



MINISTRY OF EDUCATION

*Te Tāhuhu o te Mātauranga*

## Post-school choices

*How well does academic achievement predict the tertiary education choices of school leavers?*

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This report forms part of a series called *Secondary to tertiary transitions*.

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**Acknowledgements**

The author gratefully acknowledges comments provided by Roger Smyth (Ministry of Education), Warren Smart (Ministry of Education), David Bromell (Ministry of Education), Tim Penney (Ministry of Education), Claire Harkess (Ministry of Education), Kirsty Weir (NZQA) and Boaz Shulruf on earlier drafts of this report. The author also gratefully acknowledges the assistance provided by Bhaskaran Nair (Ministry of Education) and Michael Johnston (NZQA), and Virginia Falealili, who proof-read this report.

All views expressed in this report, and any remaining errors or omissions, remain the responsibility of the author.

**Published by:**

Tertiary Sector Performance Analysis and Reporting  
Strategy and System Performance  
MINISTRY OF EDUCATION

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This report is available from the Ministry of Education's Education Counts website:  
[www.educationcounts.govt.nz](http://www.educationcounts.govt.nz)

May 2008

ISBN (Print) 978-0-478-13836-8  
ISBN (web) 978-0-478-13837-5

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## Post-school choices

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# 1 Summary

## Key findings

While academic achievement was a strong predictor of post-school choice, it had a stronger association with participation in bachelors-level study than other post-school choices.

Attaining a level 3 NCEA school qualification increased the likelihood of a school leaver participating in level 4 to 7 non-degree study at a tertiary education provider and bachelors-level study. However, attaining a level 3 NCEA qualification over a level 2 NCEA qualification did not increase the likelihood of a school leaver participating in industry training.

Attaining better results in level 1 NCEA standards increased the likelihood of a school leaver participating in level 4 to 7 non-degree study at a tertiary education provider and bachelors-level study, but not participation in industry training.

The association between academic achievement at secondary school and participation in bachelors-level study is well documented. However, what is less well known is the association between academic achievement and participation in lower-level tertiary study and industry training. The purpose of this study was to build a more detailed understanding of the association between academic achievement at secondary school and participation in the all the various types of tertiary education. While acknowledging that not everyone will ultimately want to access tertiary education, a better understanding of this association could assist policies that are intended to improve access to tertiary education for disadvantaged groups.

Previous studies have looked at transitions as a binary choice of tertiary or no tertiary, while some have looked at it by type of provider. Both of these methods have limitations given the wide range of qualifications offered by universities, polytechnics and wānanga. This study examines school leavers' choices between the labour market, industry training, level 1 to 3 certificate study at a tertiary education provider, level 4 to 7 non-degree study at a tertiary education provider and bachelors-level study.

To analyse how well academic achievement predicts the tertiary education participation of school leavers, generalised logistic regression was applied to the 53,000 students who left school in 2004. The advantage of using regression analysis in this study was that it could control for other factors, thus allowing for the association between academic achievement and post-school choices to be examined in isolation.

The study found that academic achievement at secondary school was a strong predictor of a school leaver's choice about tertiary education participation. Two aspects of academic achievement, the quality of results attained in level 1 NCEA standards and the level of NCEA qualification attained were significant in this choice. While academic achievement was a predictor of all the potential choices of tertiary education, it was strongest for predicting school leavers who participated in bachelors-level study. As might be expected, school leavers with higher levels of academic achievement were more likely to participate in bachelors-level study.

School leavers with a level 3 NCEA qualification were more likely to transition into bachelors-level and level 4 to 7 non-degree study than those with a level 2 qualification. This shows the importance of attaining a level 3 qualification for the aspirations of school leavers that participated in these higher-level tertiary education qualifications. This was not surprising given that a level 3 qualification is a

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prerequisite for most degree programmes. Better results in level 1 NCEA standards also resulted in a higher likelihood of participating in bachelors-level study and level 4 to 7 non-degree study for school leavers.

By contrast, school leavers with a level 3 NCEA qualification were not more likely to transition into level 1 to 3 certificate study or industry training than those with a level 2 NCEA qualification. However, school leavers with a level 2 NCEA qualification were more likely to transition into these types of tertiary education than school leavers with a level 1 or no NCEA qualification. Better results in level 1 NCEA standards meant that school leavers were less likely to participate in level 1 to 3 certificate study. This was likely to be due to better results opening up greater opportunities for tertiary study at higher levels. Better results were not a predictor of school leavers choosing to participate in industry training.

In addition to the different ways that academic achievement predicted participation in industry training from bachelors-level study, there were other differences in the factors that predict school leavers' post-school choice. Both the gender of a school leaver and the decile of the school they last attended were strong predictors of whether they participated in industry training but not for bachelors-level study. The influence of peers is a significant predictor of school leavers participating in bachelors-level study, especially for those from low-decile schools, but was a weaker predictor of school leavers participating in industry training.

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## 2 Introduction

The association between academic achievement at secondary school and school leavers' decisions about tertiary education is well documented in the literature. In their literature review, Leach & Zepke (2005) found that many studies have shown that academic aptitude and achievement is a critical factor in influencing peoples' decisions about their post-school lives. People who left school in 2004 with a level 3 qualification were twice as likely to enrol in tertiary education within two years than those who left with no qualification at all (Ussher 2007). Maani (2006) found that participation in tertiary education can be mainly explained by academic performance. The study found that passing year 12 increased the probability of participation in tertiary education by age 18 by 15.4 percentage points.

However, much of the previous research on the association between academic achievement and participation in tertiary education has looked at provider-based learning and particularly university study. Little is currently known about the association between academic achievement and participation in non-degree tertiary education, including industry training. Gaining a higher-level school qualification did not necessarily improve the transition rates into industry training for people who left school in 2004 (Ussher, 2007) but this association needs to be explored further.

The purpose of this study was to build a more detailed understanding of the association between academic achievement at secondary school and participation in the various types of tertiary education. Historically, groups who do not achieve well academically at school were also those who were under-represented in tertiary education. While acknowledging that not everyone will ultimately want to access tertiary education, a better understanding of this association could assist policies that are intended to improve access to tertiary education for disadvantaged groups.

This study was based on a longitudinal dataset that follows those people who left school in 2004 through their accumulation of National Certificate of Educational Achievement (NCEA) credits in secondary school and into tertiary education. The dataset allows the inclusion of a number of relevant variables from a person's time at secondary school, in addition to academic achievement variables. This dataset allows, for the first time, a complete cohort of New Zealand school leavers to be analysed. The study was also able to look at transitions into the various levels of tertiary study. Many previous studies have looked at transitions as a binary choice of tertiary or no tertiary, while some studies have looked at it by type of provider, which was not appropriate given the wide range of qualifications offered by universities, polytechnics and wānanga. An illustration of the limitations of a provider type analysis is the significant number of students enrolled at bachelors level or higher in polytechnics. Additionally, the dataset allowed participation in industry training to be analysed for the first time.

A statistical model, generalised logistic regression analysis, was used to model the association between participation in various types of tertiary education and academic achievement in secondary school, as well as other demographic and schooling-related variables. The advantage of using regression analysis in this study was that it could control for other factors, thus allowing for the association between academic achievement at secondary school and post-school choices to be examined in isolation.

While this study raises some interesting results about students' post-school choices, it has not attempted to answer why these results occurred. Further research could be undertaken to look into this.

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## 3 Data and methodology

### 3.1 Data

This study was based on a newly created longitudinal unit-record level dataset which follows a student through their achievement at senior levels of secondary school and on to enrolment in tertiary education. For full details of this dataset and definitions associated with it, refer to Ussher (2007).

This study relates to approximately 53,000 domestic students who left school during 2004 after having gained some credits towards the NCEA. The study modelled the probability of direct<sup>1</sup> transition into various areas of tertiary education. Only direct transitions were examined in this study for two reasons. First, the strong association that appeared to exist between academic achievement at secondary school and direct transitions into tertiary education was not as strong for indirect transitions (Ussher, 2007). Secondly, given the current short time-series available in the dataset, any analysis of indirect transitions at this point was going to be limited. In the future it will be possible to do a separate analysis of indirect transitions.

