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Te Tāhuhu o te Mātauranga

Modern Apprenticeships – Completion Analysis

New Zealand Government

Learners in tertiary education

This report forms part of a series called Learners in tertiary education. Other topics covered by the series include access, pathways, support, participation, retention and qualification completions.

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Modern Apprenticeships – Completion Analysis

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1 Executive Summary

This report presents participation and completion rates for the Modern Apprenticeships programme. It identifies the factors associated with 'completion' of Modern Apprenticeships, one of several measures that can be used to determine how successful the programme is at achieving government's aims for young people in workplace-based learning, by using statistical modelling. While the Modern Apprenticeships scheme does seem to have been successful in facilitating more young people to participate in formal workplace-based learning, the modelling has identified that there are clearly a number of issues that could be addressed to ensure that government's investment leads to good outcomes for all Modern Apprenticeships learners.

The most important factor associated with completion of Modern Apprenticeships is industry. Learners in some industries are more likely to complete their programmes than those in others. The implications of this finding are that the quality of Modern Apprenticeships learning across industries is uneven. This is likely to be due to a variety of industry-associated variables, such as attitude towards workplace–based learning within the industry, wages and conditions, as well as economic imperatives and other factors.

Learners also generally require more time than the standard prescription of four years to be successful in Modern Apprenticeships: those who work and learn in high intensity programmes (for correspondingly shorter periods of time) are less likely to succeed, while those who learn at low volume, over longer periods of time, are the most likely to be successful.

Previous qualification of learner is an important predictor. Low qualified learners, or those with no qualifications, are less likely to be successful than those with Levels 1 to 3 NCEA or equivalent (at that time, equivalents would have been 5th, 6th and 7th Form). The implication is that lesser qualified learners may need more support to complete their apprenticeships than other learners. For learners who perhaps have other options, such as those with 7th Form or equivalent qualifications (university entrance) the implication is that Modern Apprenticeships do not have parity of esteem with university learning.

There seems to be uneven success across different ethnic groups: Māori and Pasifika learners are less likely to complete apprenticeships than European learners. The age of learner also makes a difference: the younger ones do not do as well than the 19 and 20 year olds, while the older-yet learners may not complete their programmes at commensurate rates, but perhaps for different reasons.

There is also a strong coordinator effect – some 'types' of coordinator seem to be more successful than others. Different 'types' may operate under different imperatives and have varying levels of experience in mentoring young people through education programmes. There is also a marked ITO effect. Learners in industries where standards are set by certain ITOs are more likely to be successful than in others. Learners in rural areas are more successful than those in metropolitan areas, perhaps because there is less choice of alternative employment or learning pathway than those in the more highly populated areas.

Other variables, such as National Qualifications Framework (NQF) level, and the gender of the learner, do have an effect, but they are not as strong as the others within the model. Of concern is that females are likely to be less successful than males, and this is not because of the other factors already accounted for.

Future analytical work will focus on predictors of alternative measures of success in Modern Apprenticeships, such as credit and National Qualifications attainment.

2 Introduction

Modern Apprenticeships is a workplace-based learning programme for young people, and it is administered by the Tertiary Education Commission (TEC). It was introduced for the first time in 2000 as a pilot programme, and was rolled out nation-wide throughout 2001. Government was concerned that young learners were not participating in formalised industry training at commensurate rates with adult learners. Prior to the introduction of the Modern Apprenticeships programme in 2000, employers tended to offer structured industry training to older workers who had proved their reliability, rather than following the more traditional pattern of offering time-served apprenticeships to school leavers and young people. However, it was felt that industry training arrangements at the time were not providing sufficient support systems for young people who were engaged in workplace learning.[1]

In order to facilitate further participation by younger people, Modern Apprenticeships is based on the traditional structures of industry training, but incorporates greater support for learners through the function of coordinators. Modern Apprenticeships is targeted at 16 to 21 year olds, with some scope for persons of other ages to enrol (this specification was added later). It is intended that apprenticeships will take approximately four years to complete, and that apprentices will attain a Level 3 or 4 national qualification as a direct outcome.

The main difference between industry training and Modern Apprenticeships is the role of coordinators. As in industry training, TEC funds industry training organisations (ITOs) to make arrangements for Modern Apprenticeships training to take place. ITOs do this by setting standards and through other functions: they do not provide the training themselves.

Coordinators act as intermediaries between employers and learners, arranging for employment opportunities for prospective apprenticeships, and by ensuring that things go smoothly for both parties (more detailed information on the role of coordinators is provided in section 7.3). A variety of organisations have been engaged by TEC to perform the role of coordinator for Modern Apprenticeships. Like formalised industry training, Modern Apprenticeships is administered by industry training organisations (ITOs), and ITOs are also permitted to act as coordinators. Private Training Establishments (PTEs); Tertiary Education Institutions (TEIs) and other types of organisations (such as NGOs; Crown Research Institutes etc) also provide coordinator services. Presently, the majority of Modern Apprentices are coordinated by ITOs.

This paper provides statistical analysis of the Modern Apprenticeships programme by following the progress of cohorts of apprentices. These consist of young people commencing apprenticeships for the first time in 2002 and 2003. As well as describing these cohorts by various demographic, industry and programme factors, it provides observed completion rates after five and six years (due to timing of this analysis, six year completion rates are presently available for the 2003 cohort learners only). Statistical modelling is used to determine which of these factors predict learners' probability of completing their programme within five years of commencement.

There are several ways to measure 'success' in Modern Apprenticeships. This paper uses the 'exit indicator' variable within the data collection as an indication of the outcome of each apprenticeship. This variable indicates the reason for exiting: exits are mainly recorded as either 'completion' or 'termination'. A 'completion' is taken to mean that the coordinator is satisfied that all the learning requirements set out in the training agreement or plan have been attained by the learner, whatever these may be. In this case, the apprenticeship has been successful: its planned outcomes have been met.

[1] Jeffcoat, S & M, 2006. PG. 14.

A ‘termination’ denotes that the learner exits Modern Apprenticeships without having attained the learning requirements set out in their agreement or plan, for whatever reason: for example, the learner may cease their employment within the industry or employer before they have had the opportunity to complete their apprenticeship.

There are other measures that could be used to determine success in Modern Apprenticeships; such as national qualifications and credit attainment: these measures will be the subject of future research into the programme.[2]

3 Data issues

Modern Apprenticeships performance information is contained in two separate datasets: the industry training Performance Management System (PMS) and the Coordinator dataset. These two sources of data are not strictly comparable. Of the two, it is the coordinator dataset that is used for programme reporting. However, this does not contain as many descriptor variables as the ITO’s PMS collection. Where possible, descriptor variables derived from PMS have been assigned to coordinator data through data matching processes. Where variables have been sourced from PMS, (such as ‘Location’) they apply to the final reported activity for each learner in Modern Apprenticeships, on the assumption that they can be applied to the totality of learning. This assumption may not hold in all cases for all learners, but has been applied for simplicity’s sake.

Ministry of Education analysis of industry training data to date has focused on industry training ‘programmes’, necessitated by the limitations of the PMS data collection. While the Coordinator dataset is structured in much the same way, using ‘programmes’ as a base, it is much easier to calculate the total ‘experience’ of Modern Apprentices than it is for industry training learners.[3] This is achieved simply by taking the first start date for each learner as the beginning of learning (‘enrolment’) and following through to the final programme exit date (‘exit’), regardless of various programme changes and administration practices that intervene, as the totality of duration of learning in Modern Apprenticeships.

Some account has been taken of administrative practices in order to determine a true picture from sometimes confusing data. The most important example relates to programme exits. As mentioned, the data collection is based on ‘programmes’ – as discussed in the industry training analysis, learners embark on one or more ‘programmes’ during their time in Modern Apprenticeships. Most learners (86 percent) are only involved in one programme only: this is as intended, however, sometimes a substantive change is made to a programme by the Industry Training Organisation (ITO) while a learner is working through it. When this occurs, some ITOs assign a new programme number, and enrol all learners into the new programme. This may happen more than once for each learner. Sometimes, learners are not ‘withdrawn’ from the original programme; as such, they would appear to have failed the programme (they would be classified as ‘unknown’ in this analysis). To account for this, and other peculiarities, a ‘completion’ rating is applied to a learner if there is a programme completion at any stage of their learning in Modern Apprenticeships.[4]

[2] Qualifications and credit attainment is recorded in the PMS dataset, but not within the coordinator dataset; the main source for this study.
[3] See Mahoney, P 2009 for an in-depth discussion on the limitations of industry training and Modern Apprenticeships data collections.
[4] This correction process was only required to be applied to a small proportion of learners.

4 Methodology

The data examination described in this paper takes two parts: the first provides analysis with associated tables for a cohort of learners in Modern Apprenticeships. These learners commenced Modern Apprenticeships for the first time in 2002 or 2003. Therefore, their progress is tracked to a possible maximum of 6 years for the 2002 starters and a maximum of 5 years for the 2003 starters.

Completion rates are provided for each cohort by a variety of demographic and programme related variables, sourced from both TEC's Modern Apprenticeships Coordinator dataset and, where necessary, TEC's Industry Training Performance Management System (PMS). The tables in the first section identify the number of learners in each cohort and category: the number of 'starters' in each case, providing participation information in an efficient format.

The second section builds on the first, by providing statistical modelling of the factors associated with programme completion. Using logistic regression analysis, the probability of completion of Modern Apprenticeships within five years of first commencement is calculated for each iteration of a number of demographic, and programme related variables. This approach differs from the one used in the first section in several important ways: the first section provides the *observed probabilities* of programme completion for each variable of interest. The statistical modelling section provides the *predicted probability* of completion for significant variables. Predicted probabilities are calculated for each iteration of each variable of interest, while holding all the other variables constant, as an output of logistic regression analysis. This is helpful in that it provides an estimate of the probability of completion for each variable iteration, notwithstanding the combinations of other variables. In effect, the influence of all the other variables on the outcome are stripped away, and the influence of the iteration of the variable of interest can be isolated.

In simpler language, logistic regression analysis enables us to isolate the effects of each variable, such as age, gender, ethnic group, prior education and industry alone to a given outcome: in this case, completion of Modern Apprenticeships. It also enables estimates of the size of the effect of each variable in respect to the contribution of each iteration to the overall outcome to be made, and enables us to rank the relative importance of each variable.

5 Observed probabilities – Demographic and Learner Variables

The following tables show the observed probability of learner completion of Modern Apprenticeships, by variable of interest. The five year completion rate can be calculated for both of the cohorts, however, due to the timing of data collections, six year completion rates are only available for 2002 starters.[5]

5.1 Ethnic Group

Table one shows the overall completion rates for Modern Apprentices, as well as the rates, for each of the varying ethnic groups represented in the coordinator dataset. It shows the number of starters in each cohort year, along with the proportion who have completed their programme after a set period of time. A five year completion rate is available for all cohort start years; as such, it is the only measure that should be used to compare across years.

