

Hei titiro anō i te whāinga

Māori achievement in bachelors degrees revisited

Technical paper

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1 Overview

This document supports the report *Hei titiro anō i te whāinga – Māori achievement in bachelors degrees revisited*, which updates the analysis undertaken in *Te whai i nga taumata atakura – supporting Māori achievement in bachelors degrees* (Earle 2007).

This document presents the revised results the six logistic regression models that informed the earlier work and provides two new models based on matched school and tertiary data.

Since the original models were run, two data improvements have been made. The matching of students in the Ministry of Education's statistical dataset has been improved and rerun, eliminating the need for the provisional rematch used for the original models. The Ministry, with the assistance of the New Zealand Qualifications Authority, has also created a data set which links NCEA results with tertiary enrolment data at a unit record level. There are sufficient years in this data set to rerun the under 20-year-old first-year pass rate and return to study models. Also, an extra year of data is now available for each of the models. This is particularly important for the completion models, which had previously only included one cohort of students.

A few improvements have been made to presentation of the models. Predicted probabilities are used throughout, rather than a mix of odds ratios and probabilities. This provides easier interpretation across the models. The first-year retention models have been relabelled as 'return to study' – a more accurate descriptor. A technical error in calculating the predicted probabilities for EFTS enrolled by study type has been corrected. Model specification has been reviewed, particularly with regard to potential for multicollinearity.

1.1 The logistic regression models

Data for the models was sourced from enrolment and completion data supplied by tertiary education providers to the Ministry of Education. A data set was extracted that identified Māori first-year, first-time degree students. The national student number and the Ministry's statistically generated student number were used to match student records over time to identify which students were in their first year of a bachelors degree and had not previously studied at bachelors level. For the two models using NCEA data, first-time first-year degree students were linked to their NCEA results using the national student number.

The models were run using the SAS logistic procedure, with the logit link function. Effects were included or excluded from the model on the basis of 95 percent confidence or greater. All plausible main effects that could be derived from the data set were tested in the model. Interactions were identified on the basis of subject matter expertise and results from the main effects.

A summary of the results of each model is set out in the following chapters. Each chapter provides the overall description of the model and the key statistics for each effect. The estimated contribution of each effect has been derived from dividing the Wald Chi-square value for the effect over the total Wald Chi-square for the model. A more detailed analysis of each effect or set of effects is then presented using predicted probabilities.

First-year pass rates

These models cover first-year, first-time students enrolling from 2002 to 2006 inclusive. The outcome groups were those who passed 75 percent or more of their first-year courses and those who did not.

Pass rates were calculated by taking the average of two definitions of successful completion and dividing by the number of courses taken. The first definition was the number of courses for which a pass was recorded. The second was the number for which a pass was recorded plus courses for which the outcome had not been recorded.

Over this time period, the reporting of course outcomes has improved - that is, there is a smaller proportion of courses for which the outcome is not known. More detailed analysis suggests that the use of the midpoint approach is a reasonable estimate of course outcomes across the period. The midpoints are reasonably stable for the same groups of students over time. However, improvements in data quality may be hiding trends over time. Given the uncertainties with regard to data quality, the time variable in the models has been regarded as a control variable and left out of the interpretation.

Return to study

These models covered first-year, first-time students enrolling from 2002 to 2005 inclusive. The outcome groups were those who returned to study any time during the period to 2006 and those who did not.

Return to study was defined as returning to study towards a bachelors degree at any institution following the first year of study, anytime within the period to 2006. The following groups of students were included as continuing:

- Students who switched from one bachelors qualification to another.
- Students who moved from one provider to another.
- Students who returned to study after a gap of a year or more.

Students who studied in the earlier years covered by the model had more time to return to study than those who were in the later years. For example, a student enrolling in 2002 could return to study in 2003, 2004, 2005 or 2006, while students enrolled in 2005 could only be counted if they returned to study in 2006. To control for this, the enrolment year was included in the model and interpreted as a control variable.

The iwi affiliation variable has been removed from these models. It remained statistically significant with the improved and extended data. However, further investigation showed that it is statistically significant if data from 2002 and 2003 is included, but not if only data from 2004 and 2005 is used. This suggests that it is picking up improvements to iwi data collection in these earlier years, where students who returned were more likely to have their iwi recorded than students who did not return. Removing it from the models did not notably affect the results for the other variables. The question of the effect of iwi affiliation could be returned to in the future once there is a longer time series of high quality data.

Completion

These models covered first-year, first-time students who enrolled in 2001 or 2002 in a three-year degree programme and completed more than 2.9 EFTS of degree study in the period to 2006. The outcome groups were students who completed a bachelors or bachelors with honours degree by 2006 and those who did not.

The models were initially run with students who were enrolled for more than one year of study. This approach showed time in study to be the strongest factor – that is, a student needs to complete at least 3.0 EFTS of study to complete a three-year bachelors degree. This is a self-

evident finding, so the model was adjusted to include only those who had completed more than 2.9 EFTS of degree study. The model was limited to three-year degrees to remove confounding effects of longer programme requirements, which are associated with specific subject areas.

NCEA results data

The original models used students' self-reported highest school qualification. For school leavers, this information may be collected prior to the award of their final school qualification and therefore tends to understate their school achievement. It also doesn't provide any information on how well the student did within the qualification – that is, did they just scrape through or 'pass with flying colours'?

The National Certificate of Educational Achievement (NCEA) introduced a new set of secondary school qualifications as of 2002, replacing the previous system of qualifications. By 2004, all senior secondary students leaving school had had the chance to go through all three levels of the new NCEA system. The results for all students undertaking NCEA are collected by the New Zealand Qualifications Authority and made available to the Ministry for analytical purposes. It is possible to directly link NCEA results with tertiary education enrolments and completions through the use of the national student number.

NCEA provides an improved measure of highest school qualification of tertiary students. Using the NCEA data, rather than school qualifications collected by tertiary providers, the actual highest school qualification can be used and levels and combinations of qualifications can be more finely distinguished.

The NCEA data also provides an opportunity to look at the relative performance of students across subjects, using their results in achievement standards. A measure of achievement has been developed for analytical purposes called the 'expected percentile'. The expected percentile estimates the relative performance of students in each year and for each level of NCEA by aggregating their results across achievement standards within each subject. The resulting measure is a continuous variable that estimates the performance of a student relative to their peers on a scale from 0 to 100. A fuller description of this measure can be found in Ussher (2008) and Scott (2008).

Model presentation

The following information about each model is presented in the model summary:

- Response variable: the definition of the outcome being tested
- Response levels: the definitions for a successful or unsuccessful outcome
- Number of observations in the data set
- Selection of observations: criteria used to include students within the data set
- Max-rescaled R^2 : this estimates how much of the total variation in the outcome can be explained by the variables included in the model. This figure can range from 0 meaning no explanation provided; to 1 meaning total explanation of variation. For models dealing with social phenomena, values ranging from 0.15 to 0.30 are usual and acceptable. At these levels it means that the while the variables in the model are important at a population level for explaining the outcome, individual cases may vary considerably due to other factors not included in the model.

The type 3 analysis of effects table presents the variables included in the model in order of estimated contribution. The columns in these tables are:

- Effect: the variables included
- DF: degrees of freedom, which indicates the number of categories included in categorical variables
- Wald Chi-square: a measure of the contribution of that variable to explaining the overall variation within the data
- Pr > Chi-sq: the probability that the effect of the variable is due to random chance alone. Where the value is less than 0.05 the effect is deemed to be statistically significant. That is, it is unlikely to occur due to random chance.
- Estimated contribution: the estimated proportion of variation explained by the variable. This has been calculated as the Wald Chi-square for the variable divided by the sum of Wald Chi-square values for all variables.
- Reference value: the value at which the variable is held constant in examining the changes in predicted probabilities for other variables.

Predicted probabilities

The predicted probability is the probability of attaining the outcome for a student who fits the reference values set out for each model. The probabilities for each variable are calculated by changing the values for that variable only and holding all other variables constant. Therefore, the predicted probabilities show that if all else is constant, how much difference a change in each variable would make to the outcome.

It is important to note that these predicted probabilities are for the selected reference value set only. If a different reference value set was chosen, then the values of the predicted probabilities would change. However, the nature of the relationship between the variable and the probability of the outcome would not change if a different reference value set was selected.

The bar charts for the predicted probabilities show the reference value in light blue. The dark blue bars indicate the values which are statistically significantly different from the reference value. The reference values for continuous variables have been set as the median value for all students in the data set. The graphs show the range of values from the 10th to the 90th percentile, which cover 80 percent of students.

