET-in-schools subjects that are part of an apprenticeship/traineeship are relatively uncommon, comprising only around 10% of all courses taken by VET students, and are limited mainly to training in the traditional trades (NCVER 2011a).[8] Taking subjects as part of a school-based apprenticeships/traineeships gives students a head-start, but they must continue their training post-school to attain a qualification. Of the 90% who take classroom-based VET subjects, the most popular subjects are in the fields of Management and Commerce (30%), Engineering and related technologies (12%), Health (12%) and Food, Hospitality and Personal Services (9%) (NCVER 2011a).

[6] An exception are courses that lead to a basic level qualification - equivalent to below ISCED level 2C.
[7] There are some programs for which there is no nationally endorsed training package. In these cases, the course must be endorsed by the relevant state board of curriculum.
[8] Most apprentices/trainees leave school to complete their training, perhaps because it allows students to devote more time in an employment setting, which means they earn more money and finish their training earlier than if they'd remained in school and gained credits to their qualification by taking VET-in-schools subjects.

Although there is a strong emphasis on attaining a qualification, taking a VET-in-schools subject does not preclude students from accessing university by normal pathways. Generally speaking, university entry in Australia is dictated by a student's university entry score, which is based on academic performance in the last year of school. The university entry score is the sum of the best three subjects (after scaling to account for differences in difficulty) in the final year of study plus the score for English, which is compulsory.[9] VET subjects may or may not be included in the top three subjects depending on the state and the subject.[10] It is an objective of the Australian Government that VET subjects should be accessible for students of all academic backgrounds, including those who intend to go onto university study (MCEETYA 2001).[11]

While the skills to be developed in a given VET subject are embedded in the curriculum, in classroom-based courses, whether these skills are attained through workplace learning is up to the schools or the training provider who offers training on behalf of the school.[12] Where a workplace learning component is incorporated, it typically involves an agreement between the school and local employers to train a given number of students for the purpose of attaining skills required for accreditation, with no commitment of future employment or pay for the students. If a school chooses not to incorporate a workplace learning component into a course to attain the necessary skills for accreditation, the school will instead simulate workplace learning in the classroom. For example, as part of an IT course, students may have to develop an ability to communicate effectively with clients, which may be simulated in the classroom by having a school teacher act out the part of a client. In practice, the decision on whether or not to use workplace learning in a given subject is likely to depend on a number of factors, including student demand, school resources to co-ordinate and manage placements, the availability and willingness of local employers to be involved and the cost of providing a simulated work environment, such as the cost of equipment. Estimates from Ryan (2002)

[9] Typically 5 subjects are taken in last year of school, in which case, the university entry score will also include 10% of a fifth subject. If a sixth subject is take, an additional 10% of a sixth subject will be included as well.
[10] Making VET in schools more accessible for students of all academic backgrounds, including those who intend to go onto university, is an objective of the Australian Government, as outlined in the New Framework for Vocational Education in Schools (MCEETYA 2001). To achieve this end, the New Framework underlines the importance of course competency counting towards both the attainment of a VET qualification and tertiary entrance rank scores.
[11] To achieve this end, the MCEETYA (2001) underlines the importance of course competency counting towards both the attainment of a VET qualification and university entry scores.
[12] National training packages only set-out the minimum competencies for certificate accreditation, they do not stipulate how the subjects should be taught to achieve the minimum competencies. However, in apprenticeships/traineeships, workplace learning is mandatory as part of their employment contract.

suggest that around 60% of all students who take a VET-in-schools course get some structured workplace learning (Ryan 2002).

3. Data and definitional issues

The empirical analysis in this study is based on data from the 2003 and 2006 OECD Program for International Student Assessment (PISA), a large-scale international survey of 15 year-old students and their school principals who are also surveyed in LSAY. LSAY is a longitudinal panel study, similar to the National Longitudinal Survey of Youth (NLSY) in the United States and the Youth in Transition Survey (YITS) in Canada, which tracks students from 15 until 25. There are several LSAY cohorts (1995, 1998, 2003, 2006 and 2009), with 2003 being the first to be linked to the PISA study.[13] In 2003, parents of around 12,000 PISA participants from over 300 schools were invited to participate in LSAY and in 2006, the LSAY sample became the entire PISA sample. Overall, around 10,000 of the 12,000 PISA participants took part in the LSAY survey and the sample in 2006 was around 14,000.[14] Australia is one of only a handful of countries that have the capacity to link longitudinal datasets to PISA, the others are Canada, the Czech Republic, Denmark, Switzerland and Uruguay.

Combining PISA and longitudinal information produces a rich dataset with detailed information on students, their schools and their post-school outcomes. Student information collected includes academic performance, own and parental post-school education aspirations, home education resources and socio-economic status. School information collected includes available resources and infrastructure, details of the student and teacher community and school governance. LSAY complements this information by eliciting additional student information at age 15, such as personal attitudes, as well as longitudinal information about school subjects taken, school and post-school education outcomes, employment outcomes and living circumstances.

Because we only observe participation in VET-in-schools during upper-secondary school, we limit the sample to those who are observed to at least commence study in upper-secondary school (in most cases, remain in school until age 16). Students are identified to participate in

[13] Although data from 2009 cohort was available at the time of analysis, there were not enough waves of data available to examine upper-secondary VET course outcomes.

[14] A consequence of expanding the LSAY sample to the entire PISA sample in 2006, instead of inviting participation in LSAY (as in 2003), was a large attrition rate in 2007 from LSAY 2006. Despite the large attrition rates in 2007, we observe only minor differences in the characteristics of those who attrite and those who do not, which suggests that bias in our sample is not a major concern.

VET-in-schools if they report enrolling in a VET subject in upper-secondary school. If students left school without commencing their final year of school, information from the first year of upper-secondary school (Year 11) is used. In each year of upper-secondary school in LSAY, students who report taking at least one VET subject are asked the field of study of each subject, whether each subject is part of an apprenticeship/traineeship and the total time spent in workplace learning in all VET subjects. For the purpose of this study, we categories student treatments of VET-in-schools as: *classroom-based VET with workplace learning (WPL), classroom-based VET without WPL* and *apprenticeship/traineeships.* Students who take classroom-based VET are identified as taking workplace learning if they report spending at least 1 hour in workplace learning in upper-secondary school; otherwise they are treated as being without.[15] Apprentices/trainees are those who take only upper-secondary VET subjects that are part of an apprenticeship/traineeship. Those that take both classroom-based VET subjects and subjects as part of an apprenticeship/traineeship are removed from the sample.

