Pre-vocational programs and their impact on traineeship completion and satisfaction

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About the research

Pre-vocational programs and their impact on traineeship completion and satisfaction

Damian Oliver and Tom Karmel, NCVER

Pre-vocational programs, including VET in Schools, are providing a pathway into traineeships in the same way that pre-apprenticeships are an established route into apprenticeships in the traditional trades. This report is a parallel piece to an earlier report on the effect of pre-apprenticeships on apprentice satisfaction and completion rates.

Key messages

- Early school leavers, especially those who leave school after Year 11, are more likely to complete a traineeship if they have completed a pre-vocational course beforehand.

- Trainees in lower-skilled occupational categories such as sales workers, labourers, and machinery operators and drivers are more likely to complete their training if they have completed a pre-vocational course beforehand. Pre-vocational programs also increase the likelihood of completing a clerical and administrative traineeship.

- Pre-vocational courses reduce the likelihood of trainees in higher-skilled occupational categories (such as managers and professionals) completing their training. Pre-vocational programs also reduce the likelihood of completing a traineeship in community and personal services.

- The findings suggest that pre-vocational programs should focus on general employment and educational skills and give less emphasis to developing advanced occupational skills. They appear to be more relevant to the lower-skilled section of the labour market, and it could be concluded that traditional Year 12 is a better preparation for trainees in the more skilled occupations.

Tom Karmel
Managing Director, NCVER

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Introduction

Our recent publication (Karmel & Oliver 2011) examined the impact of pre-apprenticeships on levels of apprenticeship satisfaction and completion. We found that pre-apprenticeships do have an effect on apprenticeship completion and satisfaction but the effect is not uniform. Pre-apprenticeships had a small, positive effect on apprentices' satisfaction with the job-related aspects of their apprenticeship but no effect on satisfaction with training-related aspects. In the construction, food and electrotechnology trades, pre-apprenticeships modestly increased the likelihood of completion. However, apprentices in the automotive and engineering trades and in hairdressing were less likely to complete their training if they had undertaken a pre-apprenticeship. Similarly, pre-apprenticeships led to a higher likelihood of completion among apprentices who had finished Years 10 or 12, but not for those with post-school qualifications or who left school after Year 11. The variation by occupation and highest education level demonstrates that not all pre-apprenticeships are working well, leading us to conclude that their design must be carefully considered.

In this report we extend the analysis to look at analogous programs designed to prepare people for entry into a traineeship. Our primary intent is whether our findings for apprenticeships translate to traineeships. We are once more interested in three questions:

- Do pre-vocational programs increase the level of trainee satisfaction?

- Do pre-vocational programs increase the likelihood of a trainee completing his or her traineeship?

- Are trainees who do not complete their training less likely to quit because they didn't like the type of work or training if they have completed a pre-vocational program.

We are again interested in possible interaction effects. We consider the interaction of pre-vocational program with highest education level and occupation, as we did in the pre-apprentice report, as well as with sex.

The results show that the impact of pre-vocational programs on trainee satisfaction and completion rates varies according to occupation and highest education level.

There is no substantial impact of pre-vocational programs on trainees' satisfaction with aspects relating to their job, although there is an impact in relation to trainees' satisfaction with aspects of their off-the-job training. In the case of community and personal service workers and sales workers, however, it is negative.

Completing a pre-vocational program increases the likelihood of a trainee completing his or her training among clerical and administrative occupations, machinery operators and drivers, sales workers and labourers. Pre-vocational programs have a negative impact on completion rates in the higher-skilled managerial and professional occupations as well as in community and personal service occupations.

Pre-vocational programs substantially increase the likelihood of completing a traineeship among trainees who leave school after Year 11, whereas pre-vocational programs reduce the likelihood of completing a traineeship among trainees who complete Year 12. Pre-vocational programs make a negligible difference to traineeship completion for trainees who left school after Year 10 as well as to trainees who already possess a certificate III or higher qualification.

Among trainees who did not complete their training, those who had completed a pre-vocational program were less likely to quit because they did not like the type of work or training. This effect was particularly strong among those who had left school after Year 11.

The evidence suggests that pre-vocational programs should be directed to early school leavers (particularly those who leave after Year 11) who are interested in pursing a traineeship in occupations requiring lower skill levels (particularly sales workers and labourers) or clerical and administrative occupations. Pre-vocational programs have little to contribute to prospective trainees who have completed a post-school qualification or who have completed Year 12. There is evidence that they do not function well as an extension of the pre-apprenticeship model into higher-level traineeships, namely, traineeships in managerial and professional occupations. They also perform poorly in community and personal service occupations. This has implications for the curriculum of pre-vocational programs, which are briefly discussed in the final comments.

Background

Participation in pre-vocational programs

For the first time, the 2010 Apprenticeship Destination Survey included questions about pre-vocational programs. Respondents were asked:

> Did you complete a pre-vocational or pre-apprenticeship course before you started your [apprenticeship or traineeship] in [insert certificate]?

As a prompt, interviewers were advised that 'Pre-vocational (which means before work) and pre-vocational program courses help you develop skills to get a job, or prepare you to become an apprentice or trainee. This includes VET in schools courses.'

Thus our definition of pre-vocational programs is based on self-identification rather than the official title of a course.

The only information collected in the survey about the pre-vocational program was whether it was relevant to the traineeship that had been undertaken by the respondent. In response to the question 'how relevant was this course to your apprenticeship/traineeship?', respondents could nominate highly relevant, some relevance, very little relevance or not at all relevant. We have grouped 'highly relevant' and 'some relevance' as 'relevant' and 'very little relevance' and 'not at all relevant' as 'not relevant'.

Table 1   Participation in a pre-vocational program by occupation

ANZSCO occupation	Participated in a pre-vocational program			Did not participate in a pre-vocational program
	Total	Relevant to traineeship	Not relevant to traineeship	
All trainees[1]	**14.3**	*9.8*	*4.5*	**85.7**
Managers and professionals	20.2	*17.1*	*3.1*	79.8
Community and personal service workers	12.6	*9.4*	*3.2*	87.4
Clerical and administrative workers	15.4	*10.6*	*4.8*	84.6
Sales workers	11.8	*7.2*	*4.6*	88.2
Machinery operators and drivers	12.0	*7.0*	*5.0*	88.0
Labourers	16.5	*10.1*	*6.4*	83.5
Cert. III or higher	24.5	*16.8*	*7.7*	75.5
Year 12	11.4	*8.3*	*3.1*	88.6
Year 11	12.8	*7.8*	*5.0*	87.2
Year 10 or below	11.9	*8.1*	*3.8*	88.1

Note: 1 Trainees are defined as all apprentices and trainees except those in technician and trade occupations (ANZSCO 3).
Source: 2010 Apprentice Destination Survey.