1.2 Project-specific data definitions

The following definitions were applied to the data set.

Bachelors degrees

Bachelors degrees are the qualifications coded as 'Bachelors' on the Qualification Award Category on the New Zealand Register of Quality Assured Qualifications. Degrees with a total duration of two years' full-time equivalent or less were excluded. These are generally awarded in addition to a first bachelors degree.

This definition differs from that of bachelors-level qualifications in other Ministry reports, which includes graduate certificates and diplomas, and certificates of proficiency.

Prior activity

Tertiary education providers provide information on the main activity of each student on 31 October in the year prior to their first year of enrolment. For this project, this data has been adjusted, so that if the student was enrolled in school or tertiary study at any time during the year prior to enrolment, that is counted as their prior activity. If not, then their main activity at 31 October as reported on their first-year enrolment record was used.

Māori students

Māori students are identified on the basis of the self-declared ethnicity, as stated to their provider on their enrolment forms. Students can provide up to three ethnicities. The responses they provide may vary from year to year and among institutions.

For this study, Māori students were defined as any students who declared Māori as an ethnicity in at least one year and at least one institution, even if they also declared other ethnicities. This approach was taken to provide a consistent group of students who were represented in each year that they studied, irrespective of whether they declared themselves as Māori in every enrolment.

First-year, first-time students

First-year, first-time students were counted in this study as students who had enrolled for degree study for the first time. It included students who were in tertiary study for the first time and students who had previously studied in tertiary education towards qualifications below degree level. It excluded students who were still completing first-year degree requirements over more than one year (after their first year of enrolment) and students who were starting a second degree.

First year in degree study was determined using the Ministry of Education's matched data set, going back to 1994. First year in tertiary was determined from the information provided by the student, checked against the matched data set.

2 First-year pass rates for Māori bachelors students aged under 20 (using self-reported school data)

Model summary

Response variable	Proportion of first-year courses passed
Response levels	1. <75% passed (N=4,197) 2. 75%-100% passed (N=2,298)
Probability modelled is that the proportion of first-year courses passed is 75% to 100% Predicted probabilities presented below refer to this event	
Number of observations used	6,495
Selection of observations	Māori first-year degree students Enrolling in 2002 to 2006 inclusive Intramural enrolments only
Max-rescaled R ²	0.1484

Type 3 analysis of effects

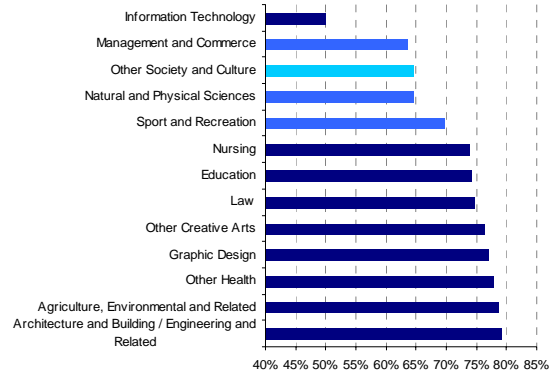
Effect	DF	Wald Chi-square	Pr > Chi-sq	Estimated contribution	Reference value (predicted probabilities)
Degree subject	12	114.249	<.0001	28%	Other society and culture
Prior activity	4	54.184	<.0001	13%	School
EFTS enrolled	1	42.0269	<.0001	10%	1.0
School decile	1	34.047	<.0001	8%	Decile 4 and above
EFTS enrolled by study type	3	29.1313	<.0001	7%	
Highest school qualification	4	20.6675	0.0004	5%	NCEA level 3+
Starting year	4	20.6067	0.0004	5%	2006
Sub-sector	3	19.0218	0.0003	5%	University
Student gender	1	18.7613	<.0001	5%	Male
Study type	3	16.3146	0.001	4%	Full-time, full-year
School definition	2	12.9619	0.0015	3%	Other schools
School roll – year 12	1	12.2217	0.0005	3%	157
School gender	1	9.295	0.0023	2%	Co-educational
Percent of students at bachelors level and above (squared)	1	4.3726	0.0365	1%	
Percent of students at bachelors level and above	1	0.3363	0.562	0%	91%

2.1 Degree subject

Subject of the qualification of enrolment, classified using NZSCED broad and selected narrow fields.

The lowest pass rates were for students in information technology. Results for management and commerce, sciences, and other society and culture were very close. These three groups represent generic bachelors degrees, including arts, social science, science and management degrees. Pass rates in more specialised degrees were higher than and, in most cases, statistically significantly different from other society and culture.

Figure 2.1: Predicted probabilities by subject



2.2 Prior activity

Main activity of the student prior to enrolment in degree programme:

School – if the student’s last year at school was a year earlier or the same year as degree enrolment

Tertiary – if the student was enrolled in a sub-degree programme in the year preceding or the same year as degree enrolment

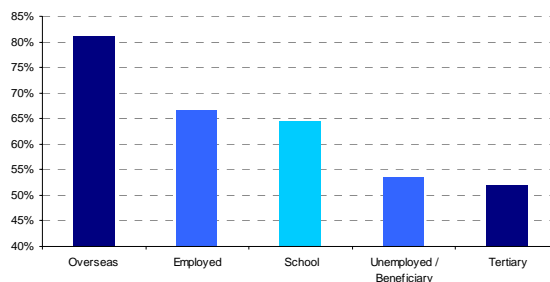
Employed; Unemployed/Beneficiary; Overseas – if the student was in neither school nor tertiary in the year prior to enrolment in degree study then these activities were used, as reported at enrolment.

Unknown values were added into schools on the basis that results for these students were not significantly different.

Students who were overseas prior to degree study had much better results than students who went straight from school. Those who studied in sub-degree programmes prior to degree study had poorer results. This appears to be the case also for students who were unemployed or were beneficiaries, but the results are statistically significant. Those who were employed had similar results to those who went straight from school.

This result may reflect a relationship between the ability of the students and the chosen activity, rather than the effect of the activity itself. For example, more able students may be more likely to travel overseas and less able students more likely to enrol for below-degree-level tertiary studies.

Figure 2.2: Predicted probabilities by prior activity



2.3 EFTS enrolled by study type

EFTS enrolled represents the proportional study load of each student in degree level studies, where 1.0 is a full-time, full-year study load.

Study type is a four-way classification of each student's overall tertiary study, including study below degree-level. It covers whether the student is full-time or part-time and enrolled for the full year or part of the year.

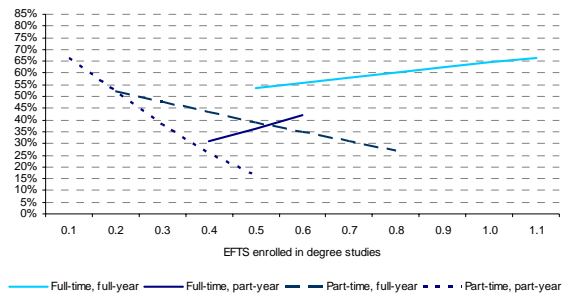
Students who were full-time, full-year in tertiary study were more likely than other students to pass 75 percent or more of their degree courses. The amount of EFTS enrolled in their degree studies had the least effect for this group, although those who were studying fully at degree level did better than those who had a mix of degree and lower level study.

Students who were full-time, part-year in tertiary study were less likely to pass 75 percent or more of their degree courses, than full-time, full-year students. However, there was a stronger positive effect in terms of EFTS enrolled for this group. This group includes students who studied full-time for one semester and then left study, possibly having failed several courses.

Students who studied part-time, full-year had similar results to full-time, full-year students if they only took one or two courses. Those taking more courses were much less likely to pass 75 percent or more of their degree courses, with the likelihood decreasing as they took on more study. These students were likely to be balancing study with other commitments, such as family and/or work.

Students who studied part-time, part-year also did as well as full-time, full-year students if they only took one or two courses. However, they did significantly worse than other students if they had higher study loads. This group included students who left study after failing courses in their first semester, who were also balancing study with other commitments.¹

Figure 2.3: Predicted probabilities by study type and EFTS enrolled



¹ In the original study, the slopes for the lines were incorrectly drawn.

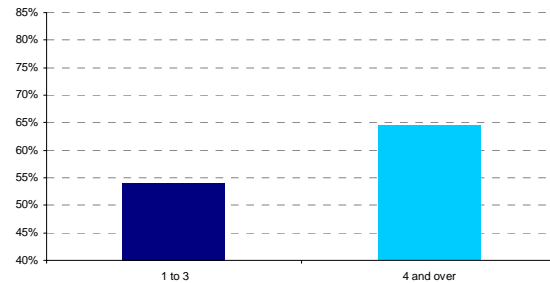
2.4 School decile

The decile ranking for purposes of equity funding of the last school attended by the student. Value is at the time of the student's last year at the school. The decile is allocated on a socio-economic deprivation index applied to a sample of families from the school, where 1 is the most deprived and 10 is the least deprived.