In all, we observe around 15,000 individuals in our sample, with around 29% taking at least one VET-in-schools subject in upper-secondary school (Table 1). Classroom-based VET is the most popular form, with 20% of upper-secondary students taking at least one of these courses. Around 4% of upper-secondary students take just VET subjects as part of an apprenticeship/traineeship and 4% take both classroom-based VET subjects and VET subjects as part of an apprenticeship/traineeship. Among those who take classroom-based VET subjects, we have large numbers with and without WPL, which is important for estimating the additional effects of workplace learning.

When estimating the impacts of taking VET-in-schools subjects, including the extra impacts of workplace learning, it is important to control for factors that may affect both selection into treatment and outcomes of interest. Failure to do so means that the estimated treatment effects will be biased (Blundell and Costa Dias 2008). Descriptive statistics presented in Table A.1 (Appendix A) show that there are considerable differences in the characteristics of students who do and do not choose to enrol in VET-in-schools subjects. Students who do VET-in-schools subjects are more than 20 percentage points less likely to report an intention to go to university, are around 18 percentage points more likely to be in the bottom two quartiles of achievement in mathematics and reading and are more likely to report having a parent without a bachelor degree. These differences underline the purpose of VET-in-schools subjects to

[15] Because only total hours in workplace learning is recorded in LSAY, for students who took more than one classroom-based VET subject in a given year and report doing some workplace learning, we do not know whether all of their subjects had a workplace learning component.

provide upper-secondary vocational education pathways for less academically oriented students.

Table 1: Sample of analysis

	LSAY 2003	LSAY 2006	Total	%
No VET-in-schools	5,892	5,264	11,156	71
VET-in-schools	2,315	2,156	4,471	29
Classroom-based VET				
No WPL	949	807	1,756	11
With WPL	755	649	1,404	9
Apprenticeship/traineeship	285	399	684	4
Classroom-based VET & apprenticeship/traineeship (omitted from the sample)	326	301	627	4
Total	8,207	7,420	15,627	100

Source: Longitudinal Survey of Australian Youth 2003 and 2006.

Compared to differences in the characteristics of students who do and do not take VET-in-schools subjects, differences between those who take classroom-based VET courses with and without workplace learning are minor (Table A.1). The largest difference is in the post-school education aspirations of students at age 15. In particular, those who do classroom-based VET subjects with workplace learning are less likely to report wanting to enter higher education after school (35% compared to 46%). The similarity of students who do and do not take courses with workplace learning suggests that selection into these courses may be driven more by school differences rather than student preferences. For this reason, controlling for school-level factors that may affect both student selection into subjects with workplace learning and outcomes may be important. Tables 2 and 3 also point to differences in the numbers of courses taken and the fields of study between those whose VET courses do and do not include workplace learning.

Table 2: Total number of VET-in-schools subjects taken in upper-secondary school

	1 subject	2 subjects	3 subjects	4 or more subjects	Number of students
	%	%	%	%	
All VET	55.91	30.15	8.01	5.94	3,858
Classroom-based VET with WPL	55.13	30.42	7.7	6.74	1,558
Classroom-based VET without WPL	69.8	21.59	5.63	2.99	1,172
Apprenticeship/traineeship	65.06	24.16	6.32	4.46	538

Source: Longitudinal Survey of Australian Youth 2003 and 2006.

Table 3: Field of study for all upper-secondary VET subjects taken

VET treatment group	Business Studies	Arts	Health/ Physical Educ.	IT	Hospitality	Technology	Other	Number of students
	%	%	%	%	%	%	%	
All VET	10.74	6.06	5.18	9.47	22.44	16.33	16.14	3,632
Classroom-based VET with WPL	10.06	4.04	5.75	8.01	27.52	14.92	17.6	1,461
Classroom-based VET without WPL	8.93	12.03	5.74	12.94	17.59	13.22	15.87	1,097
Apprenticeship/ traineeship	16.19	1.21	3.85	5.26	15.99	24.09	18.61	494

Note: Estimates include fields of study for multiple subjects taken by the same student.
Source: Longitudinal Survey of Australian Youth 2003 and 2006.

3.1 Outcomes of interest

A key outcome of interest is school completion, which is identified by whether or not a student receives a secondary school certificate upon leaving school. A secondary school certificate is a credential awarded to students who successfully meet the academic requirements of upper-secondary school (Year 11 and Year 12). This means that students who remain in education until the end of the final year of secondary school, but who did not attain a secondary school certificate because they did not meet the academic requirements, are treated as early school leavers.

A feature of this study is the wide-range of post-school impacts examined. Because there are differences in the school year of the initial sample of 15-year-olds (slightly more are in Year 10 than Year 9), to put individuals on equal footing, we estimate post-school outcomes in the first year out from school, rather than outcomes at a certain age. Participation in post-school education in the year after leaving school is measured by whether or not individuals report enrolling in at least one post-school course that leads to a national qualification (VET or higher education qualification) since leaving school. As well as engagement in post-school education in the year after school, we also examine the impacts on the highest course enrolment, categorised as either a foundation level VET course (equivalent to ISCED 2C), a VET course (ISCED 3C-5B) or a higher education course (ISCED 5a-6).

Whether or not taking VET subjects helps young people find work after leaving school is determined by whether or not it improves their employment rate. An individual is employed if they respond 'yes' to the question: "*Do you currently work in a job, in your own business or on a farm?"* Among those employed, we also make the distinction between those who find full-time and part-time employment, which depends on whether the average hours of work reported per week is greater than 35 hours per week (full-time).