Satisfaction

We would expect that pre-vocational programs would increase satisfaction with apprenticeships and traineeships. Pre-vocational programs are intended to provide students with a realistic preview of the range of tasks as well as the working and learning environment for a trainee. Research on graduate employment suggests that unmet expectations contribute to lower satisfaction and higher levels of turnover (Mabey, Clark & Daniels 1996). The Apprentice and Trainee Destination Survey asks respondents 17 separate questions related to satisfaction with particular aspects of their apprenticeship: one relating to the apprenticeship or traineeship overall; six items relating to off-the-job training; and nine items relating to their employment. Apprentices employed by group training schemes were asked an additional question. Respondents were asked to rate their satisfaction from very satisfied to very dissatisfied.

Just as we did in the pre-apprentice report (Karmel & Oliver 2011, p.11), we conducted a factor analysis to identify what underlying constructs shape apprentice satisfaction. Once again, two factors were found. The first factor relates to job-based aspects such as employment conditions and workplace climate. The nine employment-related items loaded positively onto this factor. The second factor relates more specifically to off-the-job training, with the job-related aspects loading negatively. For simplicity, we have called the first factor 'satisfaction with job-related aspects' and the second factor 'satisfaction with off-the-job training-related aspects'. The items are shown in table 2. A full explanation of the results and procedure is given in appendix C. The factors are broadly the same as those for apprentices, although overall satisfaction for trainees depended more on the off-the-job training factor than the job-related aspects, whereas the reverse was true for apprentices.

Table 2   Standardised scoring coefficients for satisfaction with job-related and training-related aspects of traineeship

Trainee satisfaction with …	Job-related aspects	Off-the-job training-related aspects
The type of work you were/are doing	0.133	-0.035
The working conditions	0.231	-0.100
The pay	0.062	-0.012
The hours of work	0.104	-0.030
Receiving adequate supervision	0.154	-0.034
Relationships with co-workers	0.087	-0.030
Training provided by your employer	0.163	-0.027
The skills you learnt on the job	0.134	-0.008
Your employment overall	0.300	-0.102
Frequency of training	-0.047	0.148
Relevance of the skills to your workplace	-0.033	0.141
The fairness of the assessments of your skills and knowledge	-0.059	0.199
The relevance of the assessment tasks	-0.064	0.214
The quality of the training facilities and equipment	-0.052	0.168
Overall quality of the off-the-job training	-0.124	0.343
Overall satisfaction with apprenticeship/traineeships	0.011	0.102

Source: 2010 Apprentice Destination Survey.

We now move to determine whether pre-vocational programs have any impact on these two satisfaction factors. To test this, we run simple multiple regression models with the satisfaction scores as the dependent variable. As an independent variable, we enter whether the respondent had completed a pre-vocational program. We include as control variables, age, occupation, duration, whether the apprenticeship was undertaken on a full-time or part-time basis, and prior level of education.[1]

The intention of pre-vocational programs is to prepare, especially, young people for the workforce and assist them to find and complete a traineeship. As such, we expect that the skills already possessed by the potential trainee are likely to affect the usefulness of a pre-vocational program. On the presumption that higher levels of general education would provide a high skills base we would expect that pre-vocational programs are most beneficial for apprentices with lower levels of education. Therefore, we include an interaction term with previous level of education. Similarly, there may theoretically be an added benefit for females undertaking pre-vocational programs if they are moving into traditionally male occupations. We also considered interactions between pre-vocational programs and age. In theory, pre-vocational programs might be less beneficial for older trainees, irrespective of level of education, because of their experience in the workforce.

Pre-vocational programs are also promoted as an introduction to the type of work involved. Therefore, we also include in the model whether there is an interaction between pre-vocational programs and the occupation of the apprenticeship, although we suspect this relationship might not be as strong as in the trades.

We test the significance of the interaction effects by running restricted models with the interaction effects removed and comparing the fit of the restricted models to that of the unrestricted model using F-tests. This procedure is outlined in table C4 in appendix C. The result is that none of the interaction effects is significant in the model of job-related aspects. Therefore, the restricted model is shown in table 3.

There is a small, positive non-significant effect of pre-vocational programs on satisfaction with job-related aspects of the traineeship. The factor scores are standardised, meaning that the average score is zero and around 95% of all responses are between -2 and 2. Completing a pre-vocational program increases the satisfaction score by less than 1/25th of one standard deviation. This is much smaller than the other effects present in the model, such as sex and age. Practically speaking, pre-vocational programs have no impact on trainees' satisfaction with the job-related aspects of their training.

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[1] To begin with, we also included sector of employment (private/public/group training organisation). However, these variables were not significant and they were removed from the model to reduce standard errors.

Table 3   Regression coefficients – satisfaction with job-related aspects of apprenticeship/traineeship

Variable	Parameter estimate	Standard error	t Value	Pr > |t|
Intercept	0.260	0.180	1.45	0.148
Completed a pre-vocational program	0.031	0.062	0.51	0.611
Highest school level				
Year 10 or below	Reference category			
Highest school level Year 11	-0.036	0.071	-0.51	0.613
Highest school level Year 12	-0.008	0.055	-0.15	0.881
Completed cert. III or higher	0.001	0.067	0.02	0.984
Occupation				
Managers and professionals	0.014	0.097	0.15	0.882
Community and personal workers	0.070	0.082	0.86	0.389
Clerical and administrative workers	0.144	0.079	1.82	0.069
Sales workers	-0.080	0.087	-0.93	0.355
Machinery operators and drivers	0.011	0.088	0.12	0.905
Labourers	Reference Category			
Income during training – midpoint values per week	3.3×10^{-4}	8.1×10^{-5}	4.05	<.0001
Female	0.086	0.049	1.76	0.079
Age at commencement	-0.030	0.011	-2.68	0.008
Age at commencement (squared)	3.8×10^{-4}	1.6×10^{-4}	2.44	0.015
Trainee was part-time	0.013	0.055	0.24	0.812
Trainee was an existing worker	0.091	0.053	1.71	0.087

Model statistics

N	1672
F score	2.94
R_2	0.0259
Adj R	0.0171

Source: 2010 NCVER Apprenticeship and Traineeship Destination Survey.

In the model of off-the-job training aspects, the interaction of pre-vocational program and occupation is significant and has been retained in the model shown in table 4. Once the interaction with occupation is taken into account, having completed a pre-vocational program increases the satisfaction level for managerial and professional workers, clerical and administrative workers, and machinery operators and drivers. The net effects are shown in table 5. Trainees in community and personal service occupations and sales occupations were less satisfied on average if they had completed a pre-vocational program.[2] For some occupations, the effect sizes are relatively substantial but there is no apparent pattern among the occupations.

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[2] We arrive at this result by adding together the coefficients from the main effect and the interaction effects.