Students from low decile schools had poorer results than those from middle and high decile schools, even when controlling for other variables in the model. There was no statistically significant difference in results for students from schools at decile 4 and above.

School decile, for this age group, can be interpreted as a broad proxy for socio-economic background – particularly for students from low decile schools, where there is a high instance of deprivation across the community.

Figure 2.4: Predicted probabilities by school decile



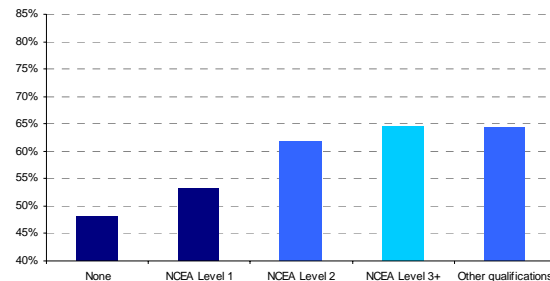
2.5 Highest school qualification

This is the highest school qualification of the student, as reported at the time of enrolment. Changes in the school qualifications system and in the quality of the data collected mean that this variable has been grouped into broad categories.

It has not been possible to separate out those who have met the university entrance requirements. Students in this age group with qualifications below university entrance can enter degree study at an ITP, wānanga or PTE. Under certain circumstances they can apply for discretionary or provisional entrance to a university.

Students with no school qualifications or NCEA level 1 only were less likely to succeed in their first year than those with NCEA level 2 or better. There was little difference in results for students with NCEA level 2, level 3 or other qualifications. However, this may reflect underreporting of higher level attainment at time of enrolment, due to lags in availability of school results.

Figure 2.5: Predicted probabilities by highest school qualification



2.6 Starting year

The first year of study for each student. It is included in the model as a control variable. This variable is interpreted as controlling for differences in data quality across years, particularly due to time-lags in fully reporting course completions.

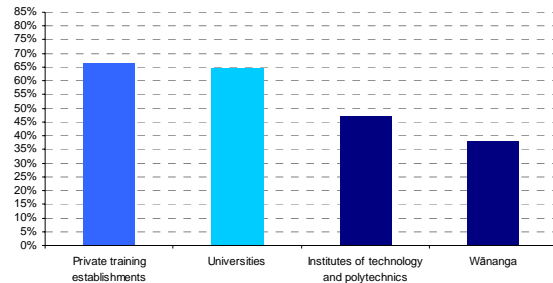
2.7 Sub-sector

Sub-sector groupings of providers, as at time of data collection.

Colleges of education have been grouped with universities, to take account of recent mergers. Other tertiary education providers have been grouped with private training establishments.

Students attending universities were more likely to pass 75 percent or more of their first year degree courses than students in ITPs and wānanga. The results for PTEs follow a similar pattern as universities, but are not statistically significant due to the small number of first-year Māori degree students in this sub-sector.

Figure 2.6: Predicted probabilities by sub-sector

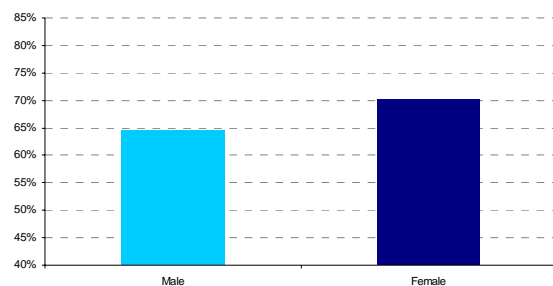


2.8 Student gender

Gender of the student.

Female students were more likely to pass 75 percent or more of their degree courses than male students, once all other factors are controlled for.

Figure 2.7: Predicted probabilities by gender of the student

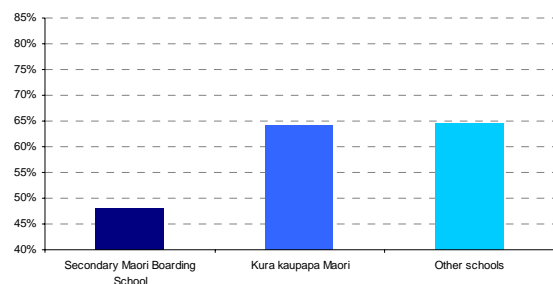


2.9 School definition

This is one of the variables used to classify schools. In this model, the two categories of interest were Māori boarding schools and kura kaupapa Māori.

There was no difference found between students who last attended a kura kaupapa Māori and students from other schools. However, students who last attended a Māori boarding school had statistically significantly poorer performance than other Māori students, after controlling for other factors in the model, including school gender.

Figure 2.8: Predicted probabilities by school definition

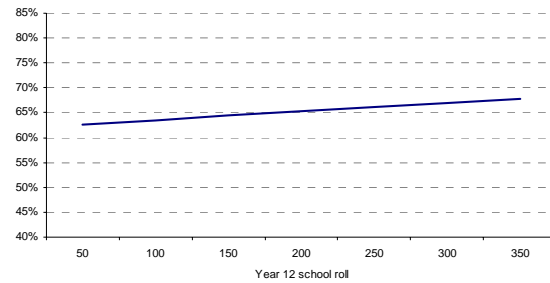


2.10 Year 12 school roll

Number of students enrolled in year 12 at the school that the student last attended, during the year the student last attended school.

Māori students from larger secondary schools, as measured by year 12 school rolls, were more likely to pass 75 percent or more of their first year degree courses.

Figure 2.9: Predicted probabilities by year 12 school roll

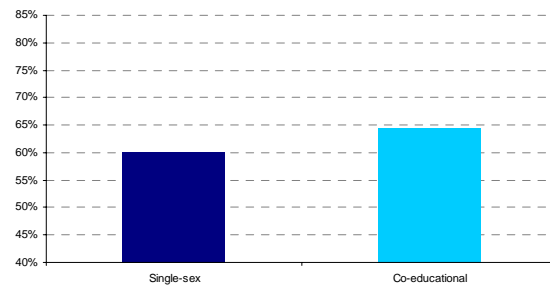


2.11 School gender

Whether the last school of attendance was boys only, girls only or co-educational.

Students who last attended a co-educational school were more likely to pass 75 percent or more of their degree courses than those who attended a single-sex school. This effect persists having adjusted for gender of the student and other characteristics of the school in the model.

Figure 2.10: Predicted probabilities by school gender



2.12 Percent of students at bachelors level and above

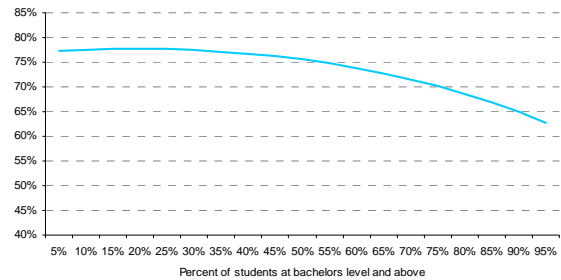
Percent of students at the provider enrolled a bachelors level and above.

This is a measure of the intensity of provision at bachelors and post graduate level within the provider. In this model, the variable has been fitted as a quadratic (i.e. curved-line) rather than a straight line.

This variable suggests that success in first-year degree courses for Māori students declined as the proportion of bachelors and above students at the provider increases. This is a generalised conclusion from the quantitative data. While it is statistically significant in the model, there will be different explanations for the outcome in different providers.

There are at least two plausible explanations for this. The first is that having more below-degree-level students at the provider is of benefit to first-year Māori degree students. This could possibly be a reflection of the way student support services works and/or teaching approaches. The other is that as proportion of students at bachelors and above, the provider becomes more focused on success at postgraduate level and there is less attention to first-year degree students.