To measure any effect of VET-in-schools on wages, we use weekly wages for a restricted sample of those in full-time employment. We prefer the use of weekly wages for full-time employed over hourly wages because the latter has to be derived as the ratio of reported average weekly wage by the reported average weekly hours of work. Such a measure is subject to error because many individuals work in jobs where their hours vary from week to week, which makes reporting average hours worked per week difficult. Also, restricting the analysis to those employed full-time makes it easier to interpret the results — full-time employment compared to part-time employment is associated with a wage discount in Australia (Booth and Wood 2008).

While they are objective measures, wages and employment states do not capture all aspects of successful transition. Other aspects of employment, such as the nature of the work, future prospects, training opportunities and job autonomy may also be important to youth. To capture the overall satisfaction with their employment outcome, we use information on whether respondents report their job is one that they would like as a career. This is an important consideration when examining short-term outcomes because in many cases, such as apprentices/trainees, youth may forego a higher wage early in their careers in the anticipation of higher wages later on. All else being equal, finding a career job may indicate the commencement of a suitable long-term career path. As for wages, we measure the impacts on the likelihood of finding a career job by restricting the sample to those in full-time employment.

4. Multivariate Approach

In this study, we estimate the overall impacts of participating in VET-in-schools and the additional impacts of workplace learning in classroom-based VET using propensity score matching. Propensity score matching is a quasi-experimental technique that simulates random assignment by lining up comparison individuals according to sufficient observable factors to remove systematic differences in the pre-experimental outcomes between the treated and non-treated. Matching methods are often preferred over parameteric regression models in dealing with non-random selection because they are not subject to functional misspecification and they do not rely on valid exclusion restrictions that in practice are hard to find (see Dustmann and Rochina-Barrachina 2000 for a review).

However, to estimate causal effects, matching requires two conditions to be met:

1. Conditional Independence Assumption (CIA): after conditioning on covariates, assignment between program participation and non-participation is effectively random; that is, there are no unobserved differences between the two groups.

2. Common Support Assumption (CSA): for each program participant, there is some individual with the same (or sufficiently similar) characteristics who does not participate, and hence who can be used as the matched counterfactual observation.

To generate a matched or 'like' control group, propensity score matching relies on a (propensity score) function of observed characteristics to find individuals from the control group who are estimated to be, within some range, just as likely to be treated, but did not. For estimating the overall impact, including impacts for each of the VET-in-schools models, the control group is members of the sample who did not enrol in any upper-secondary VET-in-schools course. For estimating the impact of workplace learning in classroom-based VET subjects, the control group is students who participated in classroom-based VET subjects without workplace learning. We use separate propensity score functions to generate a matched control groups for each treatment group. The propensity score functions are the linear predicted scores from separate binary logit models of participation in the treatment. We use linear predicted scores rather than their predicted probabilities because they allow for symmetry in selection of control observations.

When using the propensity scores to generate the matched control groups, we employ Nearest Neighbour and Kernel methods, which are standard in the literature (Blundell and Costa Dias 2008). Nearest Neighbour is the simpler technique because it selects for each treatment group member only one comparator — the one who has the closest propensity score (Caliendo and Kopeining 2008). The Kernel matching used in this study uses a calliper approach, whereby for each treated individual, the propensity scores within a 5% confidence interval are chosen from the control group. The advantage of Kernel over Nearest Neighbour is that it uses information from a neighbourhood of like individuals and not just one, which means that the treatment effects can be estimated with more precision (Blundell and Costa Dias 2008).

4.1 Choice of variables included in the matching

To ensure that the CIA holds, we use of a rich set of covariates from LSAY and PISA surveys to control for differences between those who do and do not take VET subjects. However, to reduce the chances of breaching the CSA, we follow the recommendations of Blundell and

Costa Dias (2009) and only include variables that are likely to affect both participation in VET and school completion and post-school outcomes because only these lead to selection bias. Failure to control for these factors will tend to under-estimate the benefits from VET programs (Meer 2007). To ensure common time trends, we restrict the selection of control group to individuals who are from the same PISA cohort (exact match).

Given that VET-in-school programs were originally designed to engage less academic students in education, it is important to match on prior academic performance. A strength of this study is being able to use PISA test score information to control for academic ability at age 15, which in most cases is just prior to upper-secondary school when students have to decide on whether or not to take VET subjects. Academic ability in PISA is measured in four domains: reading literacy, mathematical literacy, scientific literacy and problem solving. In each domain, the tests not only measure the understanding of concepts and mastery of processes, but also the ability to use these concepts and processes in real world situations (OECD 2005a).[16] There is a high degree of correlation across these domains and we match only on the two that explain most of the variation — reading and numeracy — by including one plausible value (the first of five) for each of the included domains.[17] For both reading and numeracy, the plausible value is entered as a series of 20 dummy variables, representing relative performance on 5 percentage-point interval scale within the PISA cohort. The omitted category is performance in the bottom 5% of PISA.

Key in estimating the effects of VET-in-school programs on school completion is controlling for differences in post-school education aspirations. There is a considerable body of literature that suggest plans are an important predictor of student outcomes (Bandura et al. 2001, Zimmerman et al. 1992, Polidano et al. 2013), and at the same time, will influence selection into VET-in-schools programs. For example, planning to enter employment after school may increase the chances of doing so, but may also motivate students to prepare for the labour market by taking a VET subject, including perhaps a course with a workplace learning component. In this study, we match on PISA information on what students intend to do in the year after school and what students think their parents want them to do in the year after school (from LSAY). Controlling for parents' aspirations, independent of own aspirations, may be important because parents' aspirations are likely to affect upper-secondary course choices and home education inputs that may also affect outcomes. For example, parents who have high

[16] For more information on the derivation of the PISA tests, see OECD (2005a).
[17] The OECD recommends including only one plausible value into any regression model (OECD 2005b).

academic expectations for their children may view VET subjects as inferior and may be more willing to invest in their child's education, for example, by supervising homework or by hiring a tutor.

As well as controlling for differences in education aspirations, we also control for differences in occupation intentions. Controlling for occupation intentions is important because they are likely to affect both preferences for doing VET subjects and workplace learning and post-school study and employment outcomes. For example, students who aspire to be tradespeople may be more likely to choose a VET subject and undertake further study as part of an apprenticeship/traineeship after school. We control for differences in occupation aspirations by using information on student's intended occupations at age 30 (1-digit International Standard Classification of Occupations (ISCO) 2008) when they are age 15.