It is important to note that school leavers may have made a direct transition into more than one level of tertiary education. For the purposes of this study, where that occurred, those school leavers will only be counted as having transitioned into the highest level of tertiary education undertaken.

Once all the students for whom a variable of interest was missing were removed from the dataset, there were 45,626 students<sup>2</sup> left to include in the logistic regression model. A comparison of this sub-sample with the original dataset revealed few differences. Of these students, 45 percent chose to enter the labour market after leaving school in 2004, 12 percent enrolled in level 1 to 3 certificate study at a tertiary education provider, 8 percent participated in industry training, 11 percent enrolled in level 4 to 7 non-degree study at a tertiary education provider and 26 percent enrolled in bachelors-level study.<sup>3</sup> For further summary statistics of this data refer to Ussher (2007).

### 3.2 Dependent variable

Most previous research examines the tertiary education choice of school leavers as a simple binary choice question. A school leaver can choose to either participate in tertiary education or enter the labour market. Both Maani (2006) and Nguyen and Taylor (2003) found that multinomial models with a greater range of tertiary education choices were superior to the simple binary model. Maani (2006) examined the choice of New Zealand school leavers as a multinomial model where students had the choice between unemployment, employment, polytechnic or university. However, this ignores the varied levels of provision that occur at different types of providers. For example, polytechnics offer a range of qualifications from level 1 certificates up to doctoral degrees.

So one limitation of these earlier studies was that the choices available to school leavers were much wider than has been modelled. In this study, the range of choices available was widened to include the five types of tertiary education available through the dataset used in this study. The model assumes a school leaver has the choice between the labour market<sup>4</sup>, level 1 to 3 certificate study at a tertiary

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<sup>1</sup> For the purposes of this study, a direct transition was defined as when a student enrolls in tertiary education any time up to the end of the year after they left school.

<sup>2</sup> This is 86 percent of the original cohort of 2004 school leavers.

<sup>3</sup> Bachelors-level study includes all bachelors-degree enrolments, as well as all graduate certificates and diplomas and certificates of proficiency at level 7 on the New Zealand Register of Quality Assured Qualifications.

<sup>4</sup> The labour market choice is actually defined in the dataset as those school leavers who did not make a transition into tertiary education, where the labour market includes employment and unemployment. It is acknowledged that a school leaver may have other choices, such as travelling overseas or becoming a caregiver and that these choices have been combined with the labour market. However, it is considered that these other choices make up a very small proportion of school leavers.



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education provider, industry training, level 4 to 7 non-degree study at tertiary providers and bachelors-level study.

It has to be acknowledged that there are entry restrictions on some of these types of tertiary education. Particularly, many bachelors-degree programmes require university entrance<sup>5</sup> as a prerequisite for entry. University entrance may be completed as part of an NCEA level 3 qualification, though it is possible to gain university entrance without gaining an NCEA level 3 qualification. This means that very few school leavers with less than a level 2 NCEA qualification have the opportunity to participate in bachelors-degree study. However, a few were able to do so through progression from lower level tertiary study, or due to the less stringent entry requirements of polytechnics and wānanga.

### 3.3 Model of post-school choice

The decision about tertiary education participation is a complex process. Consequently, a number of models have been developed to attempt to describe this decision-making process. This study adopted the model of Hossler and Gallagher (1987) that theorises a three stage decision-making process. This model has been adopted in much other research (Stage and Hossler 1989, Cabrera and La Nasa 2000, Holdsworth and Nind 2005, Leach and Zepke 2005). Predisposition is the first stage where students make decisions about whether they want to participate in tertiary education after they finish secondary school. The second, the search stage, is the process where students consider what types of tertiary education they would like to participate in. Choice is the final stage where students select the tertiary provider they will attend. This study examined factors that predicted the predisposition and search stages.

Academic achievement appears to predict the tertiary education choice of school leavers across all stages of the three-stage model (Stage and Hossler 1989, Cabrera and La Nasa 2000). The limitation with much of the research that has shown this to be true was that it focused on university study and by proxy, bachelors-level. What is largely unknown is what association academic achievement has with the decisions of school leavers to participate in non-degree tertiary education.

Academic achievement at secondary school was represented by two variables in this model. First, the highest school qualification that a school leaver has attained was represented by the variable HSQ. This variable has four categories; no qualification, level 1 NCEA qualification, level 2 NCEA qualification, or a level 3 NCEA qualification. However, there are two aspects to NCEA qualifications, quantity and quality. Level of qualification attained captures just the quantity aspect and has a limited capacity to capture, for example, the range of ability between those just passing and those passing easily. This study used a second variable to capture the quality aspects of NCEA qualifications. The expected percentile was represented by the variable EXP and summarises result information of school leavers at level 1 of the NCEA. For more information on measures of performance in NCEA qualifications and a full definition of the expected percentile refer to the technical note in Appendix C of this report.

The expected percentile was calculated using level 1 NCEA achievement standards whatever school year they were attained in. This gives the most coverage and representation of the 2004 school leaver cohort as well as providing a consistent level of qualification to measure all students across. In addition, many previous studies have found that students decide whether they will participate in tertiary education very early (Leach and Zepke, 2005). Harker et al. (2001) found that more than half of students had made the decision to attend university in year 11 or before. So the decision to participate in tertiary education based on academic achievement was likely to be made earlier at secondary school rather than just before a student left school. However, it should be noted that this

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<sup>5</sup> University entrance requires a minimum of 42 credits at level 3 or higher. Within these credits there must be at least 14 credits in two separate subjects from a list of 'approved subjects'.

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means that academic achievement could potentially be endogenous (Nguyen and Taylor, 2003). Students who have decided before year 11 that they will participate in tertiary education after leaving school have a strong motivation to perform well academically.

The association with other personal characteristics such as gender and ethnic group was variable across previous research. Generally, after controlling for other factors, gender has not been found to predict the decision of school leavers to participate in tertiary education. However, Stage and Hossler (1989) found that factors predicted the tertiary education aspirations of females and males differently. Additionally, Maani (2006) found that, while holding all other factors constant, males were 11 percentage points more likely than females to enrol at a polytechnic rather than enter unemployment at the age of 18 years. The association ethnic group has with school leavers' decisions regarding tertiary education are likely to be highly country specific, therefore results from overseas literature may be misleading in a New Zealand context. In her New Zealand study, Maani (2006) found that ethnic group had no effect on explaining the decision to enter employment, polytechnic or university instead of unemployment.

To determine whether gender predicts the likelihood of choosing different tertiary education options, an explanatory variable (GENDER) was included in the regression model. This variable had a value of 0 if the school leaver was male and 1 if the school leaver was female. The ethnic group of a school leaver was represented by an explanatory variable with five categories (ETHNIC). These categories were: European, Māori, Pasifika, Asian and 'Other'.<sup>6</sup>

Many studies have found that parental expectations and support have a strong positive association with the tertiary education participation decision (Leach and Zepke 2005). Indeed, Cabrera and La Nasa (2000) and Harker et al. (2001) report that parental expectations and support was the strongest factor influencing students' decision making. Factors that have been shown to affect parental expectations and support are parental education, family income and family size. This current study uses quantitative data from administrative datasets, so the data available on the family background of school leavers was very limited with no variables available to directly measure this.

There is some evidence to suggest that schools can influence the decisions of school leavers to participate in tertiary education, particularly those in low decile schools (Boyd, 2007). The main factors within schools are teachers and career guidance staff, but some studies have found that certain school characteristics have an association with school leavers' choice of tertiary education. The decile of a school leaver's last secondary school (DECILE) was included in the regression model. Deciles were grouped into three categories, with decile 1, 2 and 3 schools making up the low category, decile 4, 5, 6, and 7 schools making up the medium category and decile 8, 9, and 10 schools the high category. Secondary schools draw their students from such wide areas that the socioeconomic conditions of people living within these wide areas will vary significantly. As such this study will not attempt to draw any conclusions about socioeconomic status based on the school decile variable.