Figure 2.11: Predicted probabilities by percent of students at bachelors level and above



3 First-year pass rates for Māori bachelors students studying within one or two years of leaving school (linked to NCEA results)

Model summary

Response variable	Proportion of first-year courses passed
Response levels	1. 75%-100% passed (N=573) 2. <75% passed (N=745)
Probability modelled is that the proportion of first-year courses passed is 75% to 100% Predicted probabilities presented below refer to this event	
Number of observations used	1,318
Selection of observations	First-year degree students who left school in 2004 and enrolled in degree study in 2005 or 2006 Intramural enrolments only
Max-rescaled R ²	0.2265

Type 3 analysis of effects

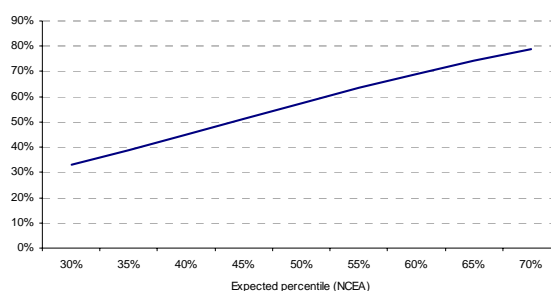
Effect	DF	Wald Chi-square	Pr > Chi-sq	Estimated contribution	Reference value (predicted probabilities)
Expected percentile (NCEA)	1	183.0279	<.0001	59%	47%
Degree subject	12	54.9038	<.0001	18%	Other society and culture
Highest school qualification	4	23.8169	<.0001	8%	NCEA Level 3+
School definition	2	16.679	0.0002	5%	Other schools
Sub-sector	1	14.3879	0.0001	5%	Non-university
Percent of students at degree level and above by sub-sector	1	8.1977	0.0042	3%	4 and over
Degree starting year	1	6.3601	0.0117	2%	2006
Prior activity	1	4.386	0.0362	1%	School or workforce
Percent of students at degree level	1	0.1108	0.7392	0%	20%

3.1 Expected percentile (NCEA)

Expected percentile in NCEA is a statistical measure of how well students performed across achievement standards, taking into account whether they attained achieved, merit or excellence. In this model, the expected percentile for the highest NCEA level for which the student had undertaken achievement standards is used. In most cases, this is NCEA level 3.

This result shows that Māori students who had higher levels of achievement in NCEA achievement standards were much more likely to pass 75 percent or more of their first year courses, even when controlling their highest school qualification. This was the largest explanatory factor in this model.

Figure 3.1: Predicted probabilities by expected percentile (NCEA)

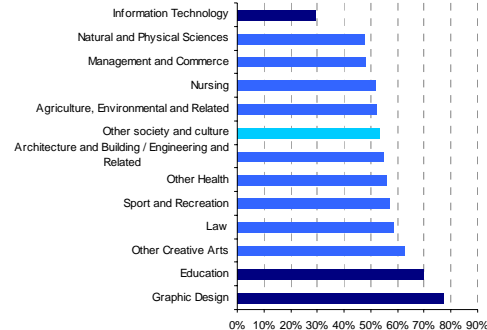


3.2 Degree subject

Subject of the qualification of enrolment, classified using NZSCED broad and selected narrow fields.

Once expected percentile and the correct highest school qualification are controlled for, there was no statistically significant difference in first-year pass rates across most subjects. The exceptions were information technology, where results are lower, and education and graphic design, where results were higher.

Figure 3.2: Predicted probabilities by degree subject



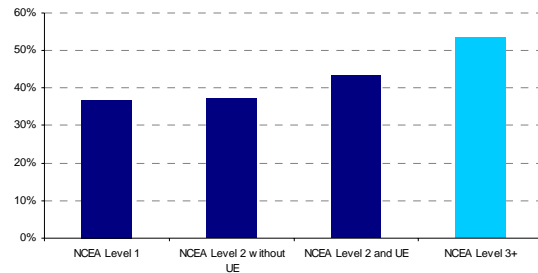
3.3 Highest school qualification

This is the highest level of NCEA qualification awarded to the student.

Students in this age group with qualifications below university entrance can enter degree study at an ITP, wānanga or PTE. Under certain circumstances they can apply for discretionary or provisional entrance to a university.

Students who studied at degree level having achieved an NCEA Level 3 qualification did better than those who had not. Those who had NCEA level 2 and achieved the university entrance requirements did somewhat better than those who had not met the requirements. There was no difference in performance between students with NCEA level 1 and NCEA 2 without UE.

Figure 3.3: Predicted probabilities by highest school qualification

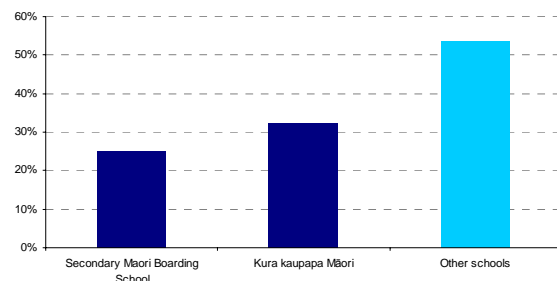


3.4 School definition

This is one of the variables used to classify schools. In this model, the two categories of interest were Māori boarding schools and kura kaupapa Māori.

This model found a definite difference in first year performance for students from Māori boarding schools, as well as students from kura kaupapa Māori. It would appear that students from these types of schools may have had more difficulty adapting to the tertiary learning environment.

Figure 3.4: Predicted probabilities by school definition



3.5 Percent of students at bachelors level and above by subsector

Percent of students at the provider enrolled a bachelors level and above.

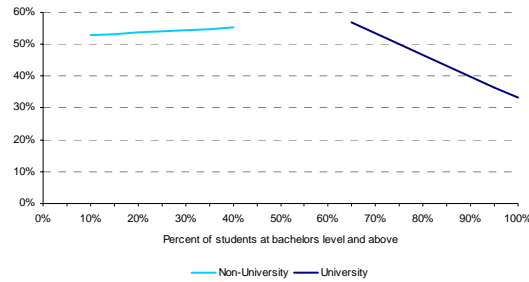
This is a measure of the intensity of provision at bachelors and post graduate level within the provider.

Subsector has been grouped into university and non-university. There were insufficient numbers in other sub-sectors to provide statistically significant results.

This model shows that students in non-university institutions did slightly better in their first year of study if there was a higher concentration of degree and above students at the provider. At universities, the opposite was true. Students at universities without any below-degree level students did worse than students at universities with a more mixed student population.

This is not dissimilar from the result reported in section 2.12 which just used percent of students at bachelors level and above. As discussed in that section, the downward slope for universities may reflect less access to appropriate study support for Māori first-year students and/or greater focus on supporting postgraduate study.

Figure 3.5: Predicted probabilities by percent of students at bachelors level and above



3.6 Starting year

The first year of study for each student. It is included in the model as a control variable. This variable is interpreted as controlling for differences in data quality across years, particularly due to time-lags in fully reporting course completions.

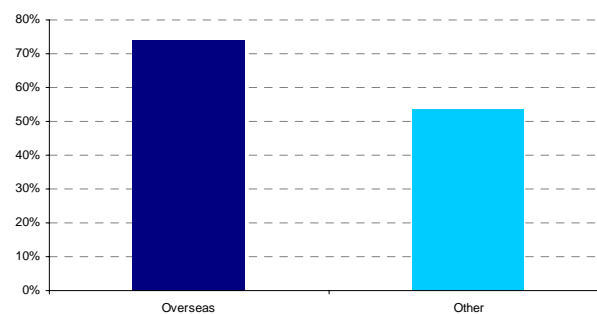
3.7 Prior activity

Main activity of the student prior to enrolment in degree programme.

The only statistically significant difference found was between students who went overseas and students who either went direct from school or had some time in work or on benefit between school and tertiary study.

This result confirms that students who have had some overseas experience between school and tertiary have much better performance in their first, even once their school performance is properly controlled for. In the previous model, it was suggested that students who go overseas may be more academically able. This model suggests that factors other than academic ability are also at play. These could be related to attitudes and motivations of students who go overseas – which may be pre-existent and lead them to seek out international experiences, or may have developed as a result of international experience, or both.

Figure 3.6: Predicted probabilities by prior activity



4 Return to study for Māori bachelors students aged under 20

Model summary

Response variable	Returned or didn't return to study following first year of study
Response levels	1. Returned to study (N=4,437) 2. Left study (N=623)
Probability modelled is continued in study Predicted probabilities presented below refer to this event	
Number of observations used	5,060
Selection of observations	Māori first-year degree students Enrolling in 2002 to 2005 inclusive Returning to study within period to 2006 Intramural enrolments only
Max-rescaled R ²	0.3677

Type 3 analysis of effects

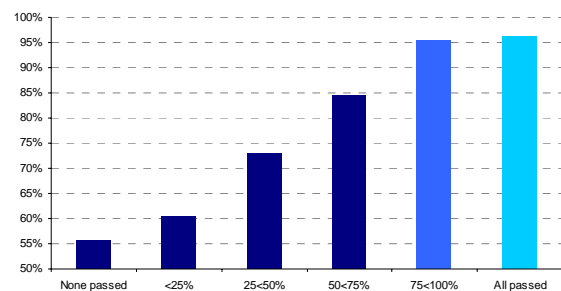
Effect	DF	Wald Chi-square	Pr > Chi-sq	Estimated contribution	Reference value (predicted probabilities)
First-year pass rate	5	473.27	<.0001	68%	All passed
Degree subject	12	61.328	<.0001	9%	Other society and culture
Study type	3	49.455	<.0001	7%	Full-time, full-year
Starting year	3	46.028	<.0001	7%	2006
Percent of degree and above students at provider	1	44.347	<.0001	6%	91%
Highest school qualification	4	20.068	0.0005	3%	NCEA Level 3+
School roll year 9 plus	1	6.1143	0.0134	1%	854

4.1 First-year pass rate

Percentage of first-year courses passed.