Table 4   Regression coefficients – satisfaction with off-the-job training-related aspects of apprenticeship

Variable	Parameter estimate	Standard error	T Value	Pr > |t|
Intercept	-0.365	0.185	-1.98	0.048
Completed pre-vocational program	-0.078	0.169	-0.46	0.646
Completed pre-vocational program*				
Managers and professionals	0.178	0.243	0.73	0.463
Community and personal service workers	-0.341	0.222	-1.54	0.124
Clerical and administrative workers	0.261	0.205	1.27	0.204
Sales workers	-0.207	0.238	-0.87	0.385
Machinery operators and drivers	0.239	0.244	0.98	0.327
Highest education level				
Cert. III or higher	-0.154	0.068	-2.27	0.023
Year 12	-0.045	0.056	-0.80	0.424
Year 11	-0.044	0.073	-0.60	0.545
Year 10 or below		Reference category		
Occupation				
Managers and professionals	-0.035	0.110	-0.32	0.748
Community and personal workers	0.141	0.090	1.56	0.119
Clerical and administrative workers	-0.106	0.088	-1.21	0.226
Sales workers	0.060	0.095	0.63	0.530
Machinery operators and drivers	-0.040	0.097	-0.41	0.683
Labourers		Reference category		
Income during training — midpoint values per week	1.1×10^{-4}	8.3×10^{-5}	1.37	0.170
Female	0.110	0.050	2.21	0.027
Age at commencement	0.017	0.012	1.44	0.150
Age at commencement (squared)	-1.2×10^{-4}	1.6×10^{-4}	-0.75	0.456
Traineeship was part-time	-0.030	0.056	-0.53	0.594
Trainee was existing worker	0.002	0.054	0.04	0.970

Model statistics

N	1672
F score	3.21
R_2	0.0375
Adj R_2	0.0258

Source: 2010 NCVER Apprenticeship and Traineeship Destination Survey.

Table 5   Net effect of a pre-apprenticeship on trainee satisfaction with off-the-job training by occupation

Occupation	Effect
Managers and professionals	0.100
Community and personal service workers	-0.419
Clerical and administrative workers	0.183
Sales workers	-0.285
Machinery operators and drivers	0.161
Labourers	-0.078

Completion

Following the approach taken in the report examining pre-apprenticeships (Karmel & Oliver 2011), we use the data from the Apprentice and Trainee Destination Survey to estimate the impact of pre-vocational programs on the likelihood of completing a traineeship. For a number of reasons, including different estimation techniques, sampling error and response bias, the estimates of the likelihood of completing a traineeship differ from the completion rates published regularly by NCVER. Once again, readers should continue to rely on the annual and quarterly reports for estimates of the completion rate for each occupation.

The Apprentice and Trainee Destination Survey includes trainees who completed their training and trainees who ended their traineeship without completing all the requirements. We test the impact of pre-vocational programs in a binary logistic regression model. Our dependent variable is the completion status of the apprentice (completed training or did not complete training) and our independent variable is whether the apprentice undertook a pre-vocational program. As controls we add age, sex, highest level of education, occupation of apprenticeship, part-time status and existing worker status. We also include the interaction of highest level of education and occupation. It has already been shown that the incidence of pre-vocational programs varies by occupation and highest level of education and we want to be sure that we do not attribute any effect to pre-vocational programs that is actually the result of underlying relationships between these two variables. Finally, we include interactions of whether the apprentice had undertaken a pre-vocational program with (1) sex (2) age (3) highest level of education, and (4) occupation. This enables us to test whether pre-vocational programs improve completion rates in some circumstances but not in others.

To test whether the interaction effects do have an impact on the likelihood of completion, we ran five reduced models, removing one interaction effect each time. Deviance scores based on likelihood ratios are used to compare the fit achieved by the restricted models to the full model, taking into account the additional parameter included in the full model. The procedure is outlined in appendix D. The result is that all interaction effects except the interaction of pre-vocational program and age and the interaction of pre-vocational program and sex significantly improve the model's fit. Our suspicions that pre-vocational programs might be less beneficial to older trainees and more beneficial to female trainees are not supported by the data. Therefore, the model we present in table 6 includes three interaction effects.

Table 6 Effect of undertaking pre-vocational program and other variables on likelihood of completing traineeship

Parameter	Estimate	Standard error	Wald ChiSq
Undertook a pre-vocational program	0.104	0.135	0.594
Pre-vocational program*			
Cert. III or higher	-0.097	0.202	0.228
Year 12	0.378	0.286	1.746
Year 11	-0.252	0.206	1.495
Managers and professionals	-0.197	0.299	0.435
Community and personal service workers	-0.488	0.249	3.834
Clerical and administrative workers	0.242	0.224	1.172
Sales workers	0.264	0.274	0.934
Machinery operators and drivers	0.081	0.332	0.060
Intercept	0.531	0.390	1.860
Female	0.251	0.088	8.146
Age at commencement	0.025	0.020	1.611
Age at commencement (squared)	-1.2×10^{-4}	2.8×10^{-4}	0.177
Part-time worker	-0.295	0.096	9.383
Existing worker	-0.323	0.099	10.561
Highest level of education (ref cat.: Year 10)			
Cert. III or higher	-0.135	0.100	1.800
Year 12	0.008	0.077	0.011
Year 11	0.042	0.105	0.161
Year 10		Reference category	
Occupation			
Managers and professionals	-0.158	0.142	1.249
Community and personal service workers	0.141	0.096	2.153
Clerical and administrative workers	0.191	0.096	3.982
Sales workers	-0.352	0.112	9.931
Machinery operators and drivers	0.491	0.127	14.884
Labourers		Reference category	
Cert. III or higher*			
Managers and professionals	0.280	0.197	2.019
Community and personal service workers	0.331	0.158	4.408
Clerical and administrative workers	0.019	0.146	0.018
Machinery operators and drivers	0.060	0.210	0.082
Sales workers	-0.539	0.220	6.003
Year 12*			
Managers and professionals	-0.240	0.198	1.479
Community and personal service workers	-0.150	0.131	1.317
Clerical and administrative workers	0.067	0.124	0.295
Sales workers	0.088	0.147	0.359
Machinery operators and drivers	0.040	0.179	0.049
Year 11*			
Managers and professionals	-0.331	0.281	1.382
Community and personal service workers	-0.044	0.171	0.065
Clerical and administrative workers	0.249	0.185	1.813
Sales workers	0.376	0.189	3.961
Machinery operators and drivers	-0.054	0.236	0.052

Model fit statistics

Criterion	Intercept only	Intercept and covariates
AIC	46682.876	44544.276
SC	46688.878	44772.353
-2 Log L	46680.876	44468.276
N		2987

Source: 2010 Apprentice and Trainees Destination Survey.