Although VET-in-schools is ubiquitous, there may be variation in the program quality, which if linked to other school characteristics that affect school completion and post-school outcomes, such as school resources, may bias results. To deal with this issue, we match on characteristics of the school that may be related to resources devoted to VET-in-schools courses and potentially school and post-school outcomes. These variables include the demand for VET-in-schools courses from the student body (proportion of peers enrolled in different types of VET-in-schools subjects), a school type identifier (government or non-government) and resources of parents at the school, proxied by a normalised index of parental socio-economic status (SES).[18] Except for the school identifier, these measures are derived for each student, using school peer information, that is, school average information, excluding information on the student themselves.

As proposed by Rosenbaum and Rubin (1985), to help choose the logit model specification, we use a balancing test to check that the mean values of the treatment and matched control group are the same. If the mean values are significantly different, then it may be concluded that the distribution of the propensity scores between the treatment and matched control group is different as well and the CIA will be violated. In the final logit specification, there are no statistically significant differences in the mean values of all the variables used in the matching

[18] Parental SES is a multi-factor measure of SES developed for PISA and includes measures of parents' economic, social and cultural status (ESCS). We also included measures of school resources from the PISA principal survey, such as reported shortages of teachers, infrastructure and equipment. These were found to be highly correlated with school type and produced results that were almost identical to those estimated when they were omitted. Results are available upon request from the authors.

(at 90% confidence level). See Tables A.2 and A.3 in the Appendix for the logit model results and balancing test results respectively.

5. Results

In this section we present the estimated average treatment effects on the treated (ATET) from the Kernel matching. Results from the Nearest Neighbour matching are generally consistent, but are estimated with less precision.[19] For all ATETs, we calculated the standard error using a bootstrap procedure with 1,000 draws. We first present results for participating in any VET-in-school subjects and for participating in different models of VET-in-schools — classroom-based VET with and without workplace learning and apprenticeships/traineeships (Table 4). Estimates of the effects of workplace learning in classroom-based VET courses, controlling for selection into these models, are presented in Table 5.

5.1 Overall impacts

Results in Table 4 show that on average, participating in VET in schools is estimated to increase the chances of secondary school completion by 14 percentage points. This result is consistent with the evidence produced by Bishop and Mane (2004), who find using cross-country comparisons, that countries with higher rates of VET participation in school have higher rates of school completion. An estimated 14 percentage point increase in school completion is a large effect, but is consistent with an overall 8 percentage point increase in school retention rates to Year 12 that has occurred in Australia since the introduction of VET-in-schools in the mid-1990s (Australian Bureau of Statistics (ABS) 2007, 2012). Given that less academic students are more likely to participate in VET-in-schools (based on PISA test scores in Table A.1), this result highlights the importance of these programs in retaining youth at risk in school. The significant positive impacts on completion are present across all VET-in-school models, but appear particularly high for courses that involve workplace learning, either as part of classroom-based subjects or as part of apprenticeships/traineeships.

[19] These results are available from the corresponding author upon request.

Table 4: ATET of VET-in-schools participation, 1st year out from school

Outcomes	All VET	Classroom-based VET with WPL	Classroom-based VET without WPL	Apprenticeship / Traineeship
Education outcomes				
Completed Year 12	0.1369***	0.1427***	0.0691***	0.1106***
	(0.0093)	(0.0123)	(0.0130)	(0.0210)
Enrolled in a post-school course	-0.0074	-0.0169	-0.0049	0.0207***
	(0.0101)	(0.0143)	(0.0151)	(0.0208)
Higher Education (ISCED5a, 6)	-0.0512***	-0.0543***	-0.0419***	-0.0713***
	(0.0065)	(0.0090)	(0.0119)	(0.0107)
VET course (ISCED 3C-5B)	0.0467***	0.0357***	0.0396***	0.0813***
	(0.0082)	(0.0119)	(0.0113)	(0.0176)
Foundation level VET course (ISCED 2C)	-0.0029	0.0018	-0.0025	0.0107
	(0.0067)	(0.0092)	(0.0088)	(0.0151)
Labour market outcomes				
Employed	0.0070	0.0170	-0.0240*	0.0369***
	(0.0077)	(0.0109)	(0.0124)	(0.0148)
Full-time employed	0.0305***	0.0238*	0.0042	0.1041***
	(0.0095)	(0.0127)	(0.0139)	(0.0202)
Part-time employed	-0.0252***	-0.0079	-0.0322**	-0.0627***
	(0.0096)	(0.0133)	(0.0149)	(0.0195)
Not employed and not enrolled in a course	-0.00868	-0.0141	0.0043	-0.0089
	(0.0064)	(0.0088)	(0.0091)	(0.0128)
Count (N)	15,561	12,857	12,508	11,791
Career job among full-time employed	0.0482***	0.0396*	0.0332	0.1183***
	(0.0159)	(0.0219)	(0.0261)	(0.0280)
Weekly wage ($A 2009) among full-time	7.441	24.952*	-10.903	-24.734*
	(8.4666)	(12.7403)	(13.9362)	(14.1601)
Count (N)	4,545	3,479	3,262	3,159

Note: LSAY Y03 and Y06 cohort data used and estimates derived using kernel matching; bootstrap standard errors based on 1,000 replications reported in parentheses; ***, ** and * indicate statistical significance at 1%, 5% and 10% levels respectively.

Taking a VET subject is estimated to have no significant effect on the chances of enrolling in further study in the year after ending secondary school. The exception is for those who take upper-secondary VET subjects related to apprenticeship/traineeships, which is estimated to increase the chances of post-school study by 2 percentage points. Given that students who commence an apprenticeship/traineeship in school are required to continue their study after school to attain accreditation, the magnitude of this effect is small. Excluding school apprenticeship/traineeships, these results suggest that VET training in schools is neither a complement nor a substitute to post-school training. Although participation in post-school study may be largely unaffected, results suggest that taking school-based VET subjects changes the mix of post-school education. We estimate that taking a VET-in-schools course is

associated with a 5 percentage point reduction in higher education enrolments in favour of more post-school VET training (at ISCED 3C-5B courses and above).