Nevertheless, it is interesting to examine the differences between starter cohorts in respect to completion rates after more years where this data is available. In particular, the proportion of the cohort that completes in the sixth year - seven percent – is relatively high, implying that a significant proportion of modern apprentices take a significant amount of time to complete. In fact, observations of learners who commenced in 2001 (not otherwise examined in this analysis) show an additional seven percent completing after six years, and an additional two percent completing after seven years.

The overall five-year completion rates for Modern Apprentices in 2002 was 32 percent; and 33 percent of 2003 starters completed within five years. It is noteworthy that an additional seven percent of 2002 starters completed Modern Apprenticeships in their sixth year.

Noticeably, 'European' and 'Other' learners consistently show the highest completion rates across all of the different ethnic groups. 'Māori' and 'Pasifika' learners show lower rates of completion than the average, and 'other' ethnic groups.

Table 1: Modern Apprenticeships Completion rates after 5 and 6 years by Start Year and Ethnic Group

Ethnic Group	2002 starters	5 year (percent)	6 year (percent)		2003 starters	5 year (percent)
European	2,910	34	41		2,949	35
Māori	575	23	27		579	21
Pasifika	70	29	34		63	13
Other	87	41	46		72	35
Not Stated	15	13	13		30	27
Total	**3,657**	**32**	**39**		**3,693**	**33**

5 Seven year completion rates for 2003 learners will be available in 2010; for 2002 starters, seven year completion rates will be available in 2009.

5.2 Gender

Table two shows the completion rates for Modern Apprentices, by gender. In summary, the observed probability of programme completion for males is consistently higher than for females. This margin of difference is approximately ten percentage points on average.

Table 2: Modern Apprenticeships Completion rates after 5 and 6 years by Start Year and Gender

Gender	2002 starters	5 year (percent)	6 year (percent)		2003 starters	5 year (percent)
Male	3,409	33	39		3,329	33
Female	248	23	30		364	25
Total	**3,657**	**32**	**39**		**3,693**	**33**

5.3 Age at Start

Table three shows the completion rates for Modern Apprentices, by their age at first commencement. The vast majority of apprentices are aged 16 to 18 years at commencement, and there are small numbers of learners aged 15 years or younger and 22 years or older.

In summary, the observed probability of programme completion for older learners (18, 19 or 20 years) is consistently higher than for the youngest learners (15 years or less to 17 years). At 21 years, the completion rate approximates to the overall average, while older learners (22 years or older) seemed to do worse than the 18, 19 or 20 year olds.

Table 3: Modern Apprenticeships Completion rates after 5 and 6 years by Start Year and Age of Learner at Start

Age at Start	2002 starters	5 year (percent)	6 year (percent)		2003 starters	5 year (percent)
15 or less	145	21	28		102	30
16 Years	638	31	37		632	29
17 Years	932	31	38		996	32
18 Years	758	34	41		774	35
19 Years	521	36	42		551	34
20 Years	358	35	41		388	36
21 Years	238	30	38		198	33
22 Years or over	67	24	28		52	13
Total	**3,657**	**32**	**39**		**3,693**	**33**

5.4 Location of Employment

Table four shows the completion rates for Modern Apprentices, by location of employment. The data is aggregated to reflect the coverage of the Tertiary Education Commission's (TEC's) regional offices.[6]

There is reasonable regional variation. Unfortunately, location data is not available for all learners – the completion rates are very low for learners whose location is unknown, suggesting a data quality and/or administrative issues.

Comparing five year completion rates within cohorts between regions, there are some clear consistencies. For example, for learners in the 2002 starter cohort working in the Auckland regions are most likely to complete. For 2003 starters, learners in the Nelson/Marlborough/West Coast region have the highest ranking, while the larger metropolitan regions have dropped in relative ranking.

Table 4: Modern Apprenticeships Completion rates after 5 and 6 years by Start Year and Final Location of Employment

Location	2002 starters	5 year (percent)	6 year (percent)		2003 starters	5 year (percent)
Auckland	826	36	45		954	31
Bay of Plenty	307	34	40		363	30
Canterbury	353	32	37		418	33
Central	362	33	38		310	33
Eastern Coast	240	37	43		253	28
Nelson/Marlborough/West Coast	207	35	41		241	43
Northland	274	35	39		241	40
Southern	349	28	41		330	35
Waikato	377	32	36		346	30
Wellington	212	29	31		212	29
Unknown	150	5	5		25	8
Total	**3,657**	**32**	**39**		**3,693**	**33**

5.5 Previous Highest Qualification

Table five shows the completion rates for Modern Apprentices, by previous highest qualification. This data is derived from the Industry Training PMS dataset: it is a self-reported variable, which is not verified by the New Zealand Qualifications Authority. For both cohorts, five year completion rates tend to increase with the 'level' of previous qualification.

The observed probability of completion within five years seems to peak with learners who have gained 6th form schooling or equivalent, and sub degree-level qualifications (certificates and diplomas). Learners with no previous qualifications (or learners who have not divulged their previous qualifications) are consistently the least likely to complete their Modern Apprenticeship.

[6] This variables reflects TEC's regional office coverage before the recent restructure of TEC's administrative functions.

Table 5: Modern Apprenticeships Completion rates after 5 and 6 years by Start Year and Previous Highest Qualification

Previous Highest Qualification	2002 starters	5 year (percent)	6 year (percent)		2003 starters	5 year (percent)
No previous qualifications	513	19	27		615	26
5th Form or Equiv	1,033	34	41		924	30
6th Form or Equiv	630	41	48		708	43
7th Form or Equiv	248	29	42		254	39
Sub Degree	319	45	51		223	43
Degree	17	35	41		10	40
Not known	897	27	31		959	29
Total	**3,657**	**32**	**39**		**3,693**	**33**

6 Observed Probabilities – Programme Factors

6.1 NQF Level

Table six shows the completion rates for learners by the NQF level of their final programme (for the majority, their final programme will be their only programme: in 86 percent of cases, learners are involved in just one programme in Modern Apprenticeships). Each programme is pitched at just one NQF level: most Modern Apprenticeships programmes are pitched at levels 3 and 4 on the National Qualifications Framework. In a few cases, where there is more than one programme per learner, the final programme level may be lower than preceding programme(s).

Table six shows a higher probability of completion for level 3 programmes for the 2002 cohort, and correspondingly, completion is on average observed less for learners at level 4. This trend is reversed in 2003. The reasons for the change are unclear: there could be developmental effects at work.

Table 6: Modern Apprenticeships Completion rates after 5 and 6 years by Start Year and National Qualifications Framework Level

NQF Level	2002 starters	5 year (percent)	6 year (percent)		2003 starters	5 year (percent)
Level 2	3	0	0		1	0
Level 3	317	35	42		502	25
Level 4	3,337	32	38		3,190	34
Total	**3,657**	**32**	**39**		**3,693**	**33**

6.2 Volume (STMs)

Table seven shows the completion rates for learners by the volume of learning for their final programme. Standard Training Measures (STMs) are a unit of measure of volume of industry training learning, to a standard of 120 credits per year. STMs are used as the basis of funding industry training programmes, including Modern Apprenticeships. For example, an STM of 0.5 would indicate the learner studying at a rate of 60 credits per year, while an STM of 1 indicates a rate of 120 credits per year. As Modern Apprenticeships occur within the workplace, around learners' work commitments,

lower STM rates are the norm. As the number of unit standards per year in a programme increases, the STM rate increases; so it is a measure of study load for the learner.

Table seven shows a consistent trend of peak of observed likelihood of completion at 0.6 to 0.8 STMs. Learners with higher; or lower STM rates tend to be less likely to complete their programme.

Table 7: Modern Apprenticeships Completion rates after 5 and 6 years by Start Year and Standard Training Measure of programme

STMs	2002 Starters	5 years (percent)	6 years (percent)		2003 starters	5 years (percent)
0.3 or less	478	28	38		340	33
0.4	463	25	29		605	25
0.5	611	34	40		540	37
0.6	1,122	32	40		1,046	38
0.7	252	38	46		331	39
0.8	475	43	47		414	37
0.9 - 1.0	152	29	32		190	24
1.1 or higher	104	13	17		227	8
Total	**3,657**	**32**	**39**		**3,693**	**33**

7 Observed Probabilities – Industry, ITO and Coordinator Factors

7.1 Industry

The Coordinator dataset contains an 'industry' variable. The TEC has used this variable for reporting purposes: reporting numbers of learners by 'industry' in Modern Apprenticeships at various intervals.

Table eight shows the completion rates for learners by Modern Apprenticeship industry. There appears to be a reasonably wide variance between industries.[7] Industries with smaller numbers of learners are likely to show more volatility in probability of completion. Learners in the 'Joinery'; 'Painting and Decorating', and the 'Electrotechnology' industries consistently show observed probability of completion of over 50 percent across the starting cohorts.

These categories were collapsed down into nine, for statistical modelling purposes, by grouping each industry into the highest level of the Australian and New Zealand Standard Industry Classification (ANZSIC 2006).[8] Table nine shows the completion rates for learners by Modern Apprenticeship ANZSIC industry.

[7] This probably reflects the different characteristics and practices in different industries. For instance, agriculture, an industry with few regulated occupations has a low completion rate, compared with engineering and electrotechnology, both covering more regulated industries, where rates are above the average for the scheme as a whole.

[8] This variable is further discussed within the statistical modelling section.

Table 8: Modern Apprenticeships Completion rates after 5 and 6 years by Start Year and Industry

Industry	2002 starters	5 year (percent)	6 year (percent)		2003 starters	5 year (percent)
Aeronautical Engineering	11	73	82		19	42
Agriculture	489	15	20		536	19
Aluminium Joinery (architectural)	10	90	90			
Baking	102	30	32		107	43
Boat building	150	26	30		114	29
Building and construction	458	25	35		693	28
Contracting	103	10	22		99	9
Dairy Manufacturing					2	0
Electricity supply	87	33	41		94	45
Electrotechnology	193	54	61		185	55
Engineering	484	44	51		423	42
Flooring	154	49	51		104	40
Food Processing	3	67	100		4	0
Forest industries	257	16	25		187	25
Furniture	77	34	34		28	36
Horticulture	200	10	14		186	12
Hospitality	63	38	43		142	42
Joinery	52	71	75		74	58
Motor Engineering	546	43	51		363	43
Painting and Decorating	46	46	48		47	53
Plastics	11	9	9		19	26
Plumbing					30	17
Printing	45	56	64		43	58
Public Sector	30	30	40		10	10
Retail	7	0	0		76	13
Road Transport	17	35	35		17	59
Seafood	15	7	33		9	11
Sports Turf	37	38	43		34	65
Telecommunications	2	100	100			
Tourism	8	13	13		48	10
Total	**3,657**	**32**	**39**		**3,693**	**33**

Table 9: Modern Apprenticeships Completion rates after 5 and 6 years by Start Year and Industry (ANZSIC 2006)

ANZSIC Industry	2002 starters	5 year (percent)	6 year (percent)		2003 starters	5 year (percent)
Accommodation and Food Services	63	38	43		142	42
Administrative and Support Services	8	13	13		48	10
Agriculture Forestry and Fishing	998	9	21		952	21
Construction	823	32	40		1,047	30
Electricity, Gas, Water and Waste Services	87	33	41		94	45
Manufacturing	581	39	44		502	44
Other	26	31	31		93	2
Professional, Scientific and Technical Services	1,041	44	51		805	42
Public Administration and Safety	30	30	40		10	10
Total	**3,657**				**3,693**	

7.2 Industry Training Organisations

Industry Training Organisations (ITOs) are responsible for administering industry training and Modern Apprenticeships. ITOs:

- set national skill standards for their industry
- provide information and advice to trainees and their employers
- develop appropriate education and training arrangements for their industry
- arrange training that is appropriate for their industry
- arrange for the assessment of trainees
- monitor education and training quality
- provide leadership on behalf of industry on skill and training needs.[9]

Most ITOs provide training in one main industry, but there are some that cover several industries. Table ten shows the industries that appear against each ITO in the Modern Apprenticeships Coordinator dataset.