Nguyen and Taylor (2003) found that attending a private school had a positive association with attending a four-year college while school size had only a slight association. This study used three additional school characteristics in the model, whether a school leaver went to a state<sup>7</sup> or private school (PRIVATE), whether a school leaver went to a coed or single sex school (COED), and the roll size of the secondary school a school leaver last attended (ROLL).

The influence of peers in the decision of school leavers to participate in tertiary education is perhaps less researched than other factors. Sokatch (2006) found that friends' plans and wishes were significant predictors of college enrolment for low socioeconomic, urban, minority public high school

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<sup>6</sup> For the purposes of this study ethnic group is measured using the prioritised method of reporting. Ethnic group is prioritised in the following order, Māori, Pasifika, Asian, 'Other', and European.

<sup>7</sup> State integrated schools are included in the state category.

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graduates. Maani (2006) included peer influence variables in a model of tertiary education choice and found that the proportion of peers who continue on to tertiary education had a positive association with the decision to attend university at the age of 18 years. An explanatory variable (PEER\_INF) was included in the model to represent the proportion of school leavers from the student's school and year level that transitioned directly into any type of tertiary education. In addition, an explanatory variable (PEER\_DEV) was included to determine the association between a school leaver's associations with deviant peers on the choice of tertiary education. This variable was measured by the proportion of students in a school leaver's school and year level that were either stood-down or suspended in 2004.

Ussher (2006) found that geographic access to tertiary education provision was a strong predictor of how far a student would travel to participate in tertiary education in New Zealand. What is not well researched is whether geographic access has an association with a school leaver's decision to participate in tertiary education. A continuous variable (ACCESS) was used to capture the association between geographic access and the choice of tertiary education. Ussher (2006) introduced this variable that is designed to measure a student's relative geographic access to tertiary education provision throughout New Zealand from the location of their last secondary school.

It is possible that local labour market conditions may have an association with the decision of a school leaver to choose tertiary education over the labour market. An explanatory variable (UNEMPLOY) that captures the unemployment rate in the region of New Zealand where the school leaver last attended secondary school was included in the model. Ideally, the model would have included youth unemployment rates but the sample error of these was too high to be considered.

### 3.4 Generalised multinomial logistic regression model

This study used generalised multinomial logistic regression to model the factors that predict the tertiary education choices of school leavers. As school leavers have five options available to choose from, the dependent variable was multinomial in make-up and takes the value of 0, 1, 2, 3, or 4. Use of ordinary least squares was not appropriate in this case as it will violate the assumption of normality and homoscedasticity of residuals and there was no assurance that the predicted value will lie between 0 and 1 (Allison 1999). Logistic regression analysis is often used to investigate the relationship between categorical responses and a set of explanatory variables (Allison 1999, Agresti 2002). Therefore this study used logistic regression to analyse the association between the explanatory variables and the tertiary education choice of school leavers.

Logistic regression uses a maximum likelihood procedure to generate logit coefficient estimates that can then be expressed as odds ratios. Multinomial logistic regression is the extension of the logistic regression model when the outcome is recorded at more than two levels (Agresti 2002). Two logistic regression models exist from multinomial responses, an ordinal response model and a nominal response model. This study treats the response variable as nominal as there was not a logical ordering to the choices of tertiary education. The generalised logistic regression model is used when the response variable is nominal.

The generalised logistic model essentially fits a binary logistic regression for each response category with a reference category, often the last response category (Agresti 2002). This study used the choice of the labour market as the reference response category and compared all other categories against this response. Labour market was chosen as the reference category because the model essentially compares all the different choices of tertiary study against choosing not to participate in tertiary study.

The generalised multinomial logistic regression model is presented in equation 1.

$$(1) \quad \log(\text{CHOICE}_i / (\text{CHOICE}_{\text{labour market}})) = \beta_1 + \beta_2 \text{HSQ} + \beta_3 \text{EXP} + \beta_4 \text{GENDER} + \beta_5 \text{ETHNIC} + \beta_6 \text{DECILE} + \beta_7 \text{PRIVATE} + \beta_8 \text{COED} + \beta_9 \text{ROLL} + \beta_{10} \text{PEER\_INF} + \beta_{11} \text{PEER\_DEV} + \beta_{12} \text{ACCESS} + \beta_{13} \text{UNEMPLOY} + \beta_{14} \text{EXP} * \text{HSQ} + \beta_{15} \text{HSQ} * \text{ETHNIC} + \beta_{16} \text{ETHNIC} * \text{DECILE} + \beta_{17} \text{PEER\_INF} * \text{HSQ} + \beta_{18} \text{DECILE} * \text{HSQ} + \beta_{19} \text{GENDER} * \text{ETHNIC} + \beta_{20} \text{DECILE} * \text{PEER\_INF} + \mu$$

Where  $\mu$  is an error term.

All the interaction effects above two levels are hard to interpret, and most importantly these effects are generally not statistically significant. So the interaction effects were considered at only two levels in this study.

### 3.5 Odds ratios

To aid with the interpretation of the logistic regression results, odds ratios are provided for the variable in question. Odds ratios are a widely used measure of the relationship between two variables that show how much more likely it was that someone with a certain characteristic will choose an outcome as compared to someone without that characteristic (Allison, 1999).

The odds of an event occurring is the probability that the event will happen divided by the probability that the event will not happen. Odds of greater than 1 mean the outcome was more likely to occur than not, while odds of less than 1 mean the outcome was less likely to occur than not. Take for example table 1, which shows the outcome variable of tertiary education choice by the gender of 2004 school leavers. The probability of participating in bachelors-level study for females was  $7,204/26,290 = 0.27$ , whilst the probability of not participating in bachelors-level study for females was  $19,086/26,290 = 0.73$ . So the odds of participating in bachelors-level study for females was  $0.27/0.73 = 0.38$ . This is more easily calculated by  $7,204/19,086 = 0.38$ . Similarly, the odds of participating in bachelors-level study for males was  $5,141/21,398 = 0.24$ .

An odds ratio is then used to compare two groups, in this example females and males. An odds ratio is calculated by dividing the odds in group 1 by the odds in group 2. For example, the odds ratio for participating in bachelors-level study for females in comparison to males was  $0.38/0.24 = 1.57$ .

The odds ratio was greater than 1, thus we can conclude that females were more likely to participate in bachelors-level study than males. The odds ratio suggests that the odds of participating in bachelors-level study for females were 1.57 times the odds of participating in bachelors-level study for males. It can also be interpreted as the odds of participating in bachelors-level study were 57 percent higher for females (Allison, 1999).

Results of the logistic regression model were reported as predicted odds ratios because they control for other variables in the model.

**Table 1: Tertiary education choice by gender for 2004 school leavers**

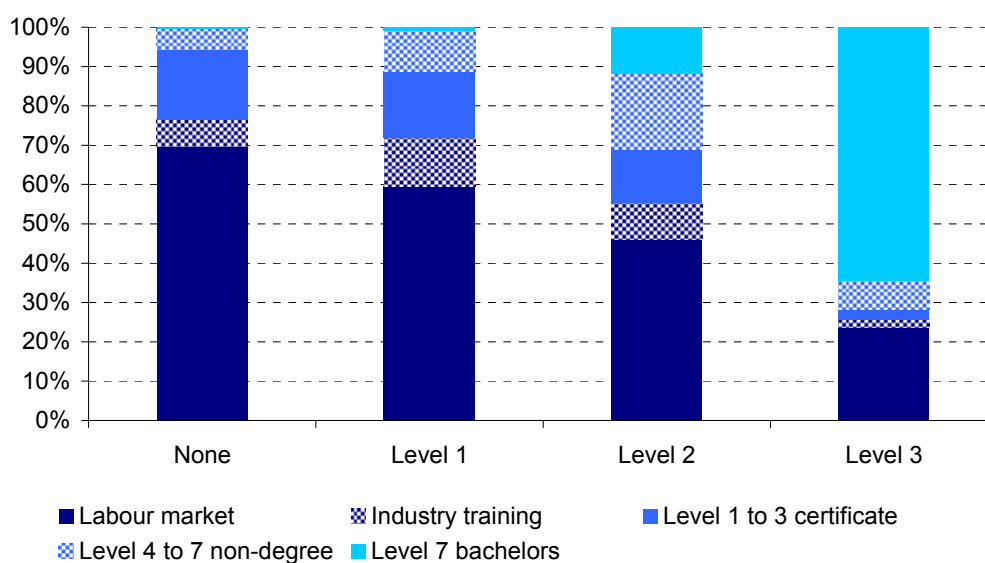
| Choice                   | Female | Male   | Total  |
|--------------------------|--------|--------|--------|
| Labour market            | 12,166 | 12,833 | 24,999 |
| Industry training        | 866    | 2,841  | 3,707  |
| Level 1 to 3 certificate | 3,095  | 3,099  | 6,194  |
| Level 4 to 7 non-degree  | 2,959  | 2,624  | 5,583  |
| Bachelors level          | 7,204  | 5,141  | 12,345 |
| Total                    | 26,290 | 26,539 | 52,829 |