There are two possible explanations for the impacts on the choice of post-school education pathways. First, for students who are unsure whether to pursue university entry, taking a VET subject may open up alternative post-school education pathways in VET. Second, for the 37% of VET-in-school students who intend to go to university (Table A.1), taking a VET subject, possibly as a fall-back option in case they miss out on university entry, may negatively impact on their chances of attaining access to university. Taking a VET course in upper-secondary school may hinder access to university because, in the main, performance in upper-secondary VET subjects does not count towards final test scores that are used to determine university entry. Also, time spent off-campus, either in workplace learning or in classroom-based setting with VET providers, may disrupt a student's academic performance.

Results from Table 4 suggest that taking VET subjects improves the chances of making a successful transition from school to the labour market. On average, taking a VET subject is estimated to improve the chances of finding full-time employment in the first year out from school by 3 percentage points.[20] However, we find no evidence that taking VET subjects without workplace learning has any significant effect on full-time employment. Similarly, we find that among those who find full-time work, taking VET courses increases the chances of being in a career job, but only for those who take courses with workplace learning. For those full-time employed, we also find that taking a classroom-based VET course with workplace learning is associated with an extra $AU2009 25 per week in earnings (equivalent to around $US2009 20 per week). The negative effect on the initial wages of those who take subjects that are part of an apprenticeship/traineeship is because many in this group continue their training post-school to attain accreditation. Apprentice/trainee wages in Australia are set at a reduced level to compensate employers for the cost of providing workplace training.

5.2 Benefits of workplace learning in classroom-based VET

Results presented in Table 4 above show differences in outcomes between upper-secondary VET models, including potentially greater benefits from classroom-based VET with a workplace learning component. To control for potential selection into workplace learning, we use Kernel propensity score matching on a sub-sample of those who take classroom-based

[20] Part of the employment effect may be transmitted through the increased chances of school completion from taking VET-in-school courses. Propensity score matching estimates based on a limited sample of those who complete school produce consistent results, implying that the employment benefits are not purely a result of increased school completion rates. Results are available upon request from the corresponding author.

VET subjects (column 2 in Table 5), where those who take workplace learning are the treated and those who do not are the controls. Table 5 also includes estimates that test the robustness of the propensity score matching results to the inclusion of additional controls for differences in the field of study and number of VET courses taken and unobserved school factors (columns 3-5). We conduct the sensitivity analysis in two steps. First, we regress the outcome variables (one at a time) on a treatment dummy using the matched sample and weights from the Kernel method to replicate the propensity score matching results. Second, to each regression model we sequentially add the three extra control variables, starting with the school fixed effects.[21]

Consistent with the estimates produced in Table 4, we find that students who take classroom-based VET subjects with workplace learning are around 9 percentage point more likely to complete secondary school compared to those who do classroom-based VET without workplace learning. This result is robust to the inclusion of additional controls for school fixed effects, course field of study and numbers of VET subjects taken. However, the reduction in the estimated effect with the inclusion of controls for the number of VET courses (column 5), suggests that some of the additional benefits from workplace learning estimated using matching can be attributed to extra VET courses taken by students who participate in workplace learning. This does not necessarily mean that the propensity score matching results are an over-estimate of the effects of workplace learning on school completion. It may be simply that workplace learning encourages students to take more VET subjects, in which case, the number of courses taken is part of the treatment effect.[22] Workplace learning may help improve school completion because it provides an incentive for students determined to enter employment to remain in school. Moreover, it provides students with opportunities to prepare for their transition to work by helping them develop connections with employers and work-ready skills that cannot be attained in the classroom. Finding work is a strong motivation for leaving school. Over 50% of early school leavers in LSAY (2003 and 2006) report that employment is the most important reason why they left school early.

[21] We conduct the sensitivity analysis in this way and not using propensity score matching because the small number of students observed in each school meant we had to relax the common support assumption for this variable. Categorical dependent variables are treated as binary outcomes and estimation is carried out using a linear probit model.

[22] If the number of VET courses taken is not causally linked to taking workplace learning, then the PSM results should be considered an upper-bound on the true effect of taking classroom-based VET with workplace learning.

Table 5: ATET of workplace learning in VET-in-schools, 1st year out from school

Outcomes	PSM analysis	Sensitivity analysis - regression results		
		With school F.E	With school F.E & controls for VET field of study	With school F.E, controls for field of study & number of VET courses
Education outcomes				
Completed Year 12	0.0863***	0.0950***	0.0776***	0.0509*
	(0.0209)	(0.0174)	(0.0198)	(0.0198)
Enrolled in a post-school course	0.0138	0.0216	0.0400*	0.0494**
	(0.0221)	(0.0197)	(0.0237)	(0.0240)
Higher Education (ISCED5a, 6)	-0.0092	-0.0171	-0.0091	-0.0041
	(0.0138)	(0.0137)	(0.0159)	(0.0161)
VET course (ISCED 3C-5B)	0.0130	0.0203	0.0095	0.0091
	(0.0175)	(0.0160)	(0.0196)	(0.0199)
Foundation level VET course (ISCED 2C)	0.0100	0.0184	0.0396**	0.0444**
	(0.0152)	(0.0129)	(0.0150)	(0.0152)
Labour market outcomes				
Employed	0.0681***	0.0863***	0.0982***	0.0939***
	(0.0194)	(0.0161)	(0.0192)	(0.0194)
Full-time employed	0.0495***	0.0490***	0.0448**	0.0392*
	(0.0210)	(0.0190)	(0.0227)	(0.0230)
Part-time employed	0.0229	0.0411*	0.0584*	0.0589*
	(0.0222)	(0.0194)	(0.0233)	(0.0236)
Not employed and not enrolled in a course	-0.0462***	-0.0503***	-0.0559***	-0.0511***
	(0.0159)	(0.0128)	(0.0153)	(0.0155)
Count (N)	*3,144*	*3,144*	*2,513*	*2,513*
Career job among full-time employed	-0.0078	-0.0495	-0.0329	-0.0343
	(0.0369)	(0.0408)	(0.0475)	(0.0489)
Weekly wage ($A 2009) among full-time employed	32.71*	42.68*	58.54**	56.40**
	(18.16)	(22.09)	(25.72)	(26.65)
Count (N)	*1,119*	*1,119*	*909*	*909*

Note: LSAY Y03 and Y06 cohort data used and PSM estimates derived using kernel matching; bootstrap standard errors based on 1,000. replications reported in parentheses ***, ** and * indicate statistical significance at 1%, 5% and 10% levels respectively.