Some industries are represented across more than one ITO, and some ITOs arrange Modern Apprenticeships in more than one industry (see Table ten).

Table eleven shows the completion rates for learners by Modern Apprenticeship Industry Training Organisation (ITO). As with industries, there appears to be a reasonably wide variance between ITOs. In most cases, there is consistency in completion rates across the starting year cohorts. ITOs with smaller numbers of learners are likely to show more volatility in probability of completion (the law of small numbers again).

The 'Joinery'; 'Printing and Allied Industries', and the 'Electrotechnology' ITOs consistently show observed probability of completion of over 50 percent across the starting cohorts.

[9] Source: Industry Training Federation Website. http://www.itf.org.nz/what-is-industry-training.html

Table 10: Modern Apprenticeships Industries by Industry Training Organisation

ITO	Modern Apprenticeship industries
Agriculture Industry Training Organisation Incorporated	Agriculture Horticulture
Aviation, Tourism and Travel Training Organisation Incorporated	Aeronautical engineering Tourism
Boating Industries Association of New Zealand Incorporated	Boat building
Building & Construction Industry Training Organisation Incorporated	Building & construction Joinery Painting & decorating
Electricity Supply Industry Training Organisation Incorporated	Electricity supply Electrotechnology
Electrotechnology Industry Training Organisation Incorporated	Dairy manufacturing Electrotechnology Painting & decorating Telecommunications
Forest Industry Training and Education Council of New Zealand Incorporated	Forest industries Furniture
Hospitality Standards Institute	Hospitality
InfraTrain New Zealand Limited	Contracting
Joinery Industry Training Organisation Incorporated	Aluminium joinery Building & construction Joinery
Master Plumbers, Gasfitters & Drainlayers New Zealand Incorporated	Building & construction Painting & decorating Plumbing Printing
NZ Motor Industry Training Organisation Incorporated	Motor engineering
New Zealand Association of Hairdressers Incorporated	Hairdressing
New Zealand Engineering, Food and Manufacturing Industry Training Organisation Incorporated (COMPETENZ)	Aluminium joinery Baking Building & construction Dairy manufacturing Electrotechnology Engineering Food processing Motor engineering Plastics
New Zealand Extractive Industries Training Organisation Incorporated	Extractives
New Zealand Flooring Industry Training Organisation Incorporated	Flooring
New Zealand Furniture Industry Training Organisation Incorporated	Furniture Plumbing
New Zealand Horticulture Industry Training Organisation Incorporated	Horticulture
New Zealand Industry Training Organisation Incorporated	Building & construction Dairy manufacturing
New Zealand Painting Contractors Association of Employers Industry Training Organisation Incorporated	Building & construction Painting & decorating Plumbing
New Zealand Seafood Industry Council Limited	Seafood
New Zealand Sports Turf Industry Training Organisation Incorporated	Sports turf
Plastics and Materials Processing Industry Training Organisation	Plastics
Printing and Allied Industries Training Council Incorporated	Electrotechnology Printing
Public Sector Training Organisation	Public sector
Retail Training New Zealand Incorporated	Retail
Tranzqual Industry Training Organisation	Building & construction Road transport

Table 11: Modern Apprenticeships Completion rates after 5 and 6 years by Start Year and Industry Training Organisation

Industry Training Organisation		2002 starters	5 year (percent)	6 year (percent)		2003 starters	5 year (percent)
Agriculture ITO		489	15	20		536	19
Aviation, Tourism and Travel		19	47	53		67	19
Boating industries		150	26	30		114	29
Building and Construction		462	24	35		694	28
Electricity Supply		87	33	41		94	45
Electrotechnology		195	55	62		185	55
Forest Industry		257	16	25		187	25
Hospitality		63	38	43		142	42
Infratrain		103	10	22		99	9
Joinery		49	76	80		73	59
Master Plumbers, Gasfitters and Drainlayers		0				30	17
COMPETENZ		599	43	49		534	42
Flooring		154	49	51		104	40
Furniture		77	34	34		28	36
Horticulture		200	10	14		186	12
NZ Industry Training		0				2	0
Painting Contractors		45	47	49		47	53
Seafood		15	7	33		9	11
Sports Turf		37	38	43		34	65
Motor		546	43	51		363	43
Plastics and Material Processing		11	9	9		19	26
Printing and Allied Industries		45	56	64		43	58
Public Sector		30	30	40		10	10
Retail Training		7	0	0		76	13
TRANZQUAL		17	35	35		17	59
Total		**3,657**	**32**	**39**		**3,693**	**33**

7.3 Coordinator Type

There are several types of organisations that can act as Modern Apprenticeship coordinators. ITOs coordinate for the large majority of apprentices, with Private Training Establishments (PTEs) also providing coordination services for a significant number. Table twelve shows the completion rates for learners by the type of coordinator. Coordinators are grouped into four categories: 'ITOs', 'Private Training Establishments' (PTEs)' 'Tertiary Education Institutions' (TEIs) and 'Others', reflecting their ownership.

At first glance there seems to be consistency across the cohorts on the average probability of completion for learners by each coordinator type. Learners whose coordinators are 'PTEs' complete at consistently higher than average rates across the cohorts while learners coordinated by 'ITOs' have consistently lower than average completion rates. Why this should be is a matter for further research.

Table 12: Modern Apprenticeships Completion rates after 5 and 6 years by Start Year and Coordinator Type

Coordinator Type	2002 starters	5 year (percent)	6 year (percent)		2003 starters	5 year (percent)
ITOs	2,002	25	32		2,153	26
PTEs	916	42	49		854	40
TEIs	386	39	45		366	39
Others	353	36	41		320	47
Total	**3,657**	**32**	**39**		**3,693**	**33**

8 Observed Probabilities – Field of Study

8.1 Field of Study

Table thirteen shows the completion rates by field of study of the learner's final programme. This data is derived from the National Qualifications Framework, matching programme identity to New Zealand Qualifications Authority qualification identity, grouped using the New Zealand Standard Classification for Education (NZSCED). Not all NZSCED categories apply to Modern Apprenticeships: only the applicable categories are represented.

There is reasonable consistency across the cohorts for each category. For example, learners in programmes coded NZSCED 'Engineering and Related Technologies' complete their programmes consistently above the average; while 'Agriculture, Environmental and Related Studies' learners consistently achieve below the average.

Table 13: Modern Apprenticeships Completion rates after 5 and 6 years by Start Year and Field of Study

Field of Study	2002 starters	5 year (percent)	6 year (percent)		2003 starters	5 year (percent)
Agriculture, Environmental and Related Studies	992	16	21		937	20
Architecture and Building	653	32	39		871	31
Creative Arts	5	60	60		4	25
Engineering and Related Technologies	1,772	40	47		1,467	42
Food, Hospitality and Personal services	63	38	43		142	42
Management and Commerce	95	31	39		140	22
Total	**3,657**	**32**	**39**		**3,693**	**33**

8.2 Duration of Learning

Table fourteen shows the completion rates for learners by their total duration (in months) in Modern Apprenticeships. The majority of starters in each cohort (81 percent in 2002 and 84 percent for 2003 starters) spend 48 months or less in Modern Apprenticeships.

In both cohorts, learners exiting Modern Apprenticeships after 36 months or less are more likely to terminate their apprenticeship than complete it (46 percent and 44 percent completed, respectively). By contrast, if learners persist beyond three years, there is a high probability of completion – two thirds of those who remain an apprentice fro between three and five years end up completing.

Between four and ten percent of learners are still active by 2007: four percent of learners who commenced in 2002 were still active by the end of 2007, while ten percent of 2003 starters were still active at this point. This difference is expected as the cohort window for the 2003 is one year narrower for them than for 2002 learners – there is no opportunity for learners to be captured in the '61 or more months' category for the 2003 cohort because this amount of time could not have elapsed by the final cut-off point of data (December 31, 2007).

Nevertheless, comparison of the shorter duration categories between the two cohorts is a valuable exercise. It shows that small numbers of learners stay in apprenticeships for longer than five years, and that an additional seven percent of the total cohort exit with a completion. If the 2003 cohort is comparable to the 2002 cohort in this respect, it would mean that approximately forty percent of the 2003 cohort would have completed their programme within six years.

Table 14: Modern Apprenticeships Completion rates after 5 and 6 years by Start Year and Total Duration (2002 and 2003 starters)

Total duration	2002 Starts	% of total	Cumulative (%)	Num Completed	Exits Compl. (%)	5 year compl. Rate (%)	5 year accumulation (%)	6 year compl. Rate (%)	6 year accumulation (%)
0 to 12 months	592	16	16	16	3	6	0	6	0
13 to 24 months	712	19	36	86	12	12	3	12	3
25 to 36 months	757	21	56	351	46	46	12	46	12
37 to 48 months	907	25	81	606	67	66	29	67	29
49 to 60 months	488	13	95	306	63	25	32	63	37
61 or more months	71	2	96	49	69	0		69	39
Still active	130	4	100						
Total	**3,657**	**100**		**1,414**	**39**	**32**		**39**	

Total duration	2003 Starts	% of total	Cumulative (%)	Number Completed	Exits Compl. (%)	5 year compl. Rate (%)	5 year accumulation (%)
0 to 12 months	705	19	19	8	1	1	0.2
13 to 24 months	685	19	38	90	13	13	2.7
25 to 36 months	789	21	59	347	44	44	12
37 to 48 months	925	25	84	604	65	65	28
49 to 60 months	234	6	90	156	67	67	33
61 or more months	0	0	90	0	0	0	
Still active	355	10	100				
Total	**3,693**	**100**		**1,205**	**33**	**33**	

9 Statistical Modelling – modelling completion

The cohorts were subjected to statistical modelling to determine the strength of each variable in predicting the probability of completion of Modern Apprenticeships within five years of starting. All final exits within five years were entered into the model, from both starting cohorts. It is acknowledged that this approach does not capture the full essence of the 2002 and 2003 cohorts, since members of each cohort have only a maximum of 5 years of activity (Table 14 above shows a seven percent sixth year effect). However; given the size of the dataset, this approach is a practical way of analysing the results.

The dependent variable was the probability of programme completion after 5 years (within a period of 60 months or less), as discussed in prior sections. Independent (or predictor) variables were sourced from those already examined.