## 4 Tertiary education choices of school leavers

### 4.1 Transition rates for school leavers

The tertiary education choices of school leavers differ markedly depending on what level of qualification they had attained when they left school. Figure 1 shows that for students who left school in 2004 with no NCEA qualification, 30 percent participated in some type of tertiary education directly after leaving school. For students who left school with a level 3 NCEA qualification this increased to 76 percent, including 65 percent who studied at bachelors level. The differences however were not as marked across all tertiary education choices. For example, with the exception of those with a level 3 NCEA qualification, school leavers transition into industry training at similar rates.

**Figure 1: Direct transition rates of 2004 school leavers by highest school qualification**



The trend was very similar when looking at the quality of results achieved in level 1 NCEA standards as measured by the expected percentile. Table 2 shows that the probability of participating in bachelors-level study for school leavers in the highest achievement quintile was 62 times higher than the lowest quintile and about 12 times higher than the second lowest quintile. In addition, school leavers from the highest achievement quintile were about six times more likely to participate in bachelors-level study than all other types of tertiary education combined.

**Table 2: Direct transition rates of 2004 school leavers by expected percentile quintile**

|                          | Quintile 1 | Quintile 2 | Quintile 3 | Quintile 4 | Quintile 5 |
|--------------------------|------------|------------|------------|------------|------------|
| Labour market            | 64%        | 55%        | 47%        | 37%        | 28%        |
| Industry training        | 8%         | 10%        | 9%         | 6%         | 2%         |
| Level 1 to 3 certificate | 19%        | 17%        | 14%        | 8%         | 3%         |
| Level 4 to 7 non-degree  | 8%         | 13%        | 16%        | 12%        | 5%         |
| Bachelors level          | 1%         | 5%         | 14%        | 37%        | 62%        |

Note: The quintile is the proportion of a ranked dataset that has been divided into five equal-sized groups.

These results suggest that the academic achievement of school leavers was a strong predictor of their tertiary education choices. However, other confounding factors were likely to mask the association between academic achievement and tertiary education choices. The purpose of using regression analysis was that it enables us to isolate the association between each factor and the likelihood of each choice. The results of the regression analysis are explored in the following section.

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## 4.2 Logistic regression results<sup>8</sup>

### *Goodness of fit*

Various model specifications were trialled in the regression modelling. While neither of the variables COED or PEER\_DEV had a statistically significant influence on the tertiary education choice of school leavers they have been left in the model. Other than the seven interaction effects that remain in the regression model no other two-level interaction effects had a statistically significant association with, or were theoretically relevant to the tertiary education choice of school leavers and so these variables were dropped from the model.

The goodness of fit of the model was good with a pseudo  $R^2$  value of around 0.48. This suggests that the model has strong explanatory power. However, it also shows that factors outside of the ones included in the regression model were associated with the tertiary education choice of school leavers. Of course, research has shown that family background is a strong influence on the tertiary education choices of school leavers and this model does not fully account for the effects of factors such as parental expectations and family income.

### *How well does academic achievement predict the tertiary education choices of school leavers?*

The results of the logistic regression analysis indicate that academic achievement at secondary school has a strong association with a school leaver's choice about tertiary education participation. So the strong relationship that exists in the summary statistics remains once all other factors were taken into account. Both the highest school qualification and expected percentile variables were strong predictors of school leavers' tertiary education choices. This implies that both the quality of results attained and the quantity of credits attained were significant in this choice.

The association between highest school qualification and the tertiary education choice of school leavers can best be illustrated by showing the predicted odds ratios for differing levels of highest school qualification. Figure 1 shows that the predicted odds of a school leaver with a level 3 NCEA qualification participating in bachelors-level study were much greater than for a school leaver with a level 2 NCEA qualification. Similarly, school leavers with a level 3 NCEA qualification were much more likely to participate in level 4 to 7 non-degree study at a tertiary education provider than those whose highest NCEA qualification was at level 2. This shows the importance of attaining a level 3 NCEA qualification for the aspirations of school leavers in participating in higher-level tertiary education.

By contrast, the likelihood of a school leaver participating in industry training or a level 1 to 3 certificate at a tertiary education provider were not improved by attaining a level 3 NCEA qualification over a level 2 NCEA qualification. However, attaining a level 2 NCEA qualification over a level 1 or no NCEA qualification improves the likelihood of a school leaver participating in industry training or a level 1 to 3 certificate. This is interesting because, without adjusting for other factors, the likelihood of participating in both these types of tertiary education was less for school leavers with a level 2 NCEA qualification than for those with a level 1 NCEA qualification.

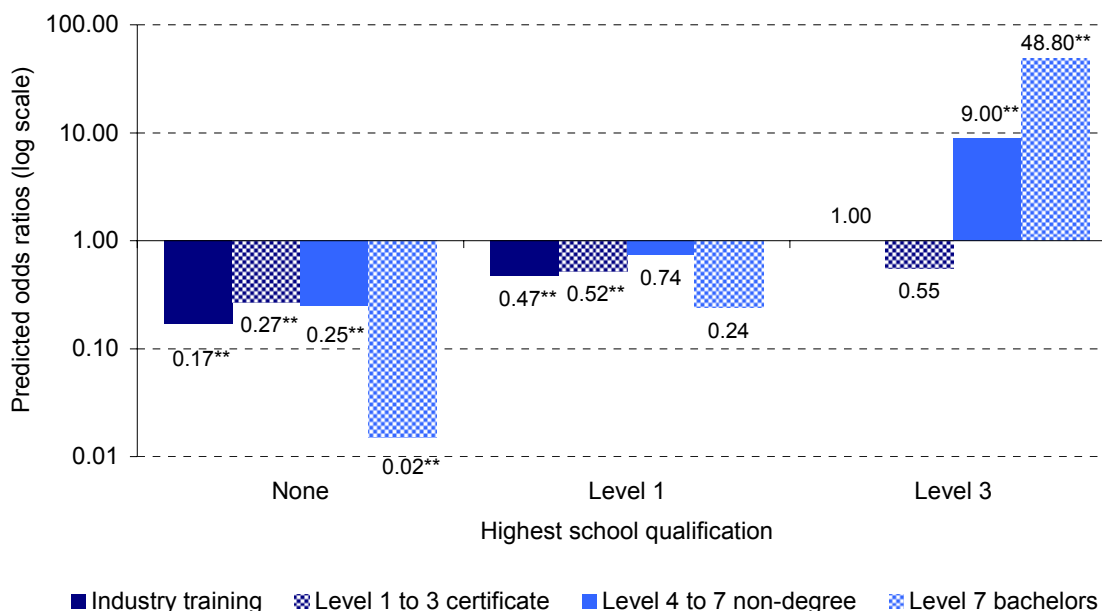
These adjusted results were not surprising and perhaps make more sense than the unadjusted results. A level 3 qualification is a prerequisite for most degree programmes and as such, few school leavers with less than this school qualification could expect to participate in bachelors-level study. The Ministry of Education (2006) reports that a level 2 school qualification is regarded as the minimum level at which students have gained the foundation skills needed for employment, as well as further

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<sup>8</sup> The logit coefficients of the explanatory variables and their associated standard errors are presented in Table 5 in Appendix A. The predicted odds ratios for all the explanatory variables are presented in Table 6 in Appendix B. The regression results were obtained using SAS Enterprise Guide 3.

study. Therefore, it could be expected that a level 2 school qualification provides a good base from which to enter non-degree tertiary education.