Results from the propensity score matching suggest that including workplace learning in classroom-based VET improves labour market transitions from school to work. In particular, in the first year after school, workplace learning within classroom-based VET is associated with around a 5 percentage point increase in the chance of being employed, especially full-time employed, with no effect on the chances of taking further study (Table 5). Results from the sensitivity analysis tell a more nuanced story, especially when controlling for differences

in VET course fields of study between those with workplace learning and those without (column 4). In particular, when controls for field of study are introduced, the full-time employment benefits for workplace learning somewhat falls and the impact on further study, especially enrolments in foundation level courses increases. A possible explanation is that workplace learning in classroom-based VET steers students into fields of VET study where there is relatively high demand for secondary school graduates, which helps improve initial full-time employment rates and also increases the likelihood that those who do not find work initially will use their workplace experience to see work in these fields rather than enter study. The availability of workplace learning across different fields is often viewed as a key signal of skill demand for students (OECD 2010c).

Conditional on finding full-time employment in the first year out from school, workplace learning within classroom-based VET is associated with being in a higher-paid job. On average, workplace learning is associated with a $AU2009 33 per week wage premium (equivalent to around $US2009 26 per week), which is consistent with the estimates presented in Table 4. Estimates from the sensitivity analysis suggest that the wage premium may be because employers value the skills developed, or the personal information attained on the student, from workplace learning. The wage premium does not appear to be related to differences in the field of study because including controls for this variable did not reduce the estimated wage premium.

6. Conclusions

Improving engagement in education of less academically inclined students and improving their post-school pathways are key objectives of OECD countries. In English-speaking countries, such as the United States, Canada, United Kingdom and Australia, where upper-secondary school is focussed on general education, a key measure has been to integrate vocational education and training (VET) subjects into the upper-secondary curriculum. In this study we add to the literature on the effectiveness of these programs in two important ways.

First, we find that while taking upper-secondary VET subjects does not affect overall engagement in post-secondary education, it does affect the post-school education pathway followed. More specifically, we find that taking VET subjects is associated with a shift away from higher education towards more post-secondary VET courses. To date, only Bishop and Mane (2004) have examined education outcomes from school VET programs and they focussed solely on school completion. Whether VET subjects close-off entry to higher

education or open-up vocational paths is an issue for future research. If taking VET courses close-off higher education opportunities, then it may be important for schools to encourage only students who do not intend to go to university to enrol in these courses. Statistics produced in this study show that 37% of students who choose VET subjects intend to go to higher education. VET courses may be taken by students with an intention to go to university because they give students extra training and workplace experiences in their desired fields of university study that may help them find employment during and after their university study.

Second, and more importantly, this is the first study to demonstrate the potential benefits of incorporating a short, structured workplace learning component into classroom-based upper-secondary VET courses. For many reasons, studies on the benefits of apprenticeships relative to general forms of education (see Wolter and Ryan 2011 for an overview) are *not* informative of the benefits from incorporating workplace learning into upper-secondary classroom-based VET subjects. These reasons include differences in the obligations and incentives of employers to provide quality training and the intensity and duration of time spent in workplace learning. We show that a short structured workplace learning component (around 15 days on average in a 12 month subject) within classroom-based VET is associated with significant and large improvements in school completion and higher initial rates of full-time employment and wages. These results add weight to recent OECD recommendations to increase the use of workplace learning within classroom-based upper-secondary VET subjects in English-speaking countries (see for example Hoeckel, et al. 2008, Kis 2011 and Kuczera 2011).

A key challenge for policy makers is engaging employers in short-term workplace learning. There are claims that there are not enough employers to meet the demands for short-term workplace learning (Clarke 2012). There may be a shortage of employers willing to engage in workplace learning because, without an employment contract, employers may not recoup the cost of training. To deal with this problem, Clarke (2012) has suggested introducing financial inducements. However, before measures are introduced, a better understanding is needed of the apparent reluctance of employers to engage in this form of training. It is not clear that employers do not recoup costs of training without an employment contract. Engaging in short-term workplace learning may be an effective way for employers to screen job candidates, to access cheap labour and at the same time build goodwill within the community. Even if it can be established that employers do not recoup the cost of short-term work placements, for inducements to be efficient, they need to be well-targeted, taking into account the net costs

borne by employers and the benefits to students. If inducements are not well-targeted, they may create incentive for rent seeking, which could potentially mute the demand-signalling effect of workplace learning and reduce any potential benefits to students. Putting aside the need for inducements, government may play an enabling role by helping to match schools and employers and by providing information and training to employers and schools to promote the use of short-term workplace learning within existing classroom-based VET programs.