Students who passed at least 75 percent of their courses were much more likely to continue in study than those who didn't. There was no significant difference between those who passed 75 percent and those who passed all of their courses.

Figure 4.1: Predicted probabilities by first-year pass rate

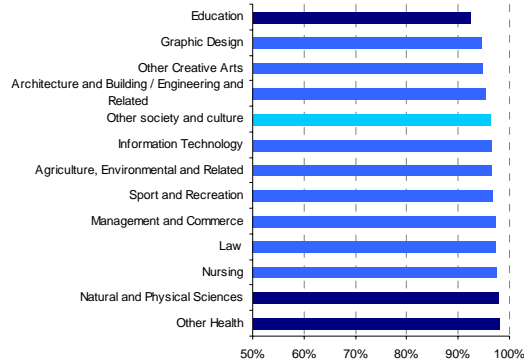


4.2 Degree subject

Subject of the qualification of enrolment, classified using NZSCED broad and selected narrow fields.

While there were differences in the first-year retention across subjects, most of the differences were not statistically significantly different from the reference group. Students in sciences and other health had a significantly higher chance of continuing in study than those in other society and culture. There was no significant difference between students in other society and culture and students in the remaining subjects, with the exception of education.

Figure 4.2: Predicted probabilities by subject

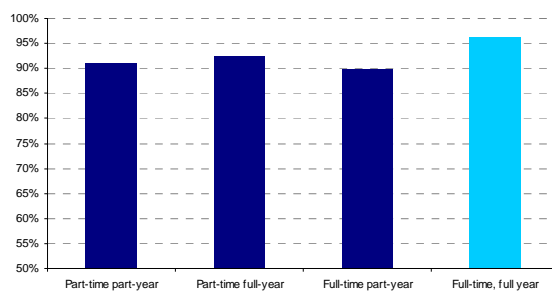


4.3 Study type

Whether full- or part-year and full- or part-time (includes all tertiary enrolments during the year, not just degree studies).

Students who were full-time, full-year in their first year had a significantly higher chance of continuing in study after one year than other students.

Figure 4.3: Predicted probabilities by study type



4.4 Starting year

The first year of study for each student. It is included in the model to control for the differing chances of each cohort of students being able to return to study. For example, those starting in 2002 have four years in which they could return, whereas those starting in 2005 only have one year within the timeframe.

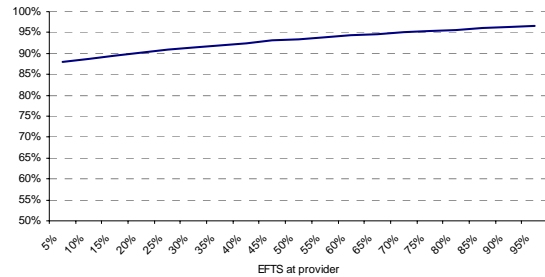
4.5 Percent of students at bachelors level and above

Percent of students at the provider enrolled a bachelors level and above.

This is a measure of the intensity of provision at bachelors and post graduate level within the provider.

Students at providers with a higher proportion of students at degree level and above were more likely to return to study. This is the opposite trend from first-year pass rates. This means that although students at providers with a lower proportion of degree and above students were more likely to succeed in their first year, they were less likely to continue in study.

Figure 4.4: Predicted percentile by percent of students at degree level and higher at provider



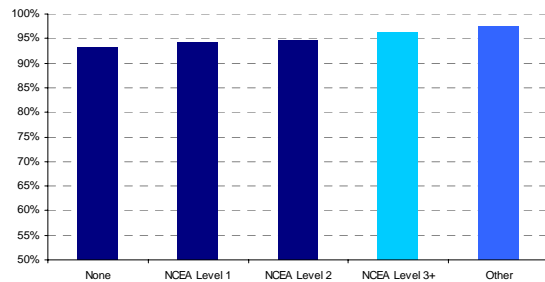
4.6 Highest school qualification

This is the highest level of NCEA qualification awarded to the student.

Students in this age group with qualifications below university entrance can enter degree study at an ITP, wānanga or PTE. Under certain circumstances they can apply for discretionary or provisional entrance to a university.

Students with qualifications below NCEA level 3 were slightly less likely to return to study, once other factors are controlled for, including first-year course outcomes.

Figure 4.5: Predicted probabilities by highest school qualification

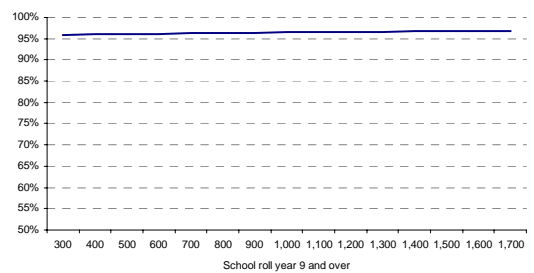


4.7 Year 9 and over school roll

Number of students enrolled in years 9 and over at the school that the student last attended, during the year the student last attended school.

Students from larger secondary schools were slightly more likely to return to study than those from smaller secondary schools.

Figure 4.6: Predicted probabilities by school roll year 9 and over



5 Return to study for Māori bachelors students studying within one or two years of leaving school (linked to NCEA results)

Model summary

Response variable	Proportion of first-year courses passed
Response levels	1. Returned to study (N=850) 2. Did not return (N=143)
Probability modelled is that the student returned to study at degree level in 2006 Predicted probabilities presented below refer to this event	
Number of observations used	1,003
Selection of observations	First-year degree students who left school in 2004 and enrolled in degree study in 2005 Intramural enrolments only
Max-rescaled R ²	0.3382

Type 3 analysis of effects

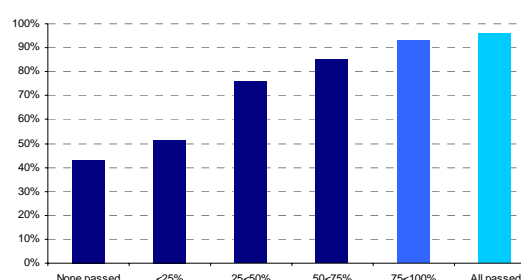
Effect	DF	Wald Chi-square	Pr > Chi-sq	Estimated contribution	Reference value (predicted probabilities)
First-year pass rate	5	116.8535	<.0001	72%	All passed
Degree subject	12	27.8345	0.0058	17%	Other society and culture
Percent of students at bachelors and above at provider	1	18.5897	<.0001	11%	91%

5.1 First-year pass rate

Percentage of first-year courses passed.

Students who passed at least 75 percent of their first year courses were more likely to continue in study than those who did not.

Figure 5.1: Predicted probabilities by first-year pass rate

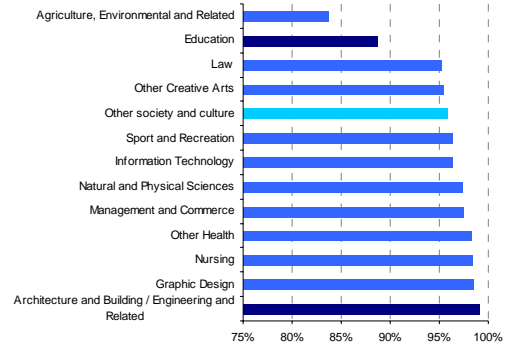


5.2 Degree subject

Subject of the qualification of enrolment, classified using NZSCED broad and selected narrow fields.

There was no significant difference between most subjects. Students in architecture, building and engineering were more likely to return to study than students in other society and culture. Students in education were quite a lot less likely to return to study.

Figure 5.2: Predicted probabilities by degree subject



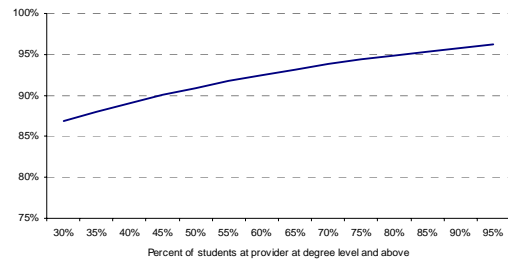
5.3 Percent of students at bachelors level and above

Percent of students at the provider enrolled a bachelors level and above.