**Figure 2: Predicted odds ratios of tertiary education choice by highest school qualification – compared to a level 2 NCEA qualification**



Notes:

1. The reference category for the dependent variable of tertiary education choice was the labour market.
2. The reference category for highest school qualification was a level 2 NCEA qualification.
3. \*\* represents significant at the 1 percent level of significance.

Table 3 shows that a 1 percentage point increase in the expected percentile was associated with a 6.5 percent increase in the predicted odds of a school leaver participating in bachelors-level study. There was no surprise here, given it is common knowledge that higher achieving students are more likely to study at bachelors level. This shows that for school leavers with a similar school qualification (in this case the reference category of level 2), those who achieved better results in level 1 NCEA standards had a greater likelihood of studying at bachelors level. Therefore those students who were motivated to achieve good results (ie. merit and excellence) were more likely to transition into bachelors-level study than those students who ‘just do enough’ in level 1 NCEA standards.

**Table 3: Predicted odds ratios of tertiary education choice by expected percentile**

|                      | Industry training | Level 1 to 3 certificate | Level 4 to 7 non-degree | Level 7 bachelors |
|----------------------|-------------------|--------------------------|-------------------------|-------------------|
| Predicted odds ratio | 0.994             | 0.984**                  | 1.005*                  | 1.065**           |

Notes:

1. The reference category for the dependent variable of tertiary education choice was the labour market.
2. \*, \*\* represents significant at the 5 percent and 1 percent levels of significance, respectively.
3. The predicted odds ratios represent the change in odds for each 1 percent increase in the expected percentile.

An increase in the expected percentile was also associated with an increase in the predicted odds of a school leaver participating in level 4 to 7 non-degree study at a tertiary education provider. This increase is, however, a lot less than that associated with bachelors-level study.<sup>9</sup>

However, a 1 percentage point increase in the expected percentile was associated with a 1.6 percent decrease in the predicted odds of a school leaver participating in level 1 to 3 certificate study at a tertiary education provider. This means gaining better results in level 1 NCEA standards actually

<sup>9</sup> As determined through 95% confidence intervals of the odds ratios.

reduces the likelihood of a school leaver participating in these types of tertiary education. This corresponds with the unadjusted results shown in table 2 where transition rates into level 1 to 3 certificate study at a tertiary education provider decreased with an increase in the expected percentile quintile. The likely explanation for this is that, as the expected percentile of school leavers increased they were more likely to choose to study at bachelors level and less likely to consider any other tertiary education options.

The expected percentile was not a statistically significant predictor for the choice of industry training, which means that an increase in the expected percentile did not result in a change in the likelihood of a school leaver choosing to participate in industry training. This was an indication that the association between academic achievement at secondary school and participation in industry training was less significant than it was for bachelors-level study.

The interaction variable between highest school qualification and expected percentile was also statistically significant in the model of post-school choices. This means that the expected percentile predicts post-school choices differently for school leavers with different levels of NCEA qualifications. As shown in table 4, while a 1 percentage point increase in the expected percentile increases the predicted odds of participating in bachelors-level study for school leavers with either a level 2 or level 3 NCEA qualification, the increase was much greater for level 2 qualifications (6.5 percent) than level 3 qualifications (3.3 percent). This is plausible, as a school leaver with a level 2 qualification would not normally gain admittance to bachelors-level study<sup>10</sup> and it was likely only the highest achieving students would do so.

**Table 4: Predicted odds ratios of tertiary education choice by expected percentile and highest school qualification**

|                            | Industry training | Level 1 to 3 certificate | Level 4 to 7 non-degree | Level 7 bachelors |
|----------------------------|-------------------|--------------------------|-------------------------|-------------------|
| No NCEA qualification      | 1.008*            | 1.003                    | 1.012**                 | 1.047**           |
| Level 1 NCEA qualification | 1.007*            | 0.991*                   | 1.005                   | 1.048**           |
| Level 2 NCEA qualification | 0.994             | 0.984**                  | 1.005*                  | 1.065**           |
| Level 3 qualification      | 0.981**           | 0.967**                  | 0.963**                 | 1.033**           |

Notes:

1. The reference category for the dependent variable of tertiary education choice was the labour market.
2. \*, \*\* represents significant at the 5 percent and 1 percent levels of significance, respectively.
3. The predicted odds ratios represent the change in odds for each 1 percent increase in the expected percentile.

For industry training the results were mixed. For school leavers with a level 2 NCEA qualification, the expected percentile was not statistically significant. For school leavers with either no NCEA qualification or a level 1 NCEA qualification, an increase in the expected percentile results in a slight increase in the likelihood of participating in industry training. However, for school leavers with a level 3 NCEA qualification, an increase in the expected percentile results in a decrease in the likelihood of participating in industry training. Again this is likely to be linked to the assertion that high achieving school leavers with a level 3 qualification would be less likely to consider tertiary education options other than bachelors-level study.

### *Gender and ethnic group*

Gender was a strong predictor in the choice of industry training as a tertiary education destination. The predicted odds of a male school leaver transitioning into industry training were almost 300 percent higher than the predicted odds for female school leavers. However, gender was not a statistically significant predictor for transition into any other types of tertiary education. This means that the female bias in bachelors-level study was reduced once all other factors were taken into account. It is likely

<sup>10</sup> While a level 3 NCEA qualification is not required for entrance to university, the University Entrance standard is attained through the gaining credits in level 3 NCEA standards.



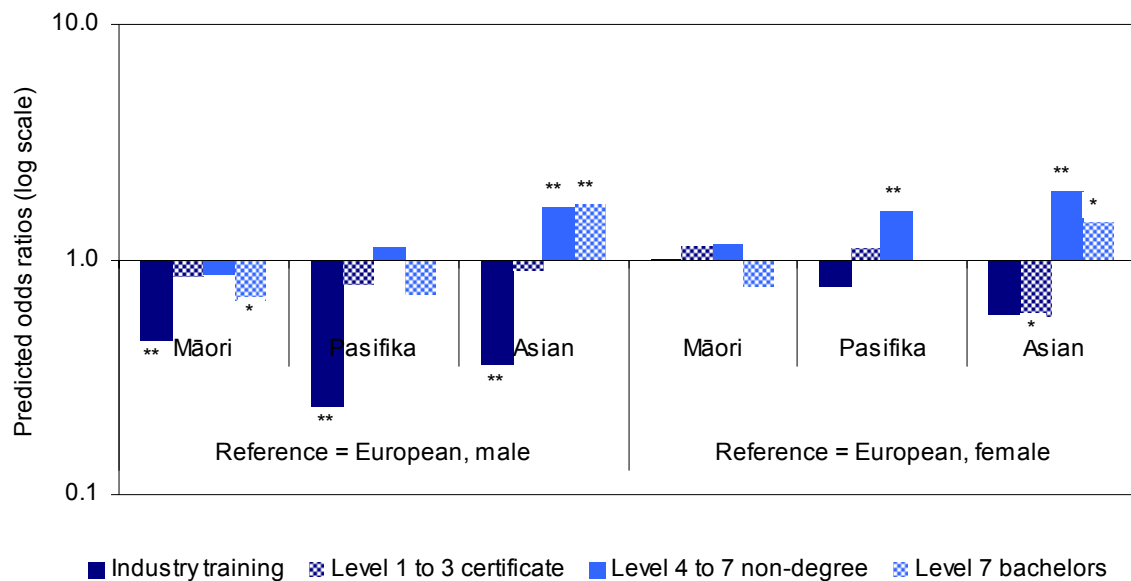
that the lower proportion of male school leavers transitioning into bachelors-level study is because males are achieving lower academically than females at secondary school.

The ethnic group of a school leaver was also associated with post-school choice, although the magnitude of this association was relatively small. The interaction variable between ethnic group and gender was also significant in the model of post-school choices, which means that ethnic group as a predictor of post-school choice affects females and males differently.