This variation indicates that some pre-vocational programs are better than others. So that the results from this model (presented in table 6) are easier to interpret, we take the coefficients to calculate the change in likelihood of completion of the traineeship associated with a pre-vocational program. The probabilities, in table 7, quantify what was apparent from the coefficients: that the effect of pre-vocational programs depends on the occupation of the traineeship and the trainee's highest level of education. Trainees in clerical and administrative occupations, sales occupations, labourer occupations and machinery operators and drivers are more likely to complete their traineeship if they have completed a pre-vocational program. There is evidence to suggest that they are having an unintended impact in managerial and professional occupations and in community and personal service occupations. Namely, trainees who have completed pre-vocational programs are less likely to complete their training.

In relation to the interaction with the trainee's highest level of education, we had predicted that pre-vocational programs would be of most benefit to those with lower levels of education. The results are not so straightforward. Trainees who left school after Year 11 are clearly more likely to complete their training if they have undertaken a pre-vocational program. In the case of those who finished Year 12, pre-vocational programs reduce the likelihood of completing a traineeship and, for all other levels of education, it seems that pre-vocational programs have little impact on the likelihood of completing a traineeship. The finding in relation to Year 11 is striking as pre-apprenticeships were found to reduce the likelihood of completing an apprenticeship for those who finished school at Year 11 (Karmel & Oliver 2011, p.19).

Table 7   Probability of completing a traineeship by occupation and whether undertaken a pre-vocational program

	Pre-vocational program	No pre-vocational program	Difference
Occupation			
Managers and professionals	57.4	61.0	-3.6
Community and personal service workers	58.1	68.3	-10.2
Clerical and administrative workers	76.2	70.6	5.6
Sales workers	64.9	57.5	7.4
Machinery operators and drivers	77.8	75.5	2.3
Labourers	58.6	55.0	3.6
Highest level of education			
Certificate III or higher qualification	66.0	65.8	0.2
Year 12	63.7	67.0	-3.3
Year 11	79.1	70.0	9.1
Year 10	66.9	65.1	1.8

Notes: Probabilities were calculated assuming trainee is full-time, not an existing worker and commences at age 28 and at the average level for all other variables not included in the prediction.

Partly these results are explained by the relationship between education and skill level. Table 8 shows for each major occupational grouping the average highest education level of the respondents as well as the average skill level required for each occupation. The average skill level was calculated using the occupation information available in the survey. On the basis of information contained in their training contract, each respondent is allocated an occupation at the six-digit level. Using this level of detail we have matched each respondent to a skill level in accordance with the Australian and New Zealand Standard Classification of Occupations (ANZSCO) (ABS & Statistics NZ 2009). Skill levels range from one to five. A skill level of one is commensurate with a bachelor degree or higher qualification or at least five years relevant experience. A skill level of five would usually require completion of compulsory secondary education or a certificate I.

Pre-vocational programs improved completion rates for trainees in sales, machinery operator and driver, and labourer occupations. Respondents in these occupational categories were the most likely to have left school without completing Year 12 and least likely to have completed a certificate III or higher. They were also training for occupations with the lowest average skill level.

Pre-vocational programs did not improve completion rates for trainees in managerial and professional occupations. This group of trainees was the most likely to have completed a certificate III or higher before commencing their traineeship and the least likely to have left school without completing Year 12. They were also training for occupations with the highest average skill level.

However, the relationship between occupation, highest education level and skill level does not explain the effect of pre-vocational programs for the two remaining occupational categories. Both community and personal service trainees and clerical and administrative trainees work in occupations with mid-range skill levels, although the clerical and administrative trainees are in occupations with a higher skill level than community and personal service trainees and are less likely to have left school before completing Year 12. Based on the above results, we would expect that pre-vocational programs would have a more positive effect among community and personal service trainees than among clerical and administrative trainees, but we find the reverse is true. This suggests there may be particular issues with pre-vocational programs for community and personal service trainees.

Table 8   Highest level of education and average skill level by occupation

Occupation	Highest level of education (%)			Average skill level
	Certificate III or higher	Year 12	Less than Year 12	
Managers and professionals	32.0	28.8	24.7	1.3
Community and personal service workers	19.8	34.3	46.0	3.9
Clerical and administrative workers	26.7	43.0	30.3	3.3
Sales workers	9.5	32.0	58.4	4.7
Machinery operators and drivers	17.6	29.9	55.5	4.0
Labourers	9.5	29.9	60.6	4.8

Source: 2010 NCVER Apprentice and Trainee Destination Survey,

Reasons for non-completion

The aim of this paper was an investigation of how a pre-vocational program affects the traineeship experience. As well as the impact on satisfaction and the probability of completion, we investigate whether undertaking a pre-vocational program affects reasons for non-completion. The Apprentice and Trainee Destination Survey asks respondents who did not complete their training the main reason for their non-completion. We divide the reasons for non-completion into three categories:

- didn't like the type of work or the type of training

- workplace reasons, such as didn't get on with the boss or the pay was too low

- other reasons, including personal reasons, being made redundant or the apprenticeship was discontinued or cancelled.

We are most interested in the first category of reasons. We hypothesise that trainees who have completed a pre-vocational program should be more familiar with the type of work or training involved. We expect that apprentices who have undertaken a pre-vocational program will be more likely to nominate workplace reasons or reasons from the 'Other' grouping. These two categories are combined and used as the reference category because these reasons are mostly beyond the control of the trainee and should be least likely to be influenced by pre-vocational programs. Our hypothesis implies that we expect the pre-vocational program variable to be negatively related to the 'didn't like type of work or training' category.

We conduct a binary logistic regression, starting once again with a full model, including interaction terms between the pre-vocational program variable, highest education level, occupation and sex. All of the interaction terms except the interaction of pre-vocational program with age are significant at the 0.001 level and the model with these interaction terms is retained (see appendix D). The results are shown in table 9.

Once again, the effect of pre-vocational programs on reasons for non-completion depends on the occupation of the apprenticeship and the apprentice's highest level of education. They also depend on sex, with pre-vocational programs affecting females' reasons for leaving more than males. So that the results are more easily interpretable, the probabilities for the main categories of interest (pre-vocational program, occupation and highest level of education) are shown in table 10.