This is a measure of the intensity of provision at bachelors and post graduate level within the provider.

Students at providers with a higher proportion of students at degree level and above were more likely to return to study. This is the opposite trend from first-year pass rates. This means that students at providers with a lower proportion of degree and above students were more likely to succeed in their first year, but less likely to continue in study.

Figure 5.3: Predicted percentile by percent of students at degree level and higher at provider



6 Completion for Māori bachelors students aged under 20

Model summary

Response variable	Whether or not completed a bachelors degree or bachelors with honours within five years of enrolling
Response levels	1. Completed (N=873) 2. Not completed (N=248)
Probability modelled is completed Predicted probabilities presented below refer to this event	
Number of observations	1,121
Selection of observations	Māori first-year degree students, who enrolled in 2001 and 2002 and completed more than 2.9 EFTS of degree study in the period to 2006 Three-year degrees only Intramural enrolments only
Max-rescaled R ²	0.4427

Type 3 analysis of effects

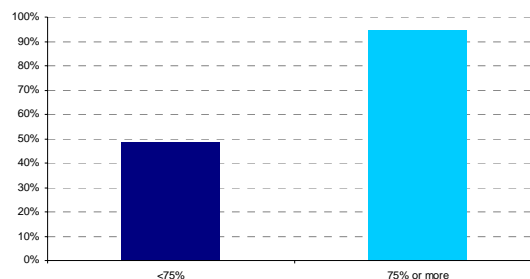
Effect	DF	Wald Chi-square	Pr > Chi-sq	Estimated contribution	Reference value (predicted probabilities)
Total pass rate	1	226.3594	<.0001	80%	More than 75%
Number of degree qualifications enrolled in	1	21.9191	<.0001	8%	1
Percent of EFTS at providers from postgraduate students	1	10.2379	0.0014	4%	15%
Number of years of degree study	1	8.3722	0.0038	3%	3
Starting year	1	7.4653	0.0063	3%	2002
Sub-sector	1	7.0784	0.0078	3%	Other

6.1 Total pass rate

The percentage of all degree courses that each student passed.

Maintaining a course pass rate of 75 percent or more of courses was the most critical success factor for completion. Those who passed 75 percent or more of their courses overall were almost twice as likely to complete a qualification.

Figure 6.1: Predicted probabilities by total course pass rate

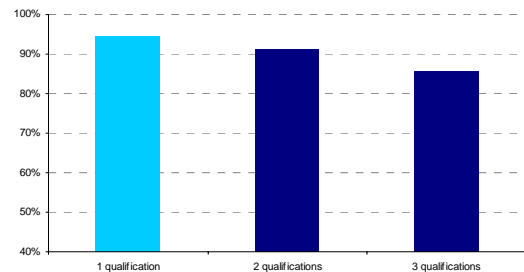


6.2 Number of degree qualifications enrolled in

The number of distinct degree qualifications that the student has enrolled in. This count doesn't include double majors within the same qualification or conjoint degrees with a single qualification code.

Students who enrolled in more than one degree qualification were less likely to complete any degree qualification within 5 to 6 years.

Figure 6.2: Predicted probabilities by number of qualifications enrolled in

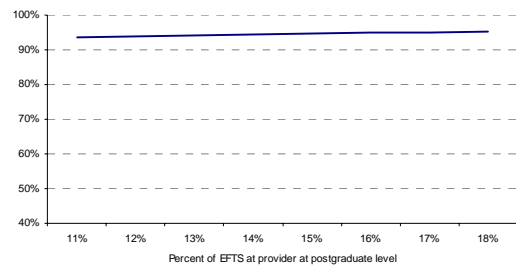


6.3 Percent of EFTS at provider from postgraduate students

The percent of postgraduate-level EFTS at the provider

Students at providers with a higher proportion of postgraduate students (in EFTS terms) were slightly more likely to complete a degree qualification.

Figure 6.3: Predicted probabilities by percent of postgraduate EFTS at the provider

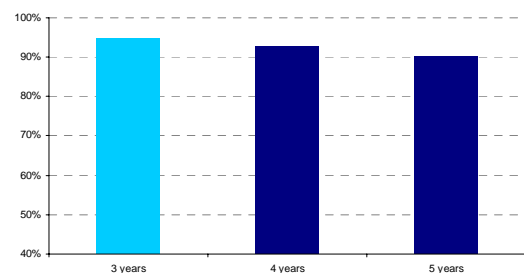


6.4 Number of years in degree study

The number of calendar years enrolled in degree study

Students who study more than 3 years at degree level had a lower chance of completing a qualification.

Figure 6.4: Predicted probability by number of years in degree study



6.5 Starting year

The first year of study for each student. It is included in the model to control for the 2001 starters having an extra year in which to complete.

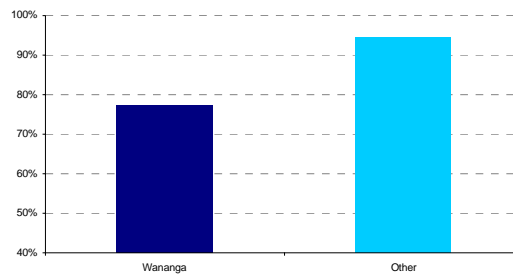
6.6 Sub-sector

Sub-sector groupings of providers, as at time of data collection:

For this model, the categories were reduced to wānanga and other sub-sectors. No statistically significant differences were found between other sub-sectors.

Students studying at wānanga were less likely to complete a qualification than those studying in other sub-sectors, even once they had completed at least 2.9 EFTS of degree study.

Figure 6.5: Predicted probabilities by sub-sector



7 First-year pass rates for Māori first-time bachelors students aged 25 to 39

Model summary

Response variable	Proportion of first-year courses passed
Response levels	1. <75% passed (N=2,573) 2. 75%-100% passed (N=2,426)
Probability modelled is that the proportion of first-year courses passed is 75% to 100% Predicted probabilities presented below refer to this event	
Number of observations	4,999
Selection of observations	Māori first-year degree students Enrolling in 2002 to 2006 inclusive
Max-rescaled R ²	0.2153

Type 3 analysis of effects

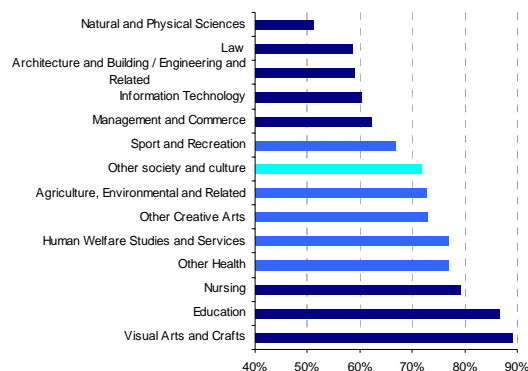
Effect	DF	Wald Chi-square	Pr > Chi-sq	Estimated contribution	Reference value (predicted probabilities)
Degree subject	13	234.1585	<.0001	43%	Other society and culture
Highest school qualification	4	82.4601	<.0001	15%	NCEA Level 3+
Prior activity	3	46.9817	<.0001	9%	Employed
Sub-sector	3	42.1552	<.0001	8%	University
EFTS enrolled by study type	3	39.9903	<.0001	7%	
EFTS enrolled	1	30.8751	<.0001	6%	0.61
Study type	3	23.837	<.0001	4%	Full-time, full-year
Age	1	14.7854	0.0001	3%	31
Highest school qualification by extramural status	4	10.5061	0.0327	2%	
Extramural status	1	10.0305	0.0015	2%	Intramural
School decile	1	7.473	0.0063	1%	4+

7.1 Degree subject

Subject of the qualification of enrolment, classified using NZSCED broad and selected narrow fields.

The chances of passing 75 percent or more of first year courses varied by subject. Students in nursing, education and visual arts and crafts were more likely to pass most of their courses. Students in science, law, architecture and engineering, and information technology were less likely to do so.

Figure 7.1: Predicted probabilities by subject



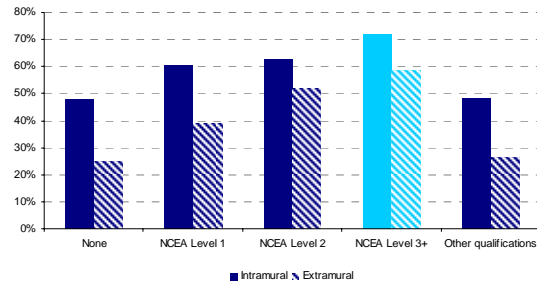
7.2 Highest school qualification by extramural status

Highest school qualification of the student is as reported at the time of enrolment. The older system of school qualifications has been mapped to equivalent NCEA levels. It has not been possible to separate out those who have met the university entrance requirements.