Figure 3 shows that the likelihood of participating in industry training and bachelors-level study was lower for male Māori school leavers than for male European school leavers. However, there was no statistically significant difference in female Māori school leavers participating in any type of tertiary study in comparison to female European school leavers. The likelihood of participating in industry training for male Pasifika school leavers was lower than for male European school leavers. After adjusting for all other factors, there was no statistically significant difference in the transition rate of Pasifika school leavers into bachelors-level study in comparison with European school leavers.

Even when adjusting for all other factors in the model, Asian school leavers were more likely to participate in bachelors-level and level 4 to 7 non-degree study than other ethnic identities. Male Asian school leavers were less likely to transition into industry training than their male European counterparts.

**Figure 3: Predicted odds ratios of tertiary education choice by gender for Māori, Pasifika and Asian school leavers compared to European school leavers**



Notes:

1. The reference category for the dependent variable of tertiary education choice was the labour market.
2. The reference category for ethnic group was European.
3. \*, \*\* represents significant at the 5 percent and 1 percent levels of significance, respectively.
4. Ethnic group was measured using the prioritised method of reporting.

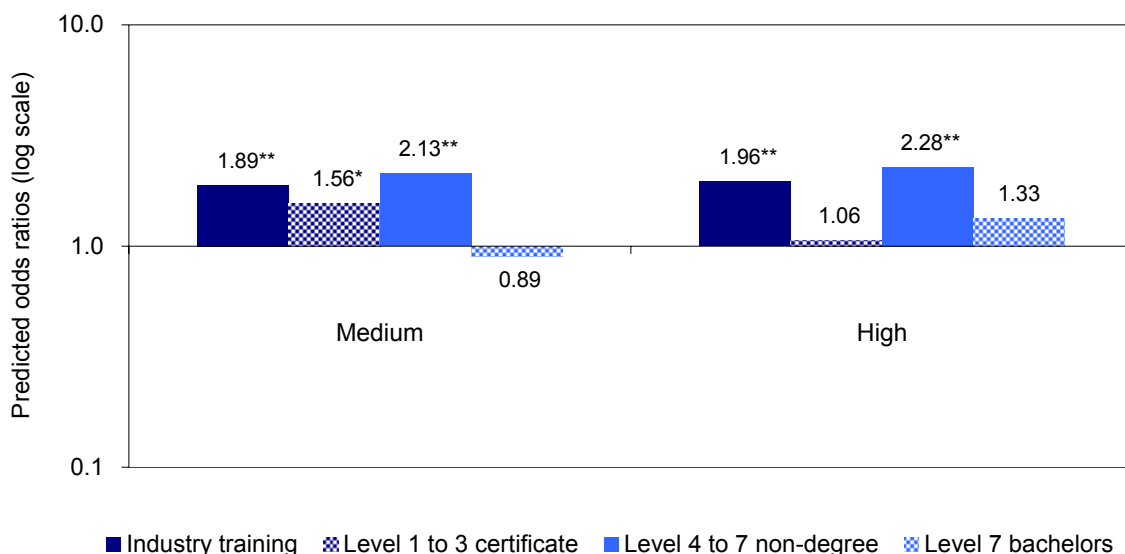
### School characteristics

The decile of the school that a leaver last attended was associated with their post-school choice, although the magnitude of this difference was relatively small and occurred only in relation to some types of tertiary education. Figure 4 shows that the likelihood of a school leaver participating in bachelors-level study was not significantly associated with the decile of the school they last attended. This result suggests that if students achieved academically while at school there were no school decile

barriers to participate in bachelors-level study. There was also very little difference in participation in level 1 to 3 certificate study at a tertiary education provider for school leavers from different decile schools.

The likelihood of participating in industry training or level 4 to 7 non-degree study at a tertiary education provider was higher for school leavers from medium or high decile schools than for school leavers from low decile schools. These are both vocational types of tertiary education and so it is apparent that school decile was associated with the choice of vocational tertiary education.

**Figure 4: Predicted odds ratios of tertiary education choice for school leavers from medium and high decile schools compared to low decile schools**



Notes:

1. The reference category for the dependent variable of tertiary education choice was the labour market.
2. The reference category for school decile was low decile schools.
3. \*, \*\* represents significant at the 5 percent and 1 percent levels of significance, respectively.

There were also some interesting interaction effects happening around school decile. The interaction variable between school decile and ethnic group was significant in the model of post-school choices, which means that school decile affects ethnic groups as a predictor of post-school choices differently. Generally, the association between school decile and post-school choices was strongest for European school leavers. In terms of type of tertiary education, the combined prediction of school decile and ethnic group was strongest for those school leavers transitioning into industry training; however it did not predict any ethnic groups in terms of transitions into bachelors-level study.

The interaction variable between school decile and highest school qualification was also statistically significant, meaning that school decile predicts post-school choices differently for school leavers with different levels of NCEA qualifications. The association between school decile and post-school choices was strongest for those students who left school with a level 2 NCEA qualification. It was not such a strong predictor for those who left school with a level 3 NCEA qualification. Again, school decile did not predict the choice of participating in bachelors-level study.

### *The influence of peers on tertiary education choice*

In general, the results of the logistic regression support the notion that peers strongly influence the tertiary education choices of school leavers. Across all choices of tertiary education, an increase in the proportion of peers that transitioned into tertiary education led to an increase in the likelihood of a

school leaver participating in tertiary education. This association was greatest for school leavers transitioning into bachelors-level study and lowest for those transitioning into industry training.

In addition, the interaction variable between peer influence and highest school qualification was significant in the model post-school choices, which means that the influence of peers affects school leavers differently depending on the level of NCEA qualification they have attained. Generally, the influence of peers was greater for those school leavers with no or low NCEA qualifications and less for those with a level 3 NCEA qualification.

There was also an interaction between peer influence and school decile, with the influence of peers being a stronger predictor of post-school choice for school leavers from low decile schools than it was for school leavers from high decile schools. In some ways this result was in agreement with the findings of Sokatch (2006) that the influence of peers in college-attending decisions was stronger for low socio-economic status youth.

**Table 5: Predicted odds ratios of tertiary education choice by peer influence and school decile**

|                       | Industry training | Level 1 to 3 certificate | Level 4 to 7 non-degree | Level 7 bachelors |
|-----------------------|-------------------|--------------------------|-------------------------|-------------------|
| Low decile schools    | 1.012**           | 1.018**                  | 1.036**                 | 1.061**           |
| Medium decile schools | 1.003             | 1.008**                  | 1.025**                 | 1.053**           |
| High decile schools   | 1.001             | 1.014**                  | 1.024**                 | 1.048**           |

Notes:

1. The reference category for the dependent variable of tertiary education choice was the labour market.
2. \*\* represents significant at the 1 percent levels of significance.
3. The predicted odds ratios represent the change in odds for each 1 percent increase in the peer influence variable.

### *Geographic access as a predictor of post-school choice*

The regression modelling showed that an improvement in the geographic access school leavers had to tertiary education provision did not lead to an increase in the likelihood of participating in provider-based tertiary education. This means, holding all other factors constant, those students who live in areas remote from tertiary education provision do not appear to be disadvantaged when it comes to participating in tertiary education.

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## 5 Conclusion

The results of this study show that academic achievement while at secondary school was a strong predictor of school leavers' post-school choices regarding the labour market and tertiary education. The two aspects of academic achievement measured in this study, level of NCEA qualification attained and quality of results in NCEA level 1 standards, were statistically significant in the post-school decisions of school leavers. But, while academic achievement at secondary school was a predictor of all of the potential choices of tertiary education, it was strongest in predicting participation in bachelors-level study. As might be expected, school leavers with higher levels of academic achievement were more likely to participate in bachelors-level study.

The association between academic achievement and post-school choices was not consistent across all types of tertiary education. While attaining a level 3 qualification over a level 2 qualification was a strong predictor of participation in bachelors-level study and level 4 to 7 non-degree study at a tertiary education provider, this was not so for participation in industry training or level 1 to 3 certificate study. The key predictor at these levels was to attain a level 2 qualification over lower level qualifications. In addition, the quality of results attained in level 1 NCEA standards was not a predictor for participation in industry training, unlike other types of tertiary education.