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Appendix A

Table A.1: Average individual characteristics by VET-in-schools participation

	No VET (Control)	All VET	Classroom-based VET with WPL	Classroom-based VET without WPL	Apprenticeship / Traineeship
Cohort 2003	0.528	0.518	0.540	0.538	0.417
Cohort 2006	0.472	0.482	0.460	0.462	0.583
Male	0.481	0.492	0.470	0.471	0.576
Female	0.519	0.508	0.530	0.529	0.424
Australian-born	0.887	0.907	0.923	0.884	0.930
Aboriginal or Torres Strait Islander	0.045	0.067	0.058	0.050	0.126
Migrant	0.112	0.090	0.074	0.114	0.066
English spoken at home	0.914	0.936	0.937	0.931	0.944
State/Territory					
N.S.W	0.220	0.264	0.356	0.186	0.130
Victoria	0.184	0.150	0.123	0.175	0.143
Queensland	0.164	0.188	0.098	0.248	0.316
South Australia	0.116	0.094	0.093	0.122	0.072
Western Australia	0.135	0.129	0.134	0.128	0.136
Tasmania	0.071	0.070	0.108	0.027	0.076
A.C.T	0.076	0.055	0.039	0.071	0.061
N.T	0.034	0.049	0.050	0.043	0.066
Region					
Major city	0.726	0.645	0.627	0.672	0.620
Regional area	0.237	0.282	0.297	0.256	0.316
Rural area	0.037	0.073	0.076	0.071	0.064
Regional unemployment rate (lagged)	5.285	5.138	5.279	5.018	4.966
Father Australian-born	0.670	0.730	0.729	0.712	0.773
Mother Australian-born	0.681	0.742	0.749	0.722	0.766
Father's highest education level					
Year 10 or below	0.245	0.320	0.310	0.327	0.317
Year 11 (or equivalent)	0.033	0.038	0.042	0.036	0.044
Secondary school certificate	0.283	0.325	0.337	0.290	0.346
VET qualification	0.101	0.110	0.120	0.100	0.095
Higher Education	0.338	0.207	0.191	0.247	0.197
Mother's highest education level					
Year 10 or below	0.229	0.275	0.271	0.269	0.292
Year 11 (or equivalent)	0.032	0.038	0.035	0.038	0.044
Secondary school certificate	0.296	0.335	0.349	0.313	0.338
VET qualification	0.120	0.132	0.142	0.126	0.120
Higher Education	0.323	0.220	0.204	0.254	0.206
School year at age 15					
Year 11	0.228	0.219	0.171	0.255	0.287
Year 10	0.714	0.728	0.771	0.701	0.646

Year 9 or below	0.057	0.053	0.058	0.044	0.066
Student's intention for first year after school					
Higher Education	0.612	0.365	0.349	0.459	0.270
Other study	0.191	0.410	0.416	0.317	0.532
Work	0.067	0.093	0.091	0.086	0.104
Other	0.129	0.132	0.145	0.137	0.094
Parent's intention for first year after school					
Higher Education	0.596	0.385	0.385	0.468	0.269
Other study	0.126	0.264	0.273	0.185	0.357
Work	0.050	0.081	0.081	0.066	0.105
Other (don't know/parents don't care)	0.228	0.269	0.260	0.281	0.269
Student's intended occupation at 30					
Manager	0.051	0.068	0.069	0.071	0.058
Professional	0.481	0.301	0.293	0.355	0.230
Associate professional	0.164	0.169	0.165	0.188	0.149
Clerical support	0.007	0.016	0.015	0.015	0.020
Service and sales	0.071	0.142	0.155	0.111	0.154
Skilled agriculture	0.009	0.014	0.019	0.007	0.016
Craft and trades	0.060	0.126	0.120	0.087	0.205
Machinery operator	0.003	0.004	0.005	0.003	0.007
Elementary/Labourer	0.059	0.058	0.062	0.059	0.048
Type of school attended at 15					
Government school	0.579	0.671	0.666	0.677	0.690
Non-Government school	0.421	0.329	0.334	0.323	0.310
School peer VET-in-school participation					
Classroom-based VET with WPL	0.130	0.179	0.209	0.149	0.145
Classroom-based VET without WPL	0.107	0.144	0.128	0.166	0.131
Apprenticeship/Traineeship	0.057	0.071	0.067	0.069	0.090
Average school peer SES (normalised)	0.289	0.139	0.140	0.158	0.092
Qunitile of PISA mathematics scores[a]					
Lowest quintile	0.127	0.212	0.198	0.181	0.289
2nd lowest quintile	0.154	0.251	0.274	0.214	0.247
3rd lowest quintile	0.193	0.233	0.228	0.220	0.256
4th lowest quintile	0.235	0.192	0.195	0.226	0.142
Highest quintile	0.291	0.112	0.105	0.159	0.066
Quintile of PISA reading scores[a]					
Lowest quintile	0.126	0.208	0.195	0.172	0.297
2nd lowest quintile	0.153	0.260	0.263	0.212	0.289
3rd lowest quintile	0.189	0.228	0.238	0.231	0.212
4th lowest quintile	0.237	0.184	0.190	0.207	0.145
Highest quintile	0.295	0.120	0.114	0.179	0.057
Number of observations	*11,156*	*4,471*	*1,756*	*1,404*	*684*

[a] Values for this variable were ranked from lowest to highest and were broken into 20 equally frequent categories. Source: Longitudinal Survey of Australian Youth 2003 and 2006.

Table A.2: Logit model coefficients

	All Students		Classroom-based VET students	
	Coefficient	**z-stat**	**Coefficient**	**z-stat**
Female	0.0490	1.04	0.0984	1.18
Australian-born	-0.1159	-1.52	-0.1667	-1.15
ATSI	0.0039	0.05	0.1623	1.21
English spoken at home	0.0547	0.63	0.0605	0.33
State/Territory (ref. case: New South Wales)				
Victoria	-0.1519	-2.25	0.0961	0.80
Queensland	0.1248	1.72	0.2891	2.33
South Australia	-0.1412	-1.83	0.0422	0.30
Western Australia	-0.0240	-0.34	-0.0704	-0.58
Tasmania	0.2587	2.87	0.2776	1.89
A.C.T	-0.4222	-4.24	-0.4219	-2.42
Northern Territory	-0.0205	-0.18	0.1257	0.72
Region of residence (ref. case: Major city)				
Regional area	0.0993	2.03	-0.0462	-0.59
Rural area	0.2266	2.40	0.0524	0.37
Regional unemployment rate (lag)	-0.2253	-10.88	-0.2309	-6.74
Father Australian-born	0.0862	1.63	-0.0469	-0.51
Mother Australian-born	0.0534	0.98	-0.0046	-0.05
Father's highest education (ref. case: Year 10 or below)				
Year 11 (or equivalent)	-0.0127	-0.12	0.1470	0.87
High School (or Year 12)	0.0163	0.32	0.0316	0.38
VET qualification	0.0112	0.16	0.0623	0.53
Higher Education	-0.0818	-1.34	0.0443	0.42
Mother's highest education (ref. case: Year 10 or below)				
Year 11 (or equivalent)	-0.0462	-0.42	-0.1113	-0.67
High School (or Year 12)	0.0675	1.29	0.1391	1.63
VET qualification	0.0866	1.27	-0.0031	-0.03
Higher Education	0.0480	0.79	0.1381	1.30
In wave 1, post-school plans (ref. case: Higher education)				
Other study	0.7151	10.77	0.4914	4.40
Work	0.3681	4.37	0.2843	2.05
Other	0.3145	4.83	0.2884	2.47
In wave 1, parents' post-school plans for student (ref. case: Higher education)				
Other study	0.1034	1.42	0.0797	0.69
Work	0.1396	1.53	0.1788	1.23
Other	0.1709	3.11	0.2029	2.07
In wave 1, intended occupation at 30 (ref. case: Professional)				
Manager	0.5250	6.39	0.3293	2.22
Associate professional	0.1889	3.44	0.0748	0.75
Clerical support	0.7054	3.85	0.7703	2.40
Service and sales	0.3869	5.71	0.4451	4.04
Skilled agriculture	0.1989	1.11	0.1483	0.61