Table 9   Logistic regression of 'Main reason for not completing training is because apprentice didn't like the type of work or training'

Parameter	Estimate	Standard error	Wald Chi Sq
Undertook a pre-vocational program	-3.507	0.252	193.007
Pre-vocational program*			
Female	-0.344	0.268	1.652
Cert. III or higher	3.591	0.375	91.785
Year 11	-10.643	0.352	912.902
Year 12	3.416	0.386	78.328
Managers and professionals	-0.178	0.584	0.093
Community and personal service workers	-0.147	0.544	0.073
Clerical and administrative workers	0.114	0.565	0.041
Sales workers	0.321	0.525	0.375
Machinery operators and drivers	-0.393	0.874	0.202
Intercept	0.213	0.705	0.091
Female	-0.019	0.101	0.036
Age at commencements	-0.124	0.044	7.888
Age at commencement (squared)	0.002	0.001	7.691
Part-time worker	-0.415	0.196	4.459
Existing worker	-0.148	0.213	0.479
Duration	-0.001	0.000	1.280
Highest level of education			
Cert. III or higher	0.397	0.202	3.864
Year 12	-0.184	0.204	0.809
Year 11	-0.041	0.252	0.027
Year 10		Reference category	
Occupation			
Managers and professionals	0.164	0.328	0.248
Community and personal service workers	0.379	0.220	2.966
Clerical and administrative workers	-0.086	0.220	0.154
Sales workers	-0.090	0.229	0.153
Machinery operators and drivers	-0.220	0.357	0.377
Labourers		Reference category	
Cert. III or higher*			
Managers and professionals	-0.628	0.485	1.678
Community and personal service workers	-0.309	0.336	0.845
Clerical and administrative workers	-0.270	0.316	0.733
Sales workers	0.122	0.357	0.116
Machinery operators and drivers	0.364	0.481	0.571
Year 12*			
Managers and professionals	0.574	0.404	2.019
Community and personal service workers	0.037	0.290	0.016
Clerical and administrative workers	0.247	0.296	0.695
Sales workers	0.235	0.316	0.557
Machinery operators and drivers	-1.181	0.710	2.767
Year 11*			
Managers and professionals	-0.399	0.719	0.308
Community and personal service workers	0.154	0.379	0.165
Clerical and administrative workers	0.504	0.437	1.331
Sales workers	-0.443	0.485	0.835
Machinery operators and drivers	1.117	0.575	3.775

Model fit statistics

Criterion	Intercept only	Intercept and covariates
AIC	9271.806	8944.481
SC	9277.083	9155.571
-2 Log L	9269.806	8864.481
N	1447	

Source: 2010 Apprentice and Trainees Destination Survey.

Table 10 Probability of choosing a work or training-related reason as main reason for not completing a traineeship (%)
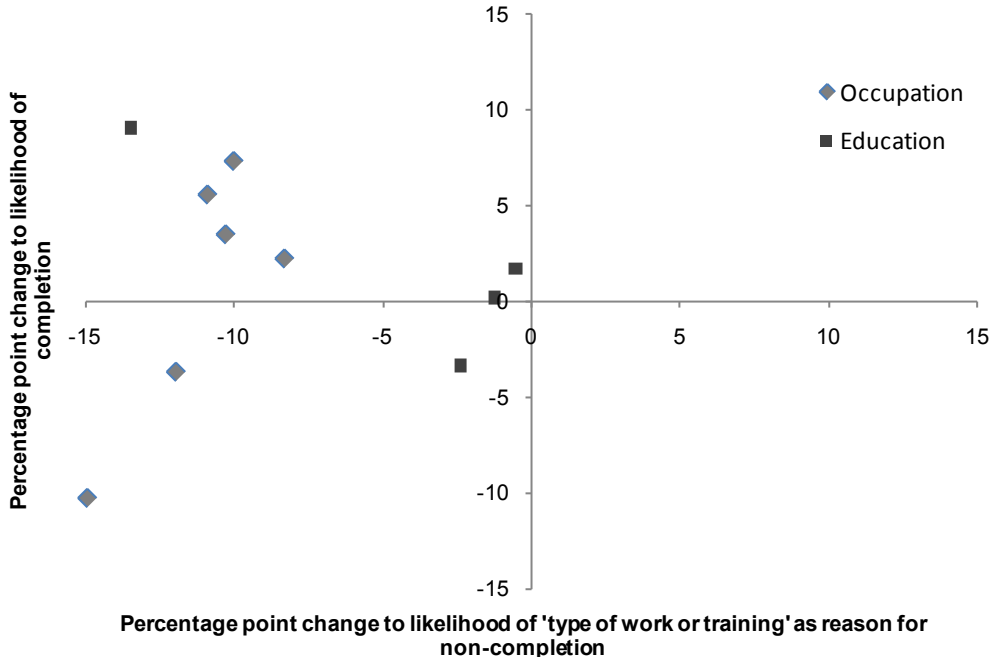
	Pre-vocational program	No pre-vocational program	Difference
Occupation			
Managers and professionals	0.7	12.7	-11.9
Community and personal service workers	1.0	15.9	-14.9
Clerical and administrative workers	0.9	11.8	-10.9
Sales workers	1.0	11.0	-10.0
Machinery operators and drivers	0.4	8.7	-8.3
Labourers	1.0	11.3	-10.3
Highest level of education			
Cert. III	12.8	14.0	-1.2
Year 12	8.2	10.6	-2.4
Year 11	0.0	13.5	-13.5
Year 10	9.5	10.0	-0.5

Notes: Probabilities were calculated assuming trainee is full-time, not an existing worker and commences at age 28 and at the average level for all other variables not included in the prediction.

Thus we find that pre-vocational programs do have an effect on reasons for not completing. This effect is relatively uniform across the occupations, although stronger for community and personal service workers and managers and professionals, the two occupational categories that did not show an improvement in the likelihood of completion. So our conclusion is that pre-vocational programs do provide a better understanding of what work and training apprentices can expect in undertaking an apprenticeship. When we compare these effects with the earlier results relating to the probability of completion, we find some evidence that this better understanding translates into higher completion rates. This point is illustrated by figure 1.

In this figure, we plot for each occupation and prior education level the change to the likelihood of completion against the change to the likelihood of giving 'type of work or training' as the reason for non-completion. If improving an apprentice's understanding of the type of work or training involved in an apprenticeship is important to increasing completion rates, we would expect to see most data points in the upper left quadrant. That is, trainees who complete a pre-vocational program should be less likely to be dissatisfied with the type of work or training and therefore more likely to complete their training. We see a fairly consistent pattern among the occupational results but little strong relationship among the education results (where pre-vocational programs had little effect except for those who left school after Year 11).

Figure 1   Impact of pre-vocational programs on reason for non-completion and likelihood of completion of a traineeship

Source: Tables 7, 10.

Final comments

Our analysis of pre-vocational programs suggests that they do have a contribution to make in improving traineeship completions if appropriately targeted.

Non-completing trainees who have completed a pre-vocational program are less likely to discontinue their training because they did not like the type of work or training and more likely to nominate a workplace or personal reason. This is largely attributable to the very strong positive impact among those who left school at Year 11 and there is little effect among the other levels of education.