Given that the decision to participate in tertiary education was likely to be made by a student early on at secondary school, that decision could be an influence on how they achieve academically at school, rather than the other way around. Students who have decided before year 11 that they will participate in tertiary education after leaving school have a strong motivation to perform well academically. More research would need to be undertaken to fully understand this relationship between academic achievement at secondary school and the decision to participate in tertiary education.

In addition to the different predictions of academic achievement for the participation of school leavers in industry training from bachelors-level study, there were other differences in the factors that predict these decisions. Both the gender of a school leaver and the decile of the school they last attended were strong predictors of whether they will participate in industry training but not for participation in bachelors-level study. The influence of peers was a significant predictor for school leavers participating in bachelors-level study, especially for those from low-decile schools. This factor was a weaker predictor for school leavers participating in industry training than it does for those participating in bachelors-level study.

The lack of family background variables in this model was of concern, given that previous studies have found this to be a significant influence in school leaver's post-school choices. However, Maani (2006) found that other than family income influencing participation at a university, no family background variables were predictors of post-school choices. A further study by Maani and Kalb (2006) found that academic achievement at secondary school was explained by many family background factors. So it is possible that family background actually has an indirect influence on participation in tertiary education through academic achievement at secondary school rather than a direct influence.

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## Appendix A: Regression output

**Table 6: Generalised logit regression estimates**

| Explanatory variable | Categories         | Post-school choices (reference = labour market) |           |                          |           |                         |           |                   |           |
|----------------------|--------------------|---|-----------|--------------------------|-----------|-------------------------|-----------|-------------------|-----------|
|                      |                    | Industry training                               |           | Level 1 to 3 certificate |           | Level 4 to 7 non-degree |           | Level 7 bachelors |           |
|                      |                    | Coefficient                                     | Std error | Coefficient              | Std error | Coefficient             | Std error | Coefficient       | Std error |
| EXP                  |                    | -0.006  | 0.003     | -0.016**                 | 0.003     | 0.005*                  | 0.002     | 0.063**           | 0.003     |
| HSQ                  | None               | -1.757**  | 0.284     | -1.296**                 | 0.217     | -1.386**                | 0.291     | -4.053**          | 1.025     |
|                      | Level 1            | -0.741**  | 0.279     | -0.637**                 | 0.237     | -0.292                  | 0.266     | -1.410            | 0.747     |
|                      | Level 2            |   |           |                          |           |                         |           |                   |           |
|                      | Level 3            | 0.001   | 0.508     | -0.587                   | 0.449     | 2.197**                 | 0.321     | 3.888**           | 0.278     |
| GENDER               | Female             |   |           |                          |           |                         |           |                   |           |
|                      | Male               | 1.358**   | 0.053     | -0.043                   | 0.040     | -0.003                  | 0.041     | 0.030             | 0.039     |
| ETHNIC               | European           |   |           |                          |           |                         |           |                   |           |
|                      | Māori              | 0.002   | 0.152     | 0.121                    | 0.110     | 0.133                   | 0.126     | -0.280            | 0.158     |
|                      | Pasifika           | -0.270  | 0.225     | 0.091                    | 0.131     | 0.466**                 | 0.139     | -0.019            | 0.185     |
|                      | Asian              | -0.557  | 0.401     | -0.566*                  | 0.239     | 0.672**                 | 0.195     | 0.366             | 0.204     |
|                      | Other              | -1.487  | 0.787     | -0.447                   | 0.396     | -0.857                  | 0.500     | -0.602            | 0.403     |
| DECILE               | Low                |   |           |                          |           |                         |           |                   |           |
|                      | Medium             | 0.635**   | 0.233     | 0.442*                   | 0.181     | 0.755**                 | 0.221     | -0.109            | 0.326     |
|                      | High               | 0.673**   | 0.253     | 0.061                    | 0.204     | 0.822**                 | 0.236     | 0.287             | 0.333     |
| PRIVATE              | State              |   |           |                          |           |                         |           |                   |           |
|                      | Private            | -0.329*   | 0.132     | -0.235*                  | 0.111     | -0.192*                 | 0.095     | -0.237**          | 0.071     |
| COED                 | Coed               |   |           |                          |           |                         |           |                   |           |
|                      | Single sex         | -0.031  | 0.047     | 0.006                    | 0.039     | -0.031                  | 0.039     | 0.060             | 0.039     |
| ROLL                 |                    | -0.010*   | 0.004     | 0.000                    | 0.003     | 0.011**                 | 0.003     | -0.005            | 0.003     |
| PEER_INF             |                    | 0.012**   | 0.004     | 0.018**                  | 0.003     | 0.036**                 | 0.004     | 0.059**           | 0.005     |
| PEER_DEV             |                    | 0.002   | 0.004     | 0.008**                  | 0.003     | -0.001                  | 0.004     | -0.002            | 0.004     |
| ACCESS               |                    | -0.005**  | 0.001     | -0.0004                  | 0.001     | 0.001                   | 0.001     | -0.0003           | 0.0005    |
| UNEMPLOY             |                    | -0.112**  | 0.041     | -0.002                   | 0.036     | -0.068                  | 0.038     | 0.154**           | 0.038     |
| EXP x HSQ            | EXP x None         | 0.014**   | 0.005     | 0.019**                  | 0.004     | 0.007                   | 0.005     | -0.017            | 0.014     |
|                      | EXP x Level 1      | 0.013**   | 0.005     | 0.007                    | 0.004     | 0.0003                  | 0.004     | -0.017            | 0.010     |
|                      | EXP x Level 3      | -0.013*   | 0.006     | -0.017**                 | 0.005     | -0.042**                | 0.004     | -0.031**          | 0.003     |
| ETHNIC x HSQ         | Māori x None       | -0.154  | 0.139     | -0.223*                  | 0.102     | -0.147                  | 0.141     | 0.672             | 0.542     |
|                      | Māori x Level 1    | -0.334*   | 0.138     | -0.202                   | 0.109     | -0.376**                | 0.129     | 0.423             | 0.323     |
|                      | Māori x Level 3    | 0.037   | 0.246     | 0.202                    | 0.188     | 0.008                   | 0.149     | -0.180            | 0.128     |
|                      | Pasifika x None    | -0.018  | 0.252     | 0.065                    | 0.139     | -0.844**                | 0.221     | -9.309            | 71.721    |
|                      | Pasifika x Level 1 | -0.263  | 0.247     | -0.274                   | 0.153     | -0.712**                | 0.174     | -0.852            | 0.758     |
|                      | Pasifika x Level 3 | 0.711*  | 0.363     | -0.074                   | 0.304     | -0.265                  | 0.207     | 0.063             | 0.178     |
|                      | Asian x None       | -0.178  | 0.413     | -0.201                   | 0.205     | -0.336                  | 0.237     | 0.798             | 0.657     |
|                      | Asian x Level 1    | -0.307  | 0.359     | -0.008                   | 0.194     | -0.464*                 | 0.181     | -0.350            | 0.414     |
|                      | Asian x Level 3    | 0.565   | 0.352     | -0.993**                 | 0.327     | -0.806**                | 0.156     | -0.706**          | 0.116     |
|                      | Other x None       | -0.307  | 0.391     | -0.263                   | 0.277     | 0.368                   | 0.298     | -9.183            | 146.2     |
| Other x Level 1      | -0.306             | 0.346   | 0.227     | 0.269                    | -0.077    | 0.290                   | -10.808   | 163.5             |           |
| Other x Level 3      | -0.032             | 0.428   | -0.744    | 0.460                    | -0.764**  | 0.284                   | -0.366    | 0.206             |           |
| DECILE x HSQ         | Medium x None      | -0.175  | 0.162     | -0.012                   | 0.118     | -0.312                  | 0.163     | -0.972            | 0.515     |
|                      | Medium x Level 1   | -0.400**  | 0.148     | -0.242*                  | 0.117     | -0.664**                | 0.134     | -0.015            | 0.392     |
|                      | Medium x Level 3   | -0.635**  | 0.229     | -0.106                   | 0.210     | -0.150                  | 0.157     | 0.130             | 0.133     |
|                      | High x None        | -0.156  | 0.185     | 0.051                    | 0.137     | -0.336                  | 0.188     | -1.307*           | 0.662     |
|                      | High x Level 1     | -0.328*   | 0.163     | -0.119                   | 0.135     | -0.567**                | 0.150     | 0.229             | 0.413     |
| High x Level 3       | -0.684**           | 0.248   | -0.285    | 0.228                    | -0.503**  | 0.169                   | -0.017    | 0.139             |           |
| PEER_INF x HSQ       | PEER_INF x None    | 0.023**   | 0.004     | 0.018**                  | 0.003     | 0.012**                 | 0.004     | 0.055**           | 0.012     |
|                      | PEER_INF x Level 1 | 0.014**   | 0.003     | 0.014**                  | 0.003     | 0.009**                 | 0.003     | 0.002             | 0.008     |
|                      | PEER_INF x Level 3 | 0.009   | 0.006     | 0.014                    | 0.006     | -0.001                  | 0.004     | -0.011**          | 0.003     |
| GENDER x ETHNIC      | Male x Maori       | -0.797**  | 0.112     | -0.296**                 | 0.078     | -0.296**                | 0.094     | -0.138            | 0.114     |
|                      | Male x Pasifika    | -1.177**  | 0.196     | -0.343**                 | 0.109     | -0.334**                | 0.125     | -0.324            | 0.166     |
|                      | Male x Asian       | -0.490  | 0.293     | 0.451**                  | 0.162     | -0.162                  | 0.126     | 0.177             | 0.100     |
|                      | Male x Other       | -0.294  | 0.322     | -0.224                   | 0.219     | -0.222                  | 0.205     | 0.107             | 0.176     |
| ETHNIC x DECILE      | Māori x Medium     | -0.032  | 0.131     | -0.150                   | 0.099     | -0.302*                 | 0.123     | 0.107             | 0.154     |
|                      | Māori x High       | 0.251   | 0.163     | -0.145                   | 0.127     | -0.326*                 | 0.149     | 0.151             | 0.171     |
|                      | Pasifika x Medium  | 0.201   | 0.207     | -0.183                   | 0.128     | -0.208                  | 0.147     | 0.089             | 0.193     |
|                      | Pasifika x High    | -0.485  | 0.360     | -0.347                   | 0.191     | -0.788**                | 0.217     | -0.384            | 0.235     |
|                      | Asian x Medium     | -0.134  | 0.339     | -0.017                   | 0.227     | -0.280                  | 0.196     | 0.539**           | 0.197     |
|                      | Asian x High       | -1.665**  | 0.449     | -0.492*                  | 0.244     | -0.787**                | 0.202     | 0.140             | 0.193     |
|                      | Other x Medium     | 0.900   | 0.762     | 0.065                    | 0.389     | 0.644                   | 0.503     | 0.428             | 0.392     |
|                      | Other x High       | 1.165   | 0.748     | -0.091                   | 0.390     | 0.589                   | 0.497     | 0.426             | 0.372     |
| PEER_INF x DECILE    | PEER_INF x Medium  | -0.009*   | 0.004     | -0.010**                 | 0.003     | -0.011**                | 0.004     | -0.006            | 0.005     |
|                      | PEER_INF x High    | -0.010*   | 0.004     | -0.004                   | 0.003     | -0.011**                | 0.004     | -0.012*           | 0.005     |
| CONSTANT             |                    | -1.949**  | 0.305     | -1.276**                 | 0.253     | -3.005**                | 0.278     | -8.014**          | 0.373     |