A backwards selection criteria was used for entering variables into the model to eliminate the possibility of collinearity between variables. Some variables were highly correlated with each other in their raw forms: for example, 'industry' and 'Industry Training Organisation' and 'Field of Study'. Where this was identified, different models were tested to see which best captured the widest possible variation while avoiding correlation bias.

The logistic regression model explained about 12 percent of the variability in the dependent variable – the probability of the individuals 'completing' Modern Apprenticeships within five years. This is a reasonable level in education programme modelling, where factors outside the reach of administrative datasets such as cognitive ability, motivation and family background are also likely to be highly influential.

The key findings from this study are that completion of Modern Apprenticeships is influenced by the following variables (among others), shown in order of importance:

- industry of employment
- volume of learning
- previous qualification of learner
- learners' ethnic group
- location of employment
- the type of coordinator
- learners' age
- the size of the ITO administering the apprenticeship
- number of programme enrolments (proxy for programme and administrative changes)
- National Qualifications Framework level
- gender of learner
- year of start

The contribution of each variable in the context of the others within the model is discussed in each of the sections below. The figures illustrate the relationships between each sub-category in each variable with respect to the predicted probability of completion. The 'predicted probability of completion', referred to in the following sections is a different measure to the 'observed probability of completion' referred to in the first section of this paper. The 'predicted probability' is calculated for each sub-category of each variable: it shows how important each of the sub-categories is *alone* with respect to predicting completion (the effects of all other variables are stripped away). It is calculated using the observed probabilities of combinations of variables; and as such, is the aggregated combination of these different 'predicted probabilities'.

'Odds ratios' are also calculated for each sub-category. Simply, odds ratios show the likelihood of completion for one value of each sub-category, over another (referred to as the reference category). It is also possible to show whether each sub-category differs statistically from the reference category. Five percent and ten percent difference thresholds are illustrated, however, the threshold for difference for the model (for backwards elimination purposes) was set at five percent.

9.1 Industry Classification

Logistic regression tends to work better with smaller rather than larger groupings of variables. When there are heterogeneous categories of variable size, (where some levels of variables are much smaller than others), there can be problems with the stability of the model. The industry variable was problematic in its raw state due to the small size of the population of some of the categories compared to others. To eliminate this problem, the industry variable was aggregated using the Australia New Zealand Standard Industry Classification (ANZSIC) 2006. This reduced the 'industry' variable down from 30 possible iterations to just nine (see appendix for mapping of industries).

It was hoped that by aggregating the industry variable into ANZSIC categories, the variability due to each industry could also be isolated from provider effects, such as those attributable to each ITO. As discussed earlier, it is not possible to incorporate both industry and ITO into the model because of the high correlation between these two variables. Therefore, we sought to group the ITOs by size. A number of alternative ITO groupings, such as by quartile of number of learners in industry training for each ITO, were tried in the model to account for any provider effects (see the relevant sections below for more details on the 'ITO Rank' variable).

The most important variable for predicting the likelihood of completion was the ANZSIC industry variable: it has the most predictive power of all the variables entered into the model. This means that, according to this model, whether or not a learner completes their programme is mainly determined by their choice of industry. This effect can be attributed to the differences between industries in relation to: economic imperatives; attitudes towards workplace learning; and employment practices within industries including pay and conditions typical for young employees. It may also be due to learners' attitudes towards occupations represented in industries; and their view of their longer-term prospects within it. Differing attitudes towards credentialisation and completion, as well as regulation of entry into professions will also undoubtedly play a part.

Figure one shows the predicted probability of completion in ANZSIC categories, showing a large variance in predicted probability of completion for learners between industries. Learners in the 'Agriculture Forestry and Fishing' and the 'Administrative Support Services' industry categories have 20 percent or less predicted probability of completion, while at the other end of the spectrum, the predicted probability of completion for learners in 'Construction'; and 'Public Administration and Safety' category industries is approximately 40 percent. The differences are obviously complex and are an area for further study. It is obvious, however, that employers in different industries place different demands on their apprentices, reflecting employment requirements.

Figure 1: Predicted Probability of Modern Apprenticeships Completion rates by ANZSIC Industry

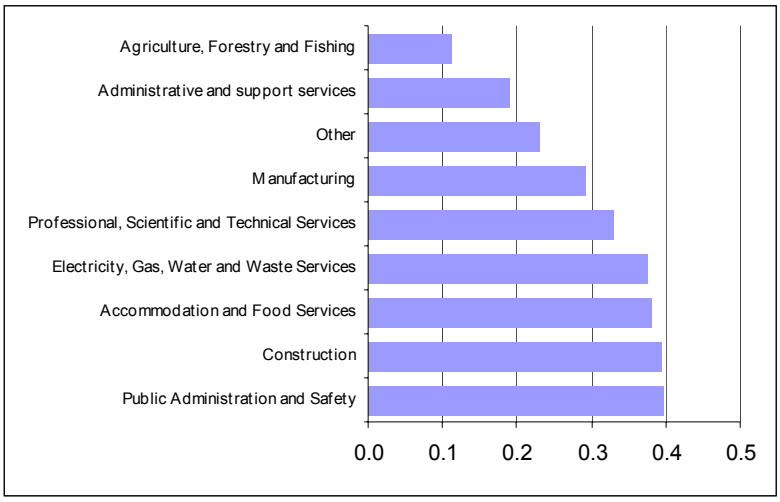
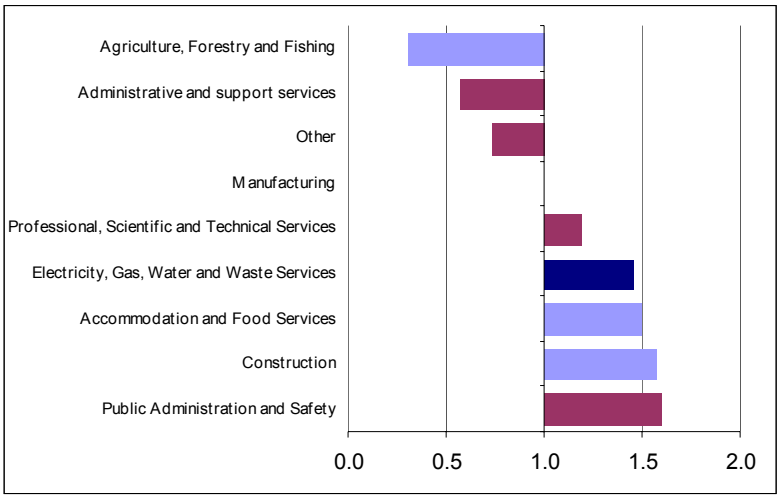


Figure two shows the odds ratio of completion for each ANZSIC category in respect to the reference category ('Manufacturing'). Learners in 'Agriculture, Forestry and Fishing' industries were statistically significantly less likely than 'Manufacturing' learners to complete their programmes.[10]

Learners in the 'Accommodation and Food Services', and 'Construction' industries were one and a half times as likely (or more) than those in 'Manufacturing' to complete their programme ('Public Administration and Safety' may appear to have a higher odds ratio but did not reach the threshold for statistical significance).

Figure 2: Odds Ratio of Completion by ANZSIC Industry (vs. Manufacturing)



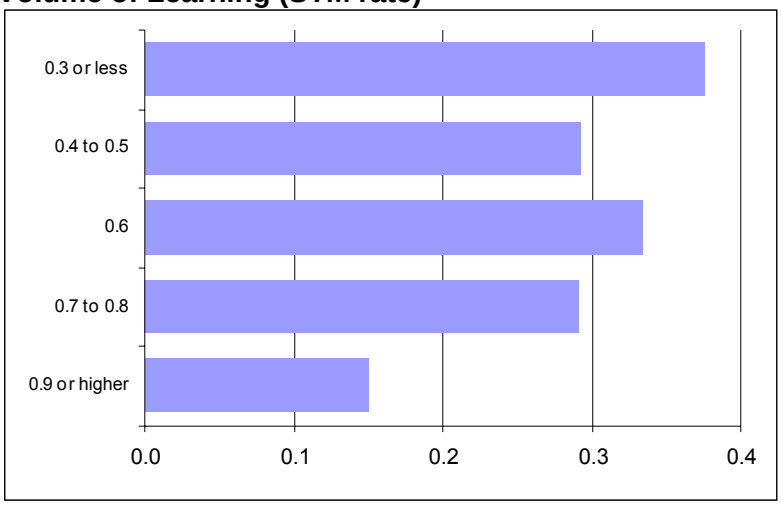
Note: Light blue indicates statistical significance at the 5 percent level . Dark blue indicates significance at the10 percent level. Red indicates non-significance.

[10] Statistical significance means that, in the context of the model, we can be fairly confident that any differences that we see between groups and the reference category are not due to the sampling or the model design. Where significance is not reached, it means that we cannot be confident of this.

9.2 Volume (STMs)

Figure three shows the predicted probability of completion by volume of learning categories. The generally discernable trend is that learners studying in the lower volume categories are more likely to complete their programmes than those in the higher volume categories. Figure 4 (below) shows the relationship between volume and probability of completion expressed as odds ratios against a reference category.

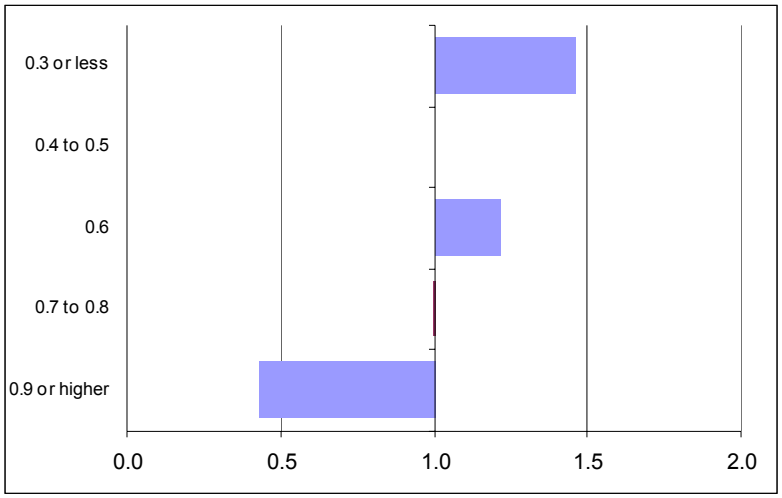
Figure 3: Predicted Probability of Modern Apprenticeships Completion rates by Volume of Learning (STM rate)



The odds ratio of completion for learners learning at 0.3 or less STMs are just under 1.5 times those at 0.4 to 0.5 while those at 0.6 STMs were about 1.2 times as likely to complete.

Those learners studying at 0.9 STMs were significantly less likely to complete: with an odds ratio of less than 0.5 (these learners were less than half as many times as likely to complete their programme as learners in the reference category).

Figure 4: Odds Ratio of Completion by Volume category (vs. 0.4 to 0.5 category)



Note: Light blue indicates statistical significance at the 5 percent level . Dark blue indicates significance at the 10 percent level. Red indicates non-significance.