Pre-vocational programs have only a moderate effect on trainees' satisfaction with the job-related aspects of their traineeship. There is more of an effect of pre-vocational programs on trainees' satisfaction with the off-the-job-training aspects of their traineeship. For most occupations, this is positive, but pre-vocational programs reduce satisfaction with off-the-job training in the community and personal service and sales occupations.

Pre-vocational programs do increase the likelihood of completing a traineeship in most occupational categories. In the community and personal services occupations and managerial and professional occupations, pre-vocational programs appear not to be working well and reduce the likelihood of completing a traineeship. In the case of managerial and professional occupations, there is some logic to this result: these occupations have the highest skill requirements of all trainee occupations and pre-vocational programs may struggle to prepare prospective trainees for all the requirements of their training, especially if they are drawing on a group with less academic ability to begin with. The flipside is that pre-vocational programs are working well in occupations with low skill requirements: sales workers, labourers and machinery operators and drivers, as well as in clerical and administrative occupations.

On the basis of the level of education results, it seems that pre-vocational programs are particularly beneficial for those who left school after Year 11. This is in contrast to pre-apprenticeships, which reduce the likelihood of completing an apprenticeship among those who leave school at Year 11.

Pre-vocational programs, particularly where delivered through VET in Schools, may be a preferable alternative to completing Year 12 for students looking to complete a traineeship. Anlezark, Karmel and Ong (2006) found that VET in Schools undertaken by Year 11 students reduces retention to Year 12 but contributes to a smoother transition into work for those who decide to leave school without completing Year 12. To the extent that some pre-vocational programs are taken through the VET in Schools setting, we could be confusing the result. Students could be leaving school at Year 11 because a pre-vocational program has shown them an alternative path into a traineeship.

We must still account for the divergent effects of pre-apprenticeships and pre-vocational programs for apprentices and trainees who leave school after Year 11. It could be that pre-apprenticeship courses are not ideally suited to those who leave school after Year 11 and who may lack the ability and motivation to complete Year 12, since ability and motivation also increase the odds of completing a three-year apprenticeship in a traditional trade. Pre-vocational programs, on the other hand, may fulfil a more useful role for those who leave school at Year 11 because they have a broader focus on vocational skills and lead to traineeships that are typically much shorter in duration than apprenticeships. One could also argue that traineeships are more about a way into employment, while apprenticeships are more identified as acquiring the skills pertaining to a particular craft.

On the basis of these results, we can make some reasonably certain conclusions about the performance of pre-vocational programs. Pre-vocational programs fulfil a useful role in assisting early school leavers, particularly those leaving after Year 11, to complete traineeships in occupations that typically require lower skill levels. Pre-vocational programs reduce the likelihood of completing a traineeship in the higher-level occupational categories such as managers and professionals. Prospective trainees interested in these occupations would be better off directly entering a traineeship, especially if they have completed Year 12. For occupations with mid-range skill levels, the results are mixed. The implication is that the curriculum for pre-vocational programs should focus more on general employability skills and less on theory or work experience directed toward a specific occupation and they should be targeted to early school leavers.

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Appendix A

Apprentice and Trainee Destination Survey

The Apprentice and Trainee Destination Survey provides information about the destinations of apprentices and trainees approximately nine months after leaving their training. The findings relate to apprentices and trainees who completed their training (completers) between April and June 2009, or who cancelled or withdrew from an apprenticeship or traineeship and did not return to finish (non-completers) during this period. The limited window may mean that we miss out on some groups of apprentices and trainees. For example, those who left their training to return to school would be unlikely to be in the survey.

The statistical publication from the survey (NCVER 2010a) presents employment outcomes, reasons for non-completion, satisfaction with the apprenticeship or traineeship, and further study destinations. A number of supporting documents are also available, including additional data tables and technical notes <http://www.ncver.edu.au/publications/2262.html>.

As the survey is based on a sample and not the entire population of apprentices and trainees who stopped their training, estimates produced by the survey are subject to sampling and non-sampling error. Sampling error is a measure of the variability that occurs because a sample rather than the entire population responds to a survey. Non-sampling error may occur for reasons such as non-response bias, incorrect responses, interviewer errors, attrition, and processing errors (see NCVER 2010b). Non-response is typically not random, and often there is a tendency for the more successful to respond. To a large extent, this bias is addressed through the use of multivariate models, and we are confident that the relationships we have estimated between pre-apprenticeships and outcomes are reasonably robust.

Appendix B

Table B1 Individual and employment characteristics of apprentices and trainees, by whether completed a pre-vocational or pre-apprenticeship course

	Pre-vocational program	No pre-vocational program
Female	51.0	54.3
Male	49.0	45.7
Age at commencement		
19 years and under	28.7	29.8
20–24 years	17.5	15.2
25 years and over	53.9	55.1
Previous level of education		
Cert. III or higher	33.5	17.3
Year 12	27.3	35.5
Year 11	11.8	13.4
Year 10 or below	27.3	33.8
Non-English speaking	9.9	12.0
English speaking/Not stated	90.1	88.0
Indigenous	2.9*	2.3
Non-Indigenous/Not stated	97.1	97.7
Have a disability	1.7*	1.8
Do not have a disability/Not stated	98.3	98.2
Metropolitan	59.6	60.0
Rural	40.4	40.0
Existing worker	64.8	64.3
Newly commencing worker	35.2	35.7

Notes: *Has a relative standard error > 25% and should be used with caution.

Table B2 Selected outcomes of trainees, by whether completed a pre-vocational program

	Pre-vocational program	No pre-vocational program
	%	%
Overall satisfaction with traineeship		
Very satisfied	40.9	34.9
Satisfied	35.0	39.9
Neither satisfied nor dissatisfied	13.8	14.8
Dissatisfied	5.5	5.7
Very dissatisfied	4.8	4.6
Completer	67.2	67.2
Non-completer	32.8	32.8
Main reason for not completing:		
Related to type of work or training	*13.6*	*12.4*
Related to workplace	*43.6*	*46.1*
Other (inc. redundancy, personal reasons)	*42.8*	*41.5*
Employment status after training (completers only)		
Employed	91.7	89.6
Employed in same occupation	*69.6*	*68.0*
Employed in different occupation[1]	*22.1*	*21.6*
Not employed	8.3	10.4
Employment status after training (non-completers only)		
Employed	68.8	74.8
Employed in same industry	*34.5*	*34.7*
Employed in different industry	*34.3*	*40.1*
Not employed	31.2	25.5

Note: 1 includes occupation not stated.

Appendix C

Factor analysis – satisfaction

The questionnaire includes items relating to satisfaction with the employment- and training-related aspects of the apprenticeship or traineeship. Exploratory factor analysis was used to see if separate employment and training or a combined satisfaction scale can be constructed.