Extramural status is whether the student was learning extramurally, by distance learning and/or block courses, or intramurally, by regular class and tutorial attendance.

Students with no school qualifications or qualifications other than New Zealand school qualifications were less likely to pass most of their courses. Students with the equivalent of NCEA level 3 or above were more likely to pass most of their courses. Being an extramural student decreased the chances of passing all courses for all students. However, the effect was more marked for those with no school qualifications or only the equivalent of NCEA level 1.

Figure 7.2: Predicted probabilities by highest school qualification and extramural status



7.3 Prior activity

Main activity of the student prior to enrolment in degree programme:

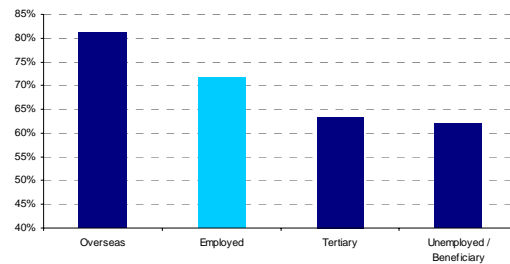
Tertiary – if the student was enrolled in a sub-degree programme in the year preceding or same year as degree enrolment

Employed; Unemployed/Beneficiary; Overseas – if the student was in neither school nor tertiary in the year prior to enrolment in degree study then used these activities as reported at enrolment

Unknown values were added into Employed on the basis that results for these students were not significantly different.

Students whose prior activity was tertiary study (below degree level) or unemployed had a lower chance of success in their first year than those who were in employment. Students returning from overseas had a much higher chance of success. However, their numbers were quite small.

Figure 7.3: Predicted probabilities by prior activity



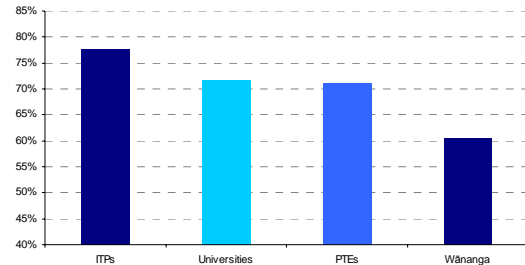
7.4 Sub-sector

Sub-sector groupings of providers, as at time of data collection.

Colleges of Education have been grouped with universities, to take account of recent mergers. Other Tertiary Education Providers have been grouped with Private Training Establishments.

Students at universities and PTEs had fairly similar results. Students at ITPs did better. However, results for students at wānanga were notably poorer.

Figure 7.4: Predicted probabilities by sub-sector



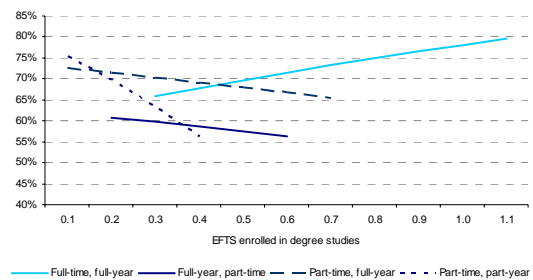
7.5 EFTS enrolled by study type

EFTS enrolled represents the proportional study load of each student in degree level studies, where 1.0 is a full-time, full-year study load.

Study type is a four-way classification of each student's overall tertiary study, including study below degree-level. It covers whether the student is full-time or part-time and enrolled for the full year or part of the year.

Students who studied a full, full-time year of degree study were most likely to pass 75 percent or more of their courses. Students who had studied part-time with a fairly large study load were also reasonably successful. However, students who were either part-time or part-year in tertiary study were likely to do less well the more degree studies they took on. This may be the result of balancing study with work and family demands. The group who did least well were full-year, part-time students, for who would have been balancing these demands over a longer time period.

Figure 7.5: Predicted probabilities by EFTS enrolled and study type

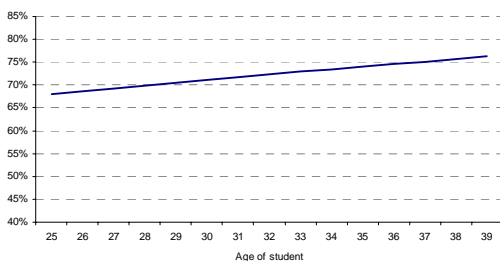


7.6 Age

Age of the student in the first year of degree study.

The chances of success increased with age, with the probability of passing 75 percent or more of courses increasing by about one percentage point for every two additional years of age.

Figure 7.6: Predicted probabilities by age



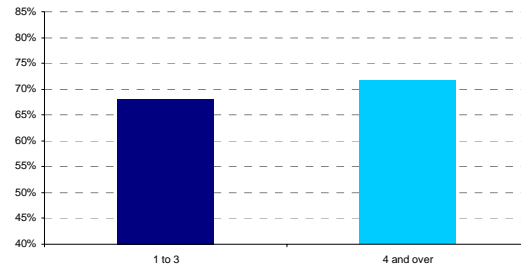
7.7 School decile

The decile ranking for purposes of TFEA funding of the last school attended by the student. Value is at the time of the student's last year at the school. The decile is allocated on a socio-economic deprivation index applied to a sample of families from the school, where 1 is the most deprived and 10 is the least deprived.

Decile was grouped into 1-3 and 4+ on the basis of testing statistical significance among individual deciles.

Students from low decile schools had a somewhat lower chance of success than those from medium and high decile schools – even when entering degree study as adult students. The difference, however, was less than the difference for students entering degree study directly from school.

Figure 7.7: Predicted probabilities by school decile



8 Return to study for Māori first-time bachelors students aged 25 to 39

Model summary

Response variable	Returned or didn't return to study following first year of study
Response levels	1. Returned to study (N=2,727) 2. Left study (N=1,561)
Probability modelled is continued in study Predicted probabilities presented below refer to this event	
Number of observations	4,288
Selection of observations	Māori first-year degree students Enrolling in 2002 to 2005 inclusive Returning to study within period to 2006
Max-rescaled R ²	0.3356

Type 3 analysis of effects

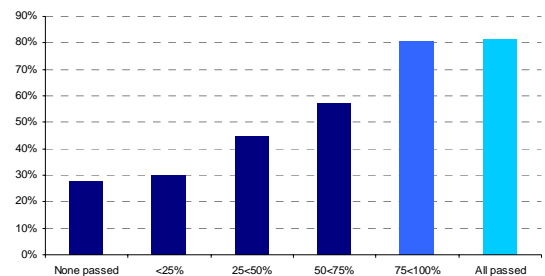
Effect	DF	Wald Chi-square	Pr > ChiSq	Estimated contribution	Reference value (predicted probabilities)
First-year pass rate	5	644.9414	<.0001	74%	All passed
Number of first-year courses	1	56.4301	<.0001	7%	6
Degree Subject	13	37.2574	0.0004	4%	Other society and culture
Sub-sector	3	35.8638	<.0001	4%	Institutes of technology and polytechnics
Extramural status	1	30.4018	<.0001	4%	Intramural
Sub-sector by extramural status	3	22.6337	<.0001	3%	
Starting year	3	19.1282	0.0003	2%	2006
Study type	3	15.6254	0.0014	2%	Full-time, full-year
Disability status	1	4.1665	0.0412	0%	With disability

8.1 First-year pass rate

The percentage of first-year courses that each student passed.

Students who passed 75 percent or more of their first-year courses were much more likely to continue in study. There was no difference between passing 75 percent of courses and passing all courses. That is, one or two failed courses in a full-time, full-year programme does not make a critical difference to continuing in study.

Figure 8.1: Predicted probabilities by first-year pass rate

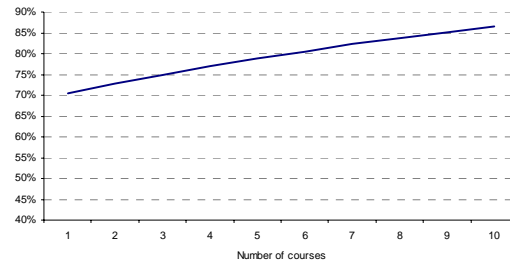


8.2 Number of first year courses

Number of courses taken in the first year of degree study

Students who took a greater number of courses in their first year were more likely to continue in study in subsequent years.