Craft and trades	0.3170	4.13	0.2893	2.70
Machinery operator	0.1183	0.38	0.1973	0.51
Elementary labourer	0.0780	0.92	0.2252	1.59
Non-government school	0.0704	1.63	0.0480	0.64
School peer involvement in VET (%)				
Apprenticeship/Traineeship	0.8544	2.48	1.5127	2.85
Classroom-based VET with WPL	2.4992	12.62	2.4708	7.42
Classroom-based VET without WPL	2.7090	12.41	1.8169	4.91
School peer SES (normalised)	-0.0018	-0.89	0.0020	0.68
Constant	-1.3794	-6.82	-1.055212	-2.97
Number of observations	*15,561*		*4547*	

Note: we also include controls for PISA math and reading test scores. For both math and reading, these controls are included as 20 dummy variables, representing the relative performance in categories of 5 percentage point intervals from the bottom performing 5% to the top performing 5%. For both scores, the bottom 5% is the omitted category. These are not reported to save space, but they show a negative relationship between test scores and treatment. These are available from the corresonding author upon request.

Table A.3: Balancing test results

	All Students		Classroom-based VET students	
	Diff	**t-stat**	**Diff**	**t-stat**
Female	0.0054	0.67	-0.0221	-1.241
Australian-born	-0.0015	-0.33	0.0047	0.491
ATSI	-0.0019	-0.47	0.0004	0.045
English spoken at home	-0.0004	-0.09	-0.0029	-0.335
State/Territory (ref. case: New South Wales)				
Victoria	-0.0017	-0.29	0.0003	0.026
Queensland	0.0082	1.31	-0.0057	-0.525
South Australia	0.0018	0.39	-0.0128	-1.209
Western Australia	0.0026	0.48	0.0139	1.173
Tasmania	-0.0024	-0.58	0.0144	1.344
A.C.T	-0.0031	-0.84	-0.0034	-0.483
Northern Territory	-0.0016	-0.45	-0.0024	-0.304
Region of residence (ref. case: Major city)				
Regional area	-0.0073	-1.00	0.0079	0.488
Rural area	0.0017	0.42	-0.0074	-0.761
Regional unemployment rate (lag)	-0.0735	-3.84	0.0580	1.356
Father Australian-born	-0.0015	-0.21	-0.0005	-0.033
Mother Australian-born	-0.0028	-0.40	0.0039	0.254
Father's highest education (ref. case: Year 10 or below)				
Year 11 (or equivalent)	-0.0016	-0.50	-0.0018	-0.247
High School (or Year 12)	0.0012	0.15	-0.0047	-0.276
VET qualification	-0.0042	-0.83	0.0003	0.029
Higher Education	0.0095	1.47	0.0087	0.623
Mother's highest education (ref. case: Year 10 or below)				
Year 11 (or equivalent)	-0.0003	-0.10	0.0011	0.162
High School (or Year 12)	0.0012	0.16	-0.0031	-0.183
VET qualification	-0.0013	-0.24	0.0048	0.386
Higher Education	0.0079	1.20	-0.0024	-0.164
In wave 1, post-school plans (ref. case: Higher education)				
Other study	0.0038	0.48	0.0119	0.675
Work	-0.0022	-0.48	0.0090	0.899
Other	-0.0001	-0.02	-0.0070	-0.554
In wave 1, parents' post-school plans for student (ref. case: Higher education)				
Other study	0.0016	0.23	0.0212	1.349
Work	-0.0029	-0.65	0.0031	0.322
Other	-0.0042	-0.59	-0.0202	-1.278
In wave 1, intended occupation at 30 (ref. case: Professional)				
Manager	0.0014	0.36	0.0097	1.110
Associate professional	-0.0048	-0.79	0.0095	0.724
Clerical support	0.0016	0.85	0.0016	0.379
Service and sales	-0.0007	-0.13	-0.0008	-0.065
Skilled agriculture	-0.0008	-0.41	0.0048	1.031

Craft and trades	0.0007	0.14	-0.0037	-0.314
Machinery operator	-0.0003	-0.25	0.0006	0.243
Elementary labourer	-0.0003	-0.09	-0.0037	-0.428
Non-government school	0.0124	1.65	0.0261	1.567
School peer VET-in-school participation (%)				
Apprenticeship/Traineeship	0.0018	1.80	-0.0008	-0.401
Classroom-based VET with WPL	0.0013	0.67	0.0024	0.520
Classroom-based VET without WPL	0.0011	0.64	-0.0046	-1.328
Average school peer SES (normalised)	0.1660	0.99	-0.0790	-0.234
F-stat. test result (p-value)	0.9837		1.0000	

Note: we do not include the balancing test results for the reading and math PISA scores. These are entered as a series of dummy variables and are not reported to save space. Nonetheless, all mean differences for the dummy variables are insignificant at 90%. Results are available from the corresponding author upon request.