A total of 16 variables were used in the factor analysis: nine employment-related items; six off-the-job training related items; and one overall satisfaction item. A tenth employment-related item was dropped because it was only asked of apprentices and trainees who were employed by a group training company.

Common factor analysis was used, rather than principal components analysis, since the observed variables are only indicators of the latent satisfaction constructs to be measured. Two factors were selected on the basis of eigenvalues being greater than 1 (table C2). Orthogonal rotation using the VARIMAX method produced the final factor matrix shown in table C3.

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**Table C1 Correlation matrix – satisfaction with apprenticeship**

Correlations

	Q10_01	Q10_02	Q10_03	Q10_04	Q10_05	Q10_06	Q10_07	Q10_08	Q10_10	Q9_01	Q9_02	Q9_03	Q9_04	Q9_05	Q9_06	Q16
Q10_01	1.000	0.525	0.414	0.490	0.501	0.448	0.489	0.566	0.590	0.306	0.369	0.366	0.376	0.328	0.362	0.432
Q10_02	0.525	1.000	0.435	0.520	0.616	0.507	0.614	0.541	0.690	0.317	0.348	0.325	0.322	0.364	0.370	0.424
Q10_03	0.414	0.435	1.000	0.384	0.384	0.290	0.393	0.356	0.451	0.262	0.264	0.270	0.295	0.278	0.276	0.327
Q10_04	0.490	0.520	0.384	1.000	0.488	0.373	0.482	0.448	0.531	0.317	0.308	0.307	0.304	0.334	0.342	0.359
Q10_05	0.501	0.616	0.384	0.488	1.000	0.444	0.667	0.572	0.626	0.372	0.380	0.384	0.375	0.418	0.425	0.490
Q10_06	0.448	0.507	0.290	0.373	0.444	1.000	0.471	0.491	0.567	0.245	0.326	0.334	0.303	0.270	0.298	0.348
Q10_07	0.489	0.614	0.393	0.482	0.667	0.471	1.000	0.613	0.651	0.416	0.404	0.386	0.396	0.426	0.444	0.508
Q10_08	0.566	0.541	0.356	0.448	0.572	0.491	0.613	1.000	0.596	0.354	0.470	0.427	0.424	0.398	0.419	0.495
Q10_10	0.590	0.690	0.451	0.531	0.626	0.567	0.651	0.596	1.000	0.355	0.407	0.393	0.391	0.396	0.403	0.498
Q9_01	0.306	0.317	0.262	0.317	0.372	0.245	0.416	0.354	0.355	1.000	0.479	0.539	0.533	0.569	0.626	0.509
Q9_02	0.369	0.348	0.264	0.308	0.380	0.326	0.404	0.470	0.407	0.479	1.000	0.572	0.652	0.500	0.589	0.495
Q9_03	0.366	0.325	0.270	0.307	0.384	0.334	0.386	0.427	0.393	0.539	0.572	1.000	0.607	0.574	0.659	0.536
Q9_04	0.376	0.322	0.295	0.304	0.375	0.303	0.396	0.424	0.391	0.533	0.652	0.607	1.000	0.552	0.612	0.532
Q9_05	0.328	0.364	0.278	0.334	0.418	0.270	0.426	0.398	0.396	0.569	0.500	0.574	0.552	1.000	0.687	0.528
Q9_06	0.362	0.370	0.276	0.342	0.425	0.298	0.444	0.419	0.403	0.626	0.589	0.659	0.612	0.687	1.000	0.590
Q16	0.432	0.424	0.327	0.359	0.490	0.348	0.508	0.495	0.498	0.509	0.495	0.536	0.532	0.528	0.590	1.000

Eigenvalues of the reduced correlation matrix: Total = 8.715 average = 0.545

Table C2 Reduced correlation matrix – satisfaction with traineeship

Factor	Eigenvalue	Difference	Proportion	Cumulative
1	7.268	5.820	0.834	0.834
2	1.447	1.193	0.166	1.000
3	0.254	0.103	0.029	1.029
4	0.151	0.066	0.017	1.047
5	0.084	0.029	0.010	1.056
6	0.055	0.032	0.006	1.063
7	0.023	0.036	0.003	1.065
8	-0.013	0.002	-0.002	1.064
9	-0.015	0.023	-0.002	1.062
10	-0.037	0.009	-0.004	1.058
11	-0.046	0.013	-0.005	1.052
12	-0.059	0.017	-0.007	1.046
13	-0.077	0.005	-0.009	1.037
14	-0.081	0.027	-0.009	1.027
15	-0.108	0.023	-0.012	1.015
16	-0.131		-0.015	1.000

Figure C1 Scree plot of Eigenvalues
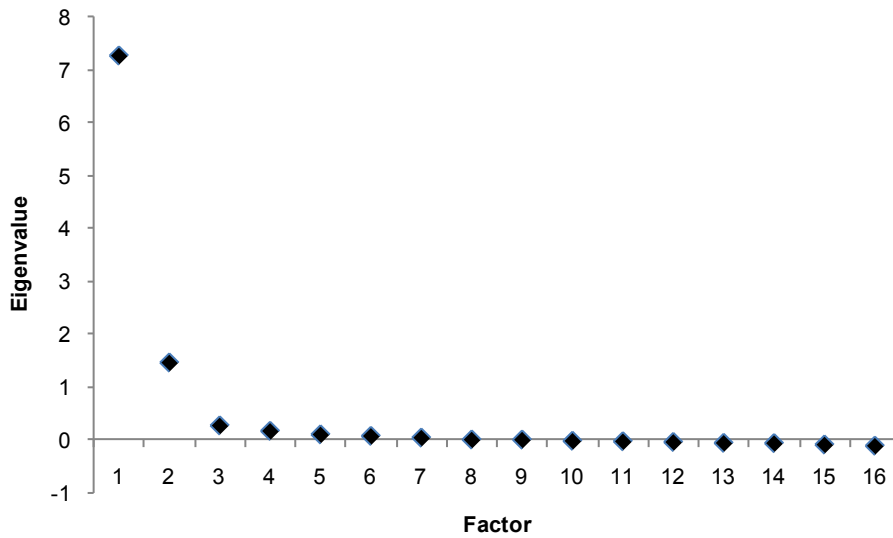
Table C3 Rotated factor pattern – satisfaction with traineeship

Apprentice satisfaction with …	Factor 1 Job-related aspects	Factor 2 Training-related aspects
The type of work you were/are doing	0.649	0.259
The working conditions	0.773	0.195
The pay	0.487	0.205
The hours of work	0.599	0.225
Receiving adequate supervision	0.703	0.300
Relationships with co-workers	0.592	0.197
Training provided by your employer	0.712	0.324
The skills you learnt on the job	0.660	0.345
Your employment overall	0.808	0.254
Frequency of training	0.233	0.674
Relevance of the skills to your workplace	0.291	0.663
The fairness of the assessments of your skills and knowledge	0.250	0.732
The relevance of the assessment tasks	0.251	0.729
The quality of the training facilities and equipment	0.265	0.706
Overall quality of the off-the-job training	0.246	0.814
Overall satisfaction with apprenticeship/traineeships	0.421	0.591

Interaction effects: satisfaction with job-related and training related aspects of traineeship

Our initial unrestricted models for satisfaction include three interaction effects: occupation by highest education level; pre-apprenticeship by highest education level; and pre-apprenticeship by occupation. Including more parameters necessarily reduces the error in the model. The F-test is the appropriate test of whether the reduction in error is large enough that it can be attributed to the effect of the additional parameters and not to random noise in the sample.