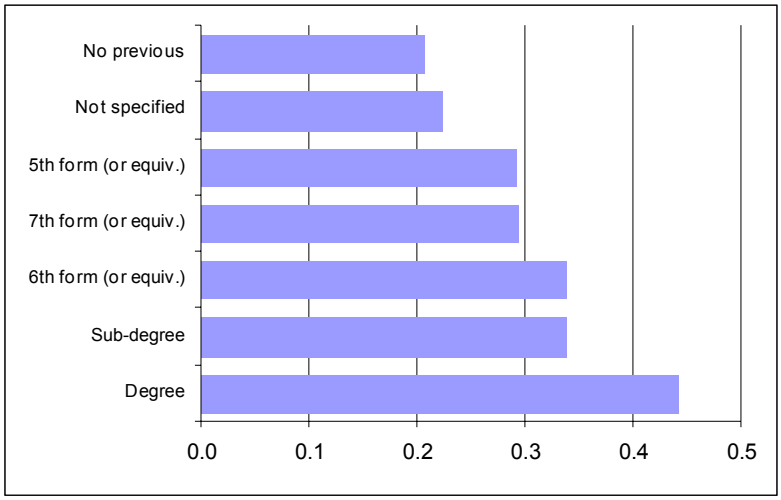
9.3 Previous Qualification

The 'Previous Qualification' variable; the third most powerful variable in the model, categorises the learner on first entrance into Modern Apprenticeships. As discussed, this variable is reported to ITOs directly by each learner, and is not based on a systematic examination of learner academic records.

Figure five shows the predicted probability of completion by previous qualification. The generally discernable trend is that learners with 'no previous' qualifications are the least likely to complete their Modern Apprenticeship, followed by those who did 'not specify' their previous qualification.

Learners with 'fifth form or equivalent' and 'seventh form or equivalent' are as equally likely to complete; while learners with 'sixth form' or below-degree qualifications are equally more likely to complete. Finally, learners with prior 'degrees' are the most likely to complete. Figure 6 shows the categories which differ significantly from the reference category ('5th Form or Equivalent').

Figure 5: Predicted Probability of Modern Apprenticeships Completion rates by Previous Qualification



The odds ratio of completion for learners with '6th Form or equivalent' and those who indicated they have qualifications at 'sub-degree' level are over 1.2 times as likely to complete their programme as those with '5th Form or Equivalent' qualifications. Learners with 'degrees' were almost twice as likely to complete; however, this variable did not reach the threshold for statistical significance.[11]

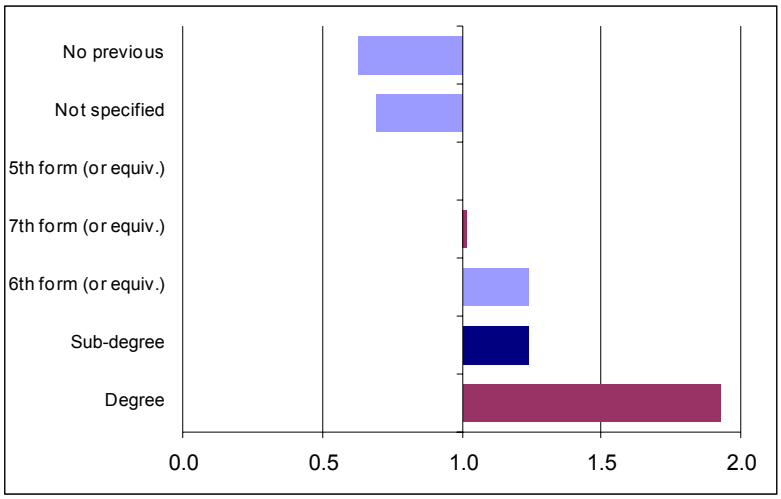
It is of interest that those who have '7th Form or Equivalent' are not significantly different from those with '5th Form or Equivalent' at completing Modern Apprenticeships, while those with '6th Form or equivalent' are more likely to. It may be that learners with '7th Form' qualifications are less likely to persevere with their Modern Apprenticeships until completion because they may subsequently decide that an apprenticeship is not their preferred pathway: they may decide to go on to university instead, as they have the prerequisite qualification ('7th Form' denotes 'University Entrance' standard has been attained) or to study towards some other post-school qualification pathway instead.[12]

11 lack of significance for learners with prior degrees is likely to be a reflection of the relatively smaller number of apprentices in this category compared to the others, affecting standard deviations.

12 NZQA currently defines the criteria for attaining University Entrance as :
- a minimum of 42 credits at level 3 or higher on the National Qualifications Framework, including a minimum of 14 credits at level 3 or higher in each of two subjects from the "approved subject" list, with a further 14 credits at level 3 or higher taken from one or two additional domains on the National Qualifications Framework or approved subjects; (cont. next page)

It is tempting to attribute the success of learners with 'degrees' to the likelihood that they are more experienced at acquiring skills and passing courses than the other groups, or are more intrinsically 'capable' of acquiring skills. Although those who already have degrees at the commencement of their apprenticeship are likely to be older than the other groups, the model suggests that these differences are not a product of the learner's age, as the effects of learner age are accounted for through the 'age' variable, which is modelled separately.

Figure 6: Odds Ratio of Completion by Previous Qualification (vs. 5th Form or Equivalent category)



Note: Light blue indicates statistical significance at the 5 percent level. Dark blue denotes significance at the 10 percent level. Red indicates non-significance.

9.4 Ethnic Group

The modelling showed that the ethnic group of the learner was the fourth most important factor associated with success as measured by completion in Modern Apprenticeships. This variable may embody a number of internal and external factors correlating highly with ethnic group.

Figure 7 shows the predicted probability of completion by Ethnic Group of learner. The generally discernable trend is that Māori and Pasifika learners are less likely to complete Modern Apprenticeships than learners who report that they are 'European / Pakeha' or 'Other' ethnic groups.

- a minimum of 14 numeracy credits at level 1 or higher in Mathematics or Pangarau on the National Qualifications Framework
- a minimum of 8 literacy credits at level 2 or higher in English or Te Reo Māori; 4 credits must be in reading and 4 credits must be in writing. The literacy credits will be selected from a schedule of approved achievement standards and unit standards.

Figure 7: Predicted Probability of Modern Apprenticeships Completion rates by Ethnic Group

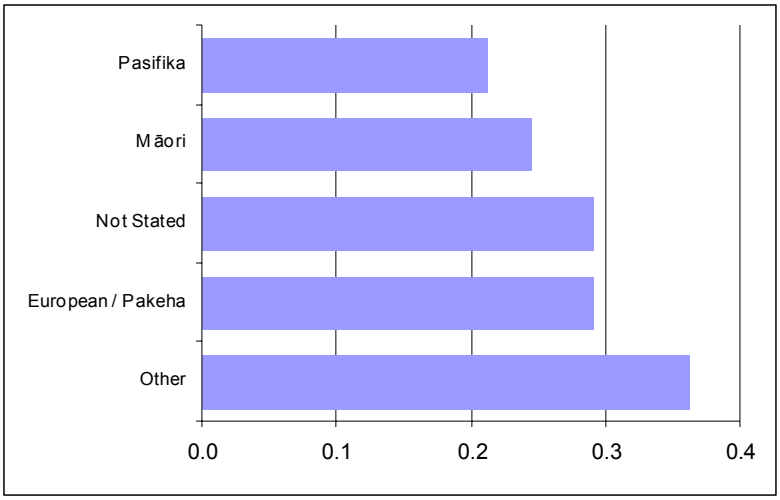
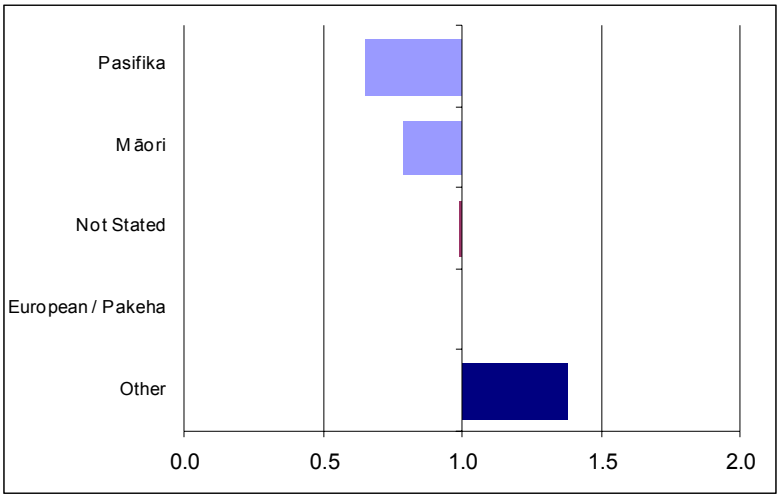


Figure 8 shows the odds ratio of completion for Māori and Pasifika learners is 0.79 and 0.65 that of 'European' learners respectively. 'Not stated' learners do not differ from European learners, suggesting that probably a majority of them could classify with the former group. 'Other' learners were more likely than 'European' learners to complete: about 1.3 times as likely.

Figure 8: Odds Ratio of Completion by Ethnic Group (vs. 'European / Pakeha' category)



Note: Light blue indicates statistical significance at the 5 percent level. Dark blue denotes significance at the 10 percent level. Red indicates non-significance.

9.5 Interaction Effect: Coordinator Type and Coordinator Rank.

The 'Coordinator Type' variable categorises the coordinator by their ownership affiliation. There are four possible values: Private Training Establishment ('PTE'), 'ITO', Tertiary Education Institution ('TEI' – such as Polytechnics or other ITPs) and 'Other'. 'Other' coordinators are a collection of organisation types that do not fit into the other categories, such as non-profit organisations; Crown Research Institutes, Community Trusts, etc.

As discussed, coordinators are the main point of difference between industry training and Modern Apprenticeships. Under section 15 of the Modern Apprenticeships Training Act 2000, Coordinators have the following functions:

- to promote apprenticeship training generally
- to identify potential apprentices, and persons who could offer apprenticeship training to current employees, new employees, or apprentices employed by the coordinator
- to arrange for potential apprentices' training or employment intended to lead to apprenticeship training for them
- to help people enter into apprenticeship training agreements
- if the coordinator employs or is to employ apprentices, to arrange for apprenticeship training to be provided to the apprentices by or on behalf of those persons, on terms and conditions that are mutually acceptable to the coordinator and those persons.

Additional functions of coordinators include:

- to produce and facilitate the implementation of individual training plans under and consistent with an apprentice's apprenticeship training agreement
- to take all reasonable practicable steps to ensure that there are in place, and operate effectively, systems to monitor apprenticeship training so as to ensure that it leads to apprentices attaining within a time that is reasonable in all the circumstances that level of skills necessary to have completed or become competent to complete a national qualification in the skills of the industry or industries concerned.
- to ensure, so far as is reasonably practicable, that apprenticeship training, and every apprenticeship training agreement, is consistent with the approved code of practice
- to support apprentices not employed by the coordinator by giving them advice and by helping them to resolve their problems in their apprenticeship training as those problems arise (including, if necessary, trying to arrange for an apprentice to complete his or her apprenticeship training with some other employer).