Figure 8.2: Predicted probabilities by number of first year courses

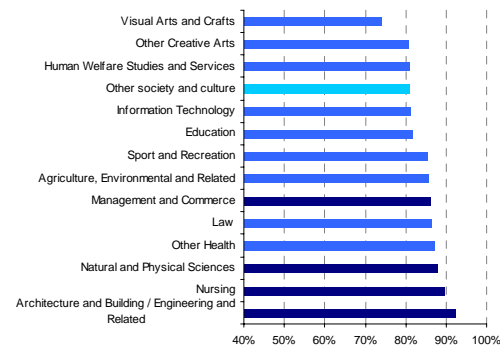


8.3 Degree Subject

Subject of the qualification of enrolment, classified using NZSCED broad and selected narrow fields.

There were some differences in probability of continuing in study across subjects. For most subjects, the probabilities were not statistically significantly different from the reference subject ('other society and culture'). The probability was statistically significantly higher in management and commerce, natural and physical sciences, nursing and architecture, building and engineering.

Figure 8.3: Predicted probabilities by subject



8.4 Sub-sector by extra-/intra-mural

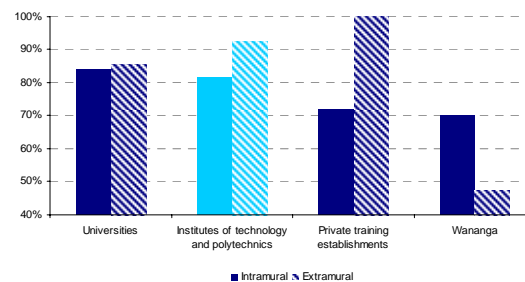
Sub-sector groupings of providers, as at time of data collection.

Colleges of Education have been grouped with universities, to take account of recent mergers. Other Tertiary Education Providers have been grouped with Private Training Establishments.

Extramural status is whether the student was learning extramurally, by distance learning and/or block courses, or intramurally, by regular class and tutorial attendance.

Intramural students at universities were more likely to return to study than intramural students in other sectors, especially wānanga and PTEs. However, extramural students at ITPs were the more likely to return to study than intra or extra mural students in other subsectors (the result for extramural PTEs students being statistically non-significant and based on very few cases). By contrast, extramural students at wānanga were the least likely to return to study.

Figure 8.4: Predicted probabilities by sub-sector and extra-/intra-mural



8.5 Starting year

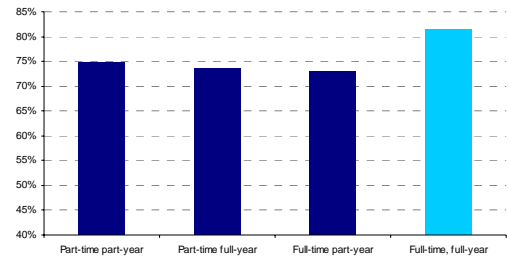
The first year of study for each student. It is included in the model to control for the differing chances of each cohort of students being able to return to study. For example, those starting in 2002 have four years in which they could return, whereas those starting in 2005 only have one year within the timeframe.

8.6 Study type

Whether full- or part-year and full- or part-time (includes all enrolments during the year).

Students who were not full-time, full-year in their first year were less likely to continue in study in the following year.

Figure 8.5: Predicted probabilities by study type

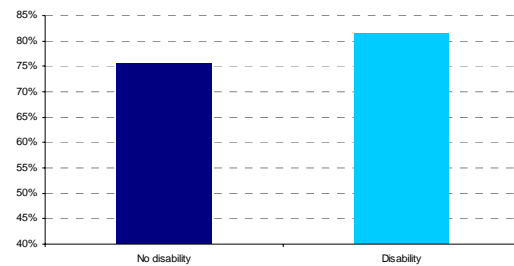


8.7 Disability

Whether the student reported having a disability that would affect his or her study at enrolment

Students with a disability were more likely to return to study than those without. A number of these students are likely to have disabilities as a result of accidents and be receiving support from ACC to retrain for a different career. This may explain the higher retention rates. Also, those with a disability may be more motivated to attain a qualification to secure an appropriate job.

Figure 8.6: Predicted probabilities by disability



9 Completion for Māori first-time bachelors students aged 25 to 39

Model summary

Response variable	Whether or not completed a bachelors degree or bachelors with honours within five years of enrolling
Response levels	1. Completed (N=518) 2. Not completed (N=191)
Probability modelled is completed Predicted probabilities presented below refer to this event	
Number of observations	709
Selection of observations	Māori first-year degree students who enrolled in 2001 and 2002 and completed more than 2.9 EFTS of degree study in the period to 2006 Three-year degrees only
Max-rescaled R ²	0.5420

Type 3 analysis of effects

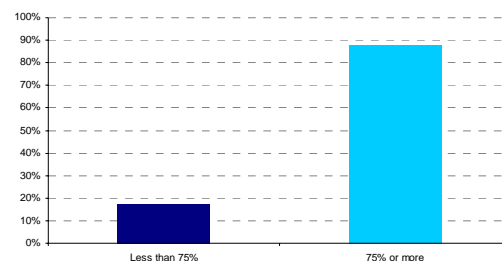
Effect	DF	Wald Chi-square	Pr > ChiSq	Estimated contribution	Reference value (predicted probabilities)
Total pass rate	1	166.72	<.0001	74%	Less than 75%
Sub-sector	3	26.655	<.0001	12%	Other
Average annual EFTS enrolled	1	14.037	0.0002	6%	1
Starting year	1	8.5856	0.0034	4%	2002
Degree subject	1	7.8344	0.0051	4%	Other

9.1 Total pass rate

The percentage of all degree courses that each student passed.

The most important factor in this model was whether students pass 75 percent or more of all of their courses. Students who didn't meet this pass rate were very unlikely to complete a degree within 5 to 6 years, even though they had studied at least 2.9 EFTS of degree level course work.

Figure 9.1: Predicted probabilities by total pass rate



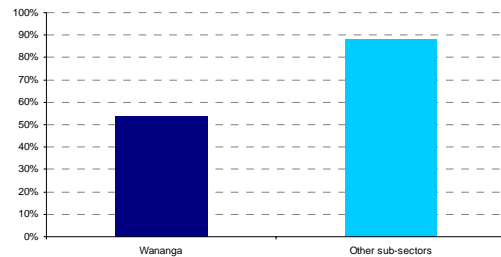
9.2 Sub-sector

Sub-sector groupings of providers, as at time of data collection.

For this model, the categories were reduced to wānanga and other sub-sectors. No statistically significant differences were found between other sub-sectors.

Students who began their degree study at a wānanga were less likely to complete within 5 to 6 years than students who started in other sub-sectors, even if they completed at least 2.9 EFTS of degree study.

Figure 9.2: Predicted probabilities by sub-sector

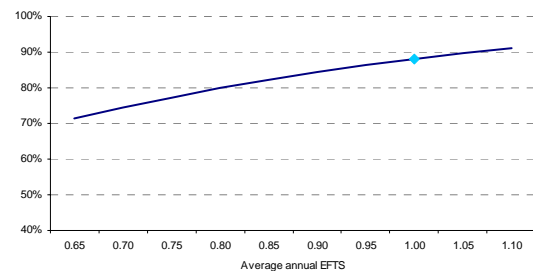


9.3 Average annual EFTS enrolled

The average of the EFTS enrolled by the student over the period of degree studies. The average is calculated based on the years the student was enrolled and excludes non-enrolled (or break) years.

Students who averaged a full-time, full-year enrolment over their period of degree studies were more likely to complete within 5 to 6 years than students who averaged a part-time or part-year enrolment, even when they completed at least 2.9 EFTS in both cases.

Figure 9.3: Predicted probabilities by annual average EFTS



9.4 Starting year

The first year of study for each student. It is included in the model to control for the 2001 starters having an extra year in which to complete.

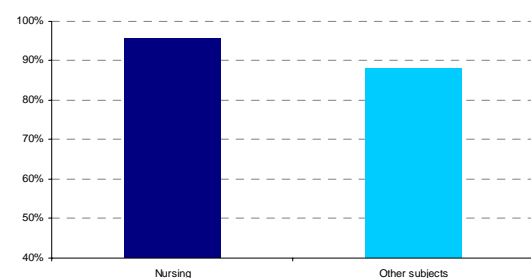
9.5 Subject

Subject of the qualification of enrolment, classified using NZSCED broad and selected narrow fields.

The only subject for which there was a statistically significant difference was nursing. So other subjects have been collapsed into a single category.

Nursing students were more likely to complete a degree within 5 to 6 years than students in other subjects, even when they had completed at least 2.9 EFTS in both cases.

Figure 9.4: Predicted probabilities by subject



References

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