The F-statistic for restricted model M is measured by

$$F = \frac{(\frac{RSS_M - RSS_F}{p_F - p_M})}{(\frac{RSS_F}{n - p_F})}$$

Where RSS_M is the residual sums of squares for the restricted model M, RSS_F is the residual sums of squares for the full model F, p_F is the number of parameters in the full model F, p_M is the number of parameters in the restricted model M and n is the number of observations.

The null hypothesis assumes that the full unrestricted model F does not provide a significantly better fit than the restricted model M. The distribution of the F-score will have (p_F – p_M, n – p_F) degrees of freedom.

Table C4 F-test statistics for comparing unrestricted and restricted models of satisfaction

	N	No. of par	Residual sum squares	F score	df1	df2	Sig value
Satisfaction with job-related aspects							
A Expanded model with all interactions	1672	41	16081				
B Restricted model with no PRE|AGE interaction	1672	40	16083	0.203	1	1671	0.653
C Restricted model with no PRE|SEX interaction	1672	40	16092	1.116	1	1671	0.291
D Restricted model with no OCC|HEL interaction	1672	26	16253	1.163	15	1657	0.294
E Restricted model with no PRE|OCC interaction	1672	36	16169	1.785	5	1667	0.113
F Restricted model with no PRE|HEL interaction	1672	38	16116	1.183	3	1669	0.315
G Restricted model with no interactions	1672	15	16388	1.198	26	1646	0.226
Satisfaction with training-related aspects							
A Expanded model with all interactions	1672	41	16738				
B Restricted model with no PRE|AGE interaction	1672	40	16745	0.682	1	1671	0.409
C Restricted model with no PRE|SEX interaction	1672	40	16739	0.097	1	1671	0.755
D Restricted model with no OCC|HEL interaction	1672	26	16919	1.176	15	1657	0.284
E Restricted model with no PRE|OCC interaction	1672	36	16894	3.040	5	1667	0.010
F Restricted model with no PRE|HEL interaction	1672	38	16746	0.260	3	1669	0.854
G Restricted model with no interactions	1672	16	17093	1.384	25	1647	0.098
H full model with only PRE|OCC interaction	1672	21	16942				
G restricted model with no interactions	1672	16	17093	2.943	25	1647	0.000

Note: Shaded model indicates final model presented in analysis.

Appendix D

Likelihood of completing an apprenticeship or traineeship

To model the likelihood of completing training, we combine the completer and non-completer sub-samples. We weight this data, using information from the same administrative data from which the sample was drawn. The data have been weighted by state, completion status (completer/non-completers) and occupation (trade/non-trade). We run a logistic regression where the dependent variable is whether or not the apprenticeship was completed, using the proc survey logistic procedure in SAS to take account of the survey strata.

We tested numerous possible interaction effects. We began with the unrestricted model, including three interaction effects: occupation by highest education level; pre-apprenticeship by highest education level; and pre-apprenticeship by occupation. We then ran three restricted models, removing one interaction block in each model. Removing parameters necessarily results in an increase in -2 log likelihood scores. The deviance statistic tests whether the increase in log likelihood is too large and the assumption of a simplified model is not justified.

The deviance statistic for model M is measured by

$$D(M) = (-2\ln l_F - -2\ln l_M)$$

Where l_F is the likelihood of the full model and l_M is the likelihood of the restricted model M. The deviance statistic has an approximate Chi-Square distribution, with $p_F - p_M$ degrees of freedom, where p_F is the number of parameters in the full model and p_M is the number of parameters in the restricted model M.

When we tested the interaction blocks, we found that the model with the interactions between pre-vocational program and age and between pre-vocational program and sex but with all other interaction terms retained results in the best fit. The results of the deviance tests are shown in table D1.

Reasons for non-completion

We followed an identical process for examining the reasons for non-completion. The main reasons for non-completion are divided into two categories: related to the type of work or training and all other reasons.

We modelled the probability of nominating a reason related to the type of work or training, again using the proc survey logistic procedure in SAS to take account of the survey strata. The deviance tests for testing interaction effects for the reasons for non-completion are shown in table D2.

Table D1 Summary of deviance tests for interaction effects – logistic regression of likelihood of completing an apprenticeship or traineeship

Model	-2 Log likelihood	Df	Models compared	Change in df	Deviance statistic (X^2)	Sig value	Decision
A. Full model	44465.151	39					
B. Model A without AGE*PREVOC interaction	44466.151	38	B to A	1	1.000	0.317	Remove AGE*PREVOC
C. Model B without PREVOC*SEX interaction	44468.276	37	C to B	1	2.125	0.145	Remove SEX*PREVOC
D. Model C without OCC*HEL interaction	44718.206	22	D to C	15	249.930	0.000	Retain OCC*HEL
E. Model C without PRE*HEL interaction	44496.635	34	E to C	3	28.359	0.000	Retain PRE*HEL
F. Model C without PRE*OCC interaction	44544.378	32	F to C	5	76.102	0.000	Retain PRE*OCC

Note: Shaded model indicates final model presented in analysis.

Table D2 Summary of deviance tests for interaction effects – logistic regression of main reason for not completing traineeship

Model	-2 Log likelihood	Df	Models compared	Change in df	Deviance statistic (X^2)	Sig value	Decision
A. Full model	8861.047	39					
B. Model A without AGE*PREVOC interaction	8864.481	38	B to A	1	3.434	0.064	Remove AGE*PREVOC
C. Model B without PREVOC*SEX interaction	8880.574	37	C to B	1	16.093	0.000	Retain SEX*PREVOC
D. Model C without OCC*HEL interaction	9027.415	22	D to B	15	162.934	0.000	Retain OCC*HEL
E. No PRE*AGE, No PRE*SEX, No PRE*HEL	8922.320	34	E to B	3	57.839	0.000	Retain PRE*HEL
F. No PRE*AGE, No PRE*SEX, No PRE*OCC	8889.228	32	F to B	5	24.747	0.000	Retain PRE*OCC

Note: Shaded model indicates final model presented in analysis.