For modelling purposes, coordinators were also ranked by quartiles according to the number of Modern Apprentices they each 'look after'. A '1' denotes that a coordinator is categorised in the first quartile (first 25 percent of share of learners) – these are the coordinators with the smallest number of coordination contracts. A '4' denotes the fourth quartile, or those coordinators in the top seventy-fifth percentile: the coordinators who are coordinating the largest number of learners.

This variable tests which is better: coordinators with many, or few coordination contracts? It attempts to capture any 'economy of scale' and 'experience' effects, separate from any due to 'type of organisation' which can be attributed to organisational 'sector working style', 'sector philosophy' and associated 'sector effectiveness'.

Modern Apprenticeship coordinator is a new role: it is likely that the organisations that tender to take on larger numbers of apprentices already have (or believe they have) the capacity to do so, based on their experience and knowledge of apprenticeship-type learning, and/or mentoring young persons. This assumption may or may not be correct. Organisations that offer coordinator services to larger numbers of learners may also have greater economies of scale than organisations that take on smaller numbers of learners, and may therefore be better supported to coordinate effectively.

On the other hand, organisations with smaller numbers of coordination contracts may be more effective than those with larger numbers of learners. They may deliberately tender for fewer coordination contracts so that they can offer more intensive coordination services to their learners.

These variables were originally modelled separately to determine if there was a coordinator type and size effect. Both were significant on their own; however, there is a clear interaction between 'size' and 'type'; which explains more variance than either variable alone in the model.

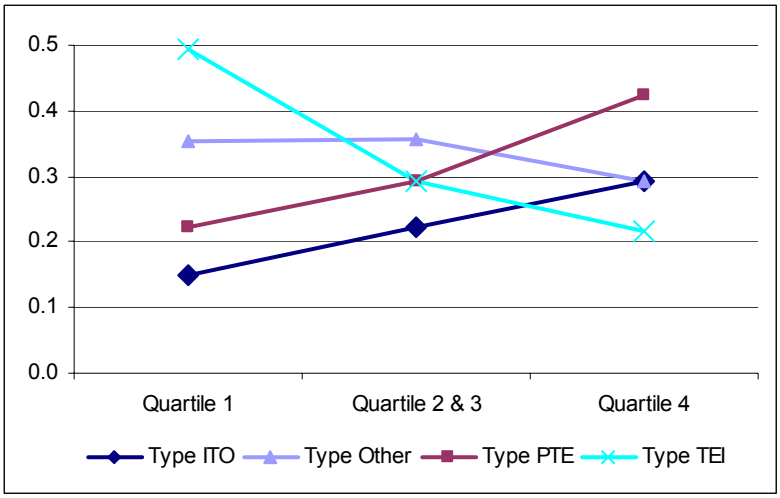
Figure 9 shows that, for coordinators with small numbers of apprentices, TEIs are the most effective, with completion rates at close to fifty percent, while ITOs are the least successful at this level. In the fourth quartile of numbers of learners per organisation, PTEs are the most successful, while TEIs are the least successful.

Because the coordinators in the fourth quartile work with the great majority of learners, these coordinators have the greatest effect on the model. When we model coordinator type variable alone, the effects of the coordinator type variable alone are roughly similar to the quartile '4' results.

Similarly, when the 'Coordinator Rank' variable is entered without interaction, there is a general effect that coordinators with smaller numbers of apprentices are more successful than those in higher quartiles. This seems to indicate that coordinating smaller numbers of learners is more likely to be associated with success, and that any advantage that coordination providers think they have in terms of economies of scale are not really evident.

The interaction shows that, of course, this differs by coordinator type. For ITOs and PTEs, having smaller number of learners to coordinate is not associated with success as much as having higher numbers of learners to coordinate. For TEIs, on the other hand, having smaller numbers of learners to coordinate seems to be more associated with success than if larger numbers of coordination contracts are in place: where the finite resource perhaps becomes over-stretched.

Figure 9: Predicted Probability of Modern Apprenticeships Completion rates by Coordinator Type and Coordinator Quartile (size)



9.6 Location of Employment

The statistical model indicates that the location of employment of the learner is the fifth most important factor associated with success as measured by completion in Modern Apprenticeships. This finding is consistent with other studies that have found differences in the completion rates of workplace-based training programmes between metropolitan and less densely populated areas. [13]

[13] Discussed further in Mahoney, P 2009.

Figure ten shows the predicted probability of completion differs by the location of employment of the workplace-based learner. The generally discernable trend is that learners in lower density areas, such as the more sparsely populated areas of the South Island; and Northland are more likely to complete their programme than those in the metropolitan areas, such as the Waikato, Auckland and Wellington.[14] This may be a consequence of greater availability of alternative employment in larger population centres.

Figure 10: Predicted Probability of Modern Apprenticeships Completion rates by Location of Employment

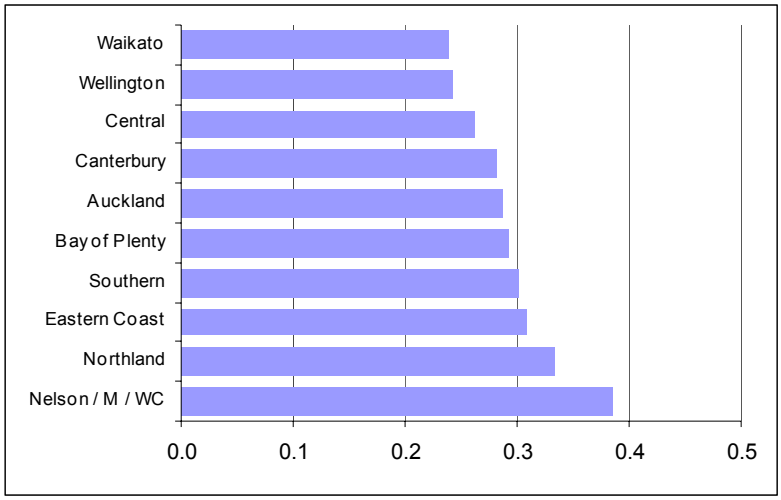
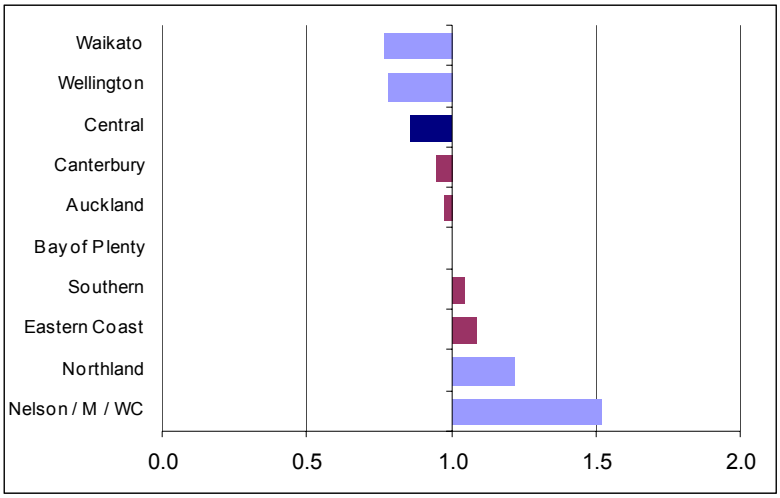


Figure eleven shows the odds ratio and statistical significance of completion over the reference category learners, those working and learning in the 'Bay of Plenty' region. It shows that learners in the 'Nelson, Marlborough and West Coast' regions are over 1.5 times as likely to complete their apprenticeship as learners in the 'Bay of Plenty'. 'Waikato' and 'Wellington' category learners are about 0.8 times as likely to complete, and were the only 'less likely' categories to reach significance at the 5 percent level ('Central' category learners were only significant at the 10 percent level).

It is theorised that this factor reflects the difference in the level of choice of alternatives for learners in metropolitan areas over rural areas. Learners in metropolitan areas may be exposed to a wider range of employment and education alternatives than those in rural areas, and may therefore be more likely to be tempted elsewhere, during the course of their apprenticeship, lowering the likelihood of completion.

[14] although the 'metropolitan' regions do consist of some 'rural' Territorial Local Authorities; i.e. Wairarapa was administered by TEC's Wellington office. This trend is also evident in industry training – see Mahoney, P 2009.

Figure 11: Odds Ratio of Completion by Location of Employment (vs. 'Bay of Plenty' category)



Note: Light blue indicates statistical significance at the 5 percent level. Dark blue denotes significance at the 10 percent level. Red indicates non-significance.

9.7 Age of Learner

Age of learner at commencement of Modern Apprenticeships is the seventh most important predictor of completion in the statistical model.

Figure twelve shows that the youngest, and oldest learners, are the least likely to complete. The probability of completion peaks for those in the middle of the age range at commencement: nineteen year olds. Figure twelve shows the odds ratios and the statistical significance of the relationships between the age groups.

Figure 12: Predicted Probability of Modern Apprenticeships Completion rates by Age of Learner at Commencement

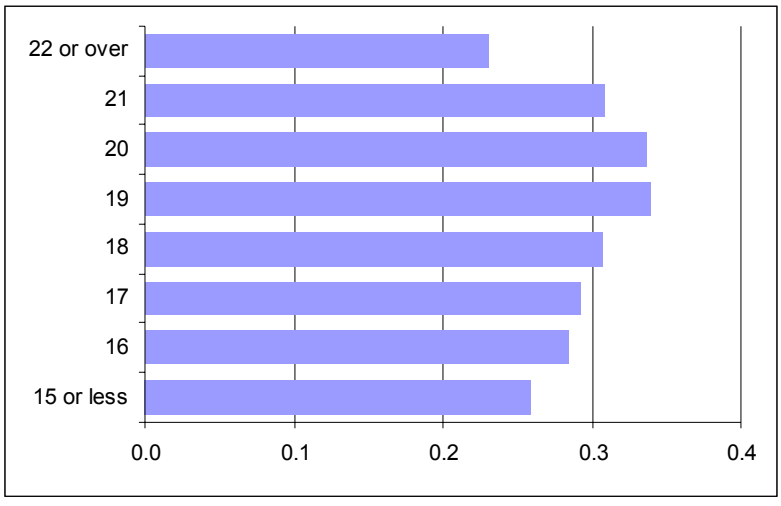
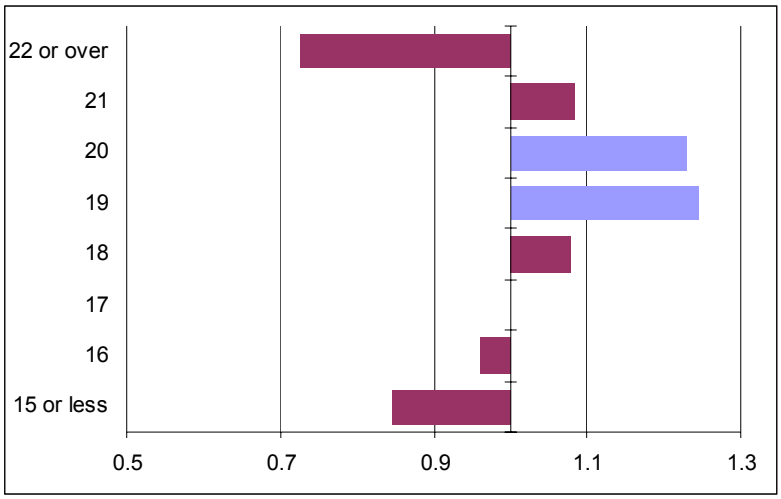


Figure thirteen shows that only '19' and '20' years old at commencement learners reached the threshold for statistical difference from the reference category. Learners aged nineteen years at commencement were 1.25 times as likely as 17 year olds to complete their apprenticeship. While learners aged twenty-two years or older at commencement appear to be 0.7 times as likely to

complete, smaller numbers of learners in this category means that this finding is not statistically significant.

Figure 13: Odds Ratio of Completion by Age at Commencement (vs. '17 years' category)



Note: Light blue indicates statistical significance at the 5 percent level. Dark blue denotes significance at the 10 percent level. Red indicates non-significance.

9.8 ITO Size Quartile Rank

This variable ranks ITOs into size categories, based on the total number of industry training learners (including Modern Apprentices) with each ITO in the industry training PMS dataset.[15] The categories represent the quartiles: '1' denotes the first quartile, i.e. the ITOs whose total number of learners relative to the others places them at 25 percent or less of the total number of learners: these are the smallest ITOs. The second and third quartile ('2 and 3') are grouped, representing the ITOs administering between 26 percent and 74 percent of the total number of learners. The final category, '4' represents the ITOs in the 75 to 100 percent quartile range: these are the very 'biggest' ITOs with the most numbers of industry training learners.

We take account of industry training numbers, not just Modern Apprentice numbers, because ITOs administer Modern Apprenticeships in much the same way as they do industry training: their role (among others) is to set the standards for training in each industry, and provide administrative support and strategic leadership. Some ITOs also offer coordinator services for Modern Apprenticeships; others are not involved in coordination.

The rationale for creation and inclusion of this variable in the model is an attempt to isolate any provider effects (in this case, ITO effects) from the industry effects represented by the ANZSIC variable. That this variable is able to gauge any effects due to the ITOs themselves is predicated on an assumption that the number of learners is a characteristic that is unique to each organisation (ITO). It is certainly affected by the number of employees in the industry, perhaps reflecting the level of 'need' for workplace learning within each industry.

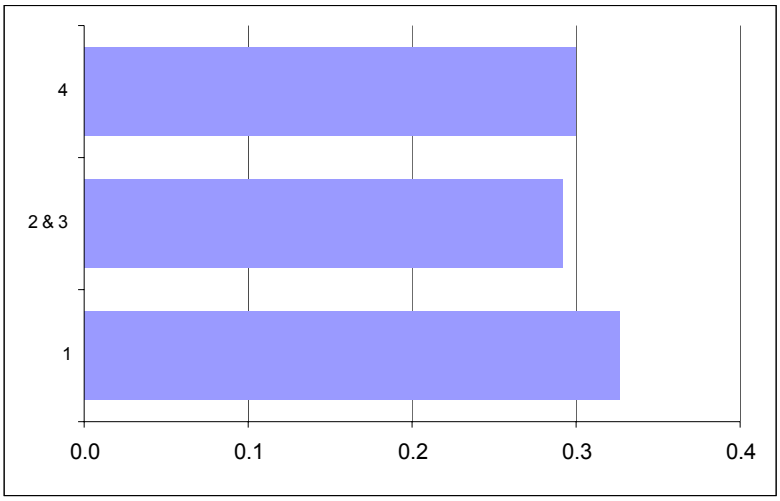
However, it is assumed that there is a certain level of independence between the number of employees (the size) of an industry and the number of workplace-based learners in each industry. In this sense, this variable captures a quality that is unique to the ITOs themselves; it is separate from

[15] See Mahoney, P, 2009 for a description of the role of ITOs in administering industry training.

industry. It does not make any assumptions about quality, such as 'big (or conversely small) must be good': and these are not supported by the observed data.[16]

Figure fourteen shows that learners who are administered by the smaller (quartile '1') ITOs are more likely to be successful than apprentices administered by the ITOs with larger numbers of industry training learners (quartiles '2 & 3' and '4').

Figure 14: Predicted Probability of Modern Apprenticeships Completion rates by ITO size quartile



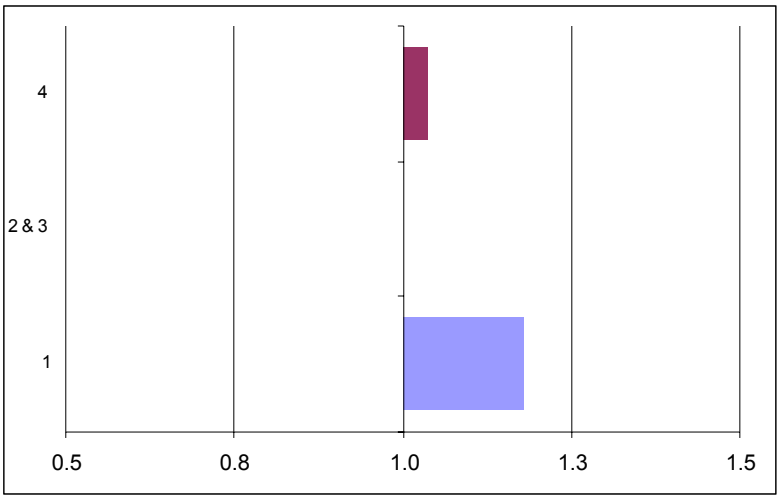
This variable is a proxy variable for an 'ITO' effect. An ITO effect can be inferred from the number of learners each ITO administers relative to each other. For example, if an industry is large (i.e. it has a large number of employees relative to other industries) it is likely, but not necessary, that there will be a large number of industry trainees relative to other industries represented in industry training. If there is a match (or not) between the demand and supply of learners, this is likely to be a function of the ITO effectively assessing and meeting (or not meeting) that demand.[17]

Figure fifteen shows that learners in smaller (quartile '1') ITOs are 1.2 times more likely to complete Modern Apprenticeships than learners in ITOs with larger numbers of industry training learners (quartiles '2 & 3' and '4', which are not statistically different from each other).

The ITOs with smaller numbers of learners seem to be more effective at facilitating successful outcomes for their learners than the ITOs with larger numbers of learners. This effect holds across the different industry representations of each ITO, and it is significant in the presence of the ANZSIC industry variable. There could be a number of reasons for this effect, however, what's important to note is that *there does seem to be an ITO effect*, and that it is a relatively important one.

16 For example, completion rates for the ITOs grouped as fourth quartile, or 'big' vary considerably.
17 Industry size is irrelevant for the purposes of this model, so competence at meeting demand is not inferred.

Figure 15: Odds Ratio of Completion by ITO size quartile (vs. '2 & 3' category)



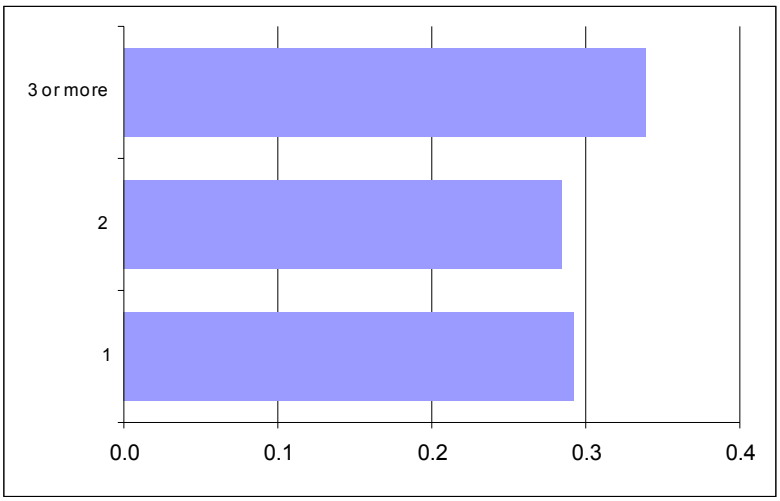
Note: Light blue indicates statistical significance at the 5 percent level. Dark blue denotes significance at the 10 percent level. Red indicates non-significance.

9.9 Number of Programmes per Learner

This variable categorises learners by the number of 'programme identifiers' against their record. As discussed, the majority of learners in Modern Apprenticeships (and industry training) are recorded as participating in just one programme. Where they are recorded in more than one programme, this may be because there has been an administrative change to the programme. Where this occurs, the ITO concerned generally withdraws all learners from the affected programme and enrols them into the new one.

While on the face of it, it is difficult to see that this practice would affect learner outcomes either way, it is clear that it does, although to a relatively small extent. Figures sixteen and seventeen show a higher likelihood of completion for learners involved in three or more programmes in total during Modern Apprenticeships. This may reflect ITO intervention, presumably for improvement of programmes, as learners progress.

Figure 16: Predicted Probability of Modern Apprenticeships Completion rates by Number of Programmes per Learner

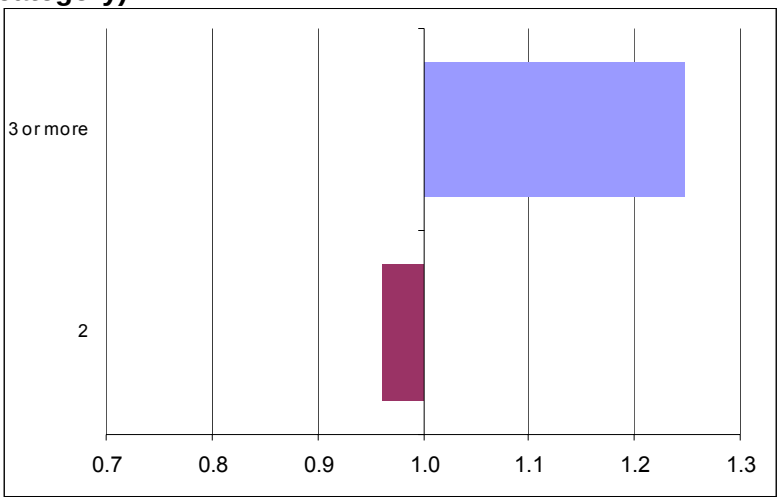


Learners who have three or more 'programme ids' within their record are the most likely to complete. To identify and explain this effect, several considerations could be taken into account. A recent phenomenon has been the development of 'chimneying' techniques by some ITOs, where learners progress up through a series of programmes to reach their eventual learning destination. This practice involves 'progressing' learners through a number of shorter programmes, gradually increasing the level of each. If this variable reflects this practice, then it would appear there is some merit to this approach in particular circumstances (i.e. it works with three or more programmes).

This variable may also reflect the ability of learners to change their course during their Modern Apprenticeship. Those that are able to change, as signalled by an addition of a programme id, may well do so to their satisfaction, and thereby enhance their likelihood of seeing the apprenticeship through to the end. However, it is not clear that this is likely, or that it is even possible for apprentices to make changes in this way. There may be *some* accommodation for learners wishing to change their programme, however, given the relational structures operating within Modern Apprenticeships, it seems unlikely that learners would have the power to change their programme much, if at all.

It seems more likely that learners with multiple programme identifiers have them due to the administrative practices of ITOs: when ITOs substantively change programmes, they create new 'programme ids', and enrol the incumbent learners into the new programme. It may be that the changes ITOs make to programmes have a beneficial effect on completion rates for them. If this is the case, it is not clear why the effect would be negative for 'two programme ids', and not for three or more.

Figure 17: Odds Ratio of Completion by Number of Programmes per Learner (vs. '1' category)



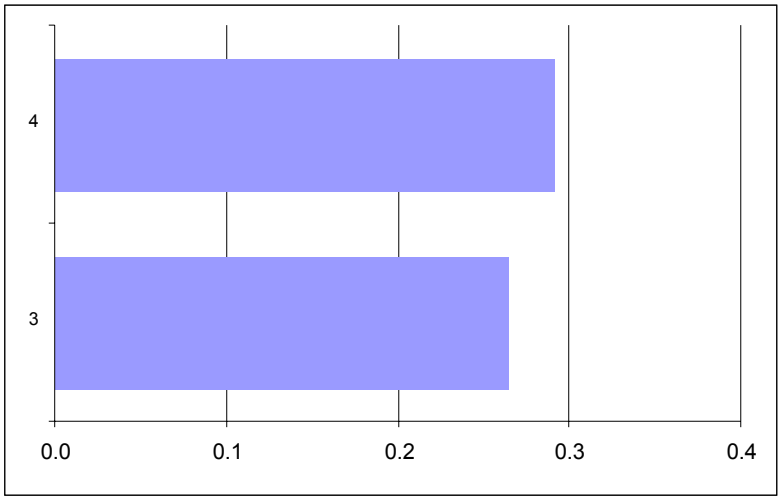
Note: Light blue indicates statistical significance at the 5 percent level. Dark blue denotes significance at the 10 percent level. Red indicates non-significance.

9.10 NQF Level per Learner

This variable reflects the National Qualifications Framework level (NQF level) of learners' Modern Apprenticeships. As discussed, the minority of learners participate in more that one programme: where this is the case, the level of the final programme, or the programme that is completed, is used for this variable. Most learners participate at levels three and four of the National Qualifications Framework: however, there are a very few enrolled in programmes at both higher and lower levels. For the sake of size consistency between groups, required for successful statistical modelling, learners in the cohort participating at levels other than levels three or four were excluded from this analysis.

Figure eighteen shows an increased probability of completion for learners in programmes at level four rather than at level three. The odds ratio of completion for level three over level four are calculated at 0.87, or eighty seven percent (significantly different at the five percent level).

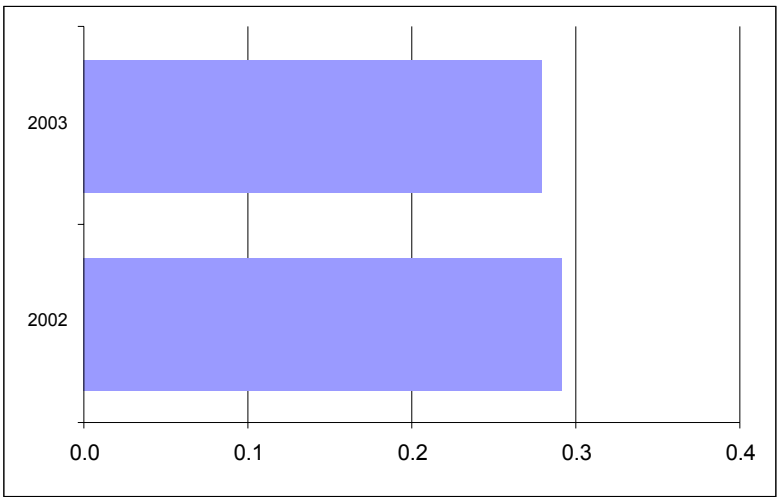
Figure 18: Predicted Probability of Modern Apprenticeships Completion rates by NQF Level



9.11 Start Year

Learners who commenced their apprenticeship in 2002 were more likely than learners commencing in 2003 to complete their programme, within five years. Learners who commenced their apprenticeship in 2003 were 0.94 times as likely as learners commencing in 2002 to complete their programme, within five years (significantly different at the five percent level).

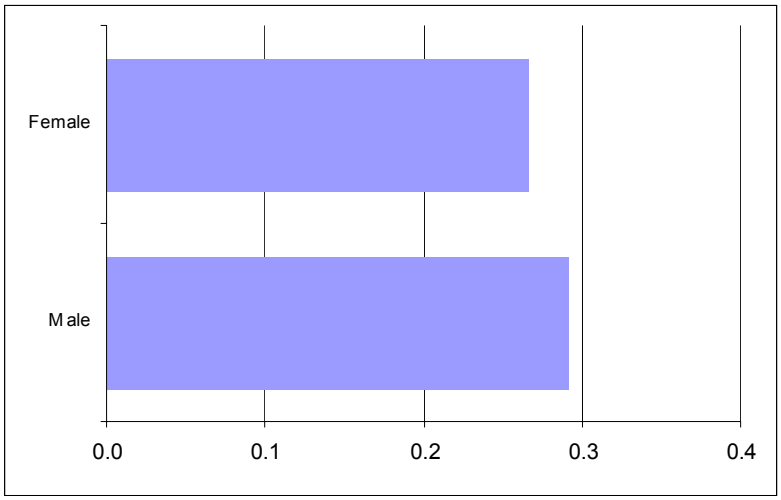
Figure 19: Predicted Probability of Modern Apprenticeships Completion rates by Start Year



9.12 Gender of Learner

This variable shows the gender of each learner. Figure 20 shows that females are less likely than males to complete their apprenticeship: cohort females were 0.88 times as likely as males to complete their apprenticeship (significantly different at the five percent level).

Figure 20: Predicted Probability of Modern Apprenticeships Completion rates by Gender



10 Conclusion

While the Modern Apprenticeships scheme does seem to have been successful in facilitating the participation of more young people in formal workplace-based learning, there are clearly a number of issues that could be addressed to ensure that government's investment leads to desirable outcomes for them. This study identifies the factors associated with completion of Modern Apprenticeships, one of several measures that can be used to determine how successful the programme is at achieving government's aims for young people in workplace-based learning.

The most important factor associated with completion of Modern Apprenticeships is industry. Holding all other factors constant, learners in some industries are more likely to complete their programmes than those in others. This is likely to be due to a variety of industry-associated variables, such as attitude towards workplace–based learning within the industry, wages and conditions, as well as economic imperatives and other factors. The implications of this finding are quite clear: the quality of Modern Apprenticeships learning across industries is uneven.

The proposed volume of learning for each learner is also important. Modern Apprentices work towards National Certificates in their chosen field, which usually consist of 120 credits on the National Qualifications Framework. If a learner studies at 0.5 STMs, they should complete their certificate (and presumably their programme) within two years of commencement (their rate of study is set at 60 credits per year). However, there seems to be a disconnection between the planned STM rate, and the actual duration of learning. Lower volume programmes (which, by definition, take more time to reach the 120 credit target) are more likely to eventuate in completion than higher volume ones. This finding, along with the observed effects of duration on propensity to complete, (overall, observed completion rates are high for learners exiting at 5 and 6 years) suggests that learners generally require longer than the standard prescription of four years to be successful in Modern Apprenticeships: those that work and learn in high intensity programmes (for correspondingly shorter periods of time) are less likely to succeed.

Previous qualification of the learner is an important predictor, as is their ethnic group. Lowly qualified learners, or those with no qualifications, are less likely to be successful than those with Levels 1 to 3 NCEA or equivalents (5th, 6th and 7th Form). Those who already have degrees may be less concerned with completion, and more with acquiring skills through their apprenticeship: they complete at lower rates than those with NCEA or equivalents. The implication, is that lesser qualified learners may need more support to complete their apprenticeship than other learners. For learners for whom perhaps other options are available, such as those with 7th Form or equivalent qualifications (university entrance), the implication is that Modern Apprenticeships do not have parity of esteem with university learning. However, more research is required to follow the progress of these learners to determine their eventual destination.

Māori and Pasifika learners are less likely to complete an apprenticeship than European learners. Holding all other factors constant, including previous qualifications of learners, it is not clear how much internal or external factors contribute to this effect. The age of the learner also makes a difference: the younger ones do less well than the 19 and 20 year olds, while the older-yet learners may not complete their programmes at commensurate rates, but for perhaps different reasons.

There is also a strong coordinator effect – some 'types' of coordinator seem to be more successful than others. Different 'types' may operate under different imperatives and have varying levels of experience in mentoring young people through education programmes. There is also a marked ITO

effect. Learners in industries where standards are set by certain ITOs are more likely to be successful than in others.

Learners in rural areas are more successful than those in metropolitan areas, perhaps because there is less choice of alternative employment or learning pathway than there is for those in the more highly populated areas.

Other variables, such as NQF level, and the gender of the learner, do have an effect, but they are not as strong as the others within the model. Of concern is that females are likely to be less successful than males, and this is not because of the industry that they choose to work in, or the other factors already accounted for within the model. As such, it is tempting to ascribe external factors to this effect (most of the available internal factors are already accounted for in the model).

It will be interesting to see if these differences perpetuate, but this will only become clear once more time has elapsed and more data is available for analysis. Modern Apprenticeships may have developed further in subsequent years, and this, at present, cannot be captured by retrospective cohort analysis. Further analytical work will focus on predictors of alternative measures of success in Modern Apprenticeships, such as credit and National Qualifications attainment.

11 Bibliography

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12 Appendix

Modern Apprenticeships Industry name	ANZSIC 2006 Level 1 Mapping
Aeronautical engineering	Professional, Scientific and Technical Services
Agriculture	Agriculture, Forestry and Fishing
Aluminium joinery	Construction
Baking	Manufacturing
Boat building	Manufacturing
Building & construction	Construction
Contracting	Construction
Dairy manufacturing	Manufacturing
Electricity supply	Electricity, Gas, Water and Waste Services
Electrotechnology	Manufacturing
Engineering	Professional, Scientific and Technical Services
Extractives	Mining
Flooring	Construction
Food processing	Manufacturing
Forest industries	Agriculture, Forestry and Fishing
Furniture	Manufacturing
Horticulture	Agriculture, Forestry and Fishing
Hospitality	Accommodation and Food Services
Joinery	Construction
Motor engineering	Professional, Scientific and Technical Services
Painting & decorating	Construction
Plastics	Manufacturing
Plumbing	Construction
Printing	Manufacturing
Public sector	Public Administration and Safety
Retail	Other
Road transport	Other
Seafood	Agriculture, Forestry and Fishing
Sports turf	Agriculture, Forestry and Fishing
Telecommunications	Other
Tourism	Administrative and Support Services

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