Notes:

- \*, \*\* represents significant at the 5 percent and 1 percent levels of significance, respectively.
- Robust standard errors that control for the presence of heteroscedasticity are reported in this table.

## Appendix B: Predicted odds ratios for the regression model

**Table 7: Predicted odds ratios**

| Explanatory Variable | Categories         | Post-school choices (reference = labour market) |                          |                         |                   |
|----------------------|--------------------|---|--------------------------|-------------------------|-------------------|
|                      |                    | Industry training                               | Level 1 to 3 certificate | Level 4 to 7 non-degree | Level 7 bachelors |
| EXP                  |                    | 0.994   | 0.984**                  | 1.005*                  | 1.065**           |
| HSQ                  | None               | 0.173**   | 0.274**                  | 0.250**                 | 0.017**           |
|                      | Level 1            | 0.476**   | 0.529**                  | 0.747                   | 0.244             |
|                      | Level 2            |   | REFERENCE CATEGORY       |                         |                   |
|                      | Level 3            | 1.001   | 0.556                    | 9.000**                 | 48.803**          |
| GENDER               | Female             |   | REFERENCE CATEGORY       |                         |                   |
|                      | Male               | 3.890**   | 0.958                    | 0.997                   | 1.030             |
| ETHNIC               | European           |   | REFERENCE CATEGORY       |                         |                   |
|                      | Māori              | 1.002   | 1.128                    | 1.142                   | 0.755             |
|                      | Pasifika           | 0.763   | 1.095                    | 1.593**                 | 0.981             |
|                      | Asian              | 0.573   | 0.568*                   | 1.957**                 | 1.442             |
|                      | Other              | 0.226   | 0.640                    | 0.425                   | 0.548             |
| DECILE               | Low                |   | REFERENCE CATEGORY       |                         |                   |
|                      | Medium             | 1.888**   | 1.556*                   | 2.127**                 | 0.897             |
|                      | High               | 1.960**   | 1.063                    | 2.276**                 | 1.332             |
| PRIVATE              | State              |   | REFERENCE CATEGORY       |                         |                   |
|                      | Private            | 0.720*  | 0.790*                   | 0.826*                  | 0.789**           |
| COED                 | Coed               |   | REFERENCE CATEGORY       |                         |                   |
|                      | Single sex         | 0.969   | 1.006                    | 0.970                   | 1.062             |
| ROLL                 |                    | 0.990*  | 1.000                    | 1.011**                 | 0.995             |
| PEER_INF             |                    | 1.012**   | 1.018**                  | 1.036**                 | 1.061**           |
| PEER_DEV             |                    | 1.002   | 1.008**                  | 0.999                   | 0.998             |
| ACCESS               |                    | 0.995**   | 1.000                    | 1.001                   | 1.000             |
| UNEMPLOY             |                    | 0.894**   | 0.998                    | 0.935                   | 1.167**           |
| EXP x HSQ            | EXP x None         | 1.014**   | 1.019**                  | 1.007                   | 0.983             |
|                      | EXP x Level 1      | 1.013**   | 1.007                    | 1.000                   | 0.984             |
|                      | EXP x Level 3      | 0.987*  | 0.983**                  | 0.959**                 | 0.970**           |
| ETHNIC x HSQ         | Māori x None       | 0.857   | 0.800*                   | 0.864                   | 1.959             |
|                      | Māori x Level 1    | 0.716*  | 0.817                    | 0.687**                 | 1.526             |
|                      | Māori x Level 3    | 1.038   | 1.223                    | 1.009                   | 0.836             |
|                      | Pasifika x None    | 0.982   | 1.067                    | 0.430**                 | 0.000             |
|                      | Pasifika x Level 1 | 0.769   | 0.760                    | 0.490**                 | 0.427             |
|                      | Pasifika x Level 3 | 2.037*  | 0.928                    | 0.767                   | 1.065             |
|                      | Asian x None       | 0.837   | 0.818                    | 0.714                   | 2.221             |
|                      | Asian x Level 1    | 0.736   | 0.992                    | 0.629*                  | 0.705             |
|                      | Asian x Level 3    | 1.759   | 0.371**                  | 0.447**                 | 0.494**           |
|                      | Other x None       | 0.736   | 0.769                    | 1.444                   | 0.000             |
|                      | Other x Level 1    | 0.736   | 1.255                    | 0.926                   | 0.000             |
|                      | Other x Level 3    | 0.969   | 0.475                    | 0.466**                 | 0.694             |
| DECILE x HSQ         | Medium x None      | 0.840   | 0.988                    | 0.732                   | 0.378             |
|                      | Medium x Level 1   | 0.670**   | 0.785*                   | 0.515**                 | 0.985             |
|                      | Medium x Level 3   | 0.530**   | 0.900                    | 0.860                   | 1.139             |
|                      | High x None        | 0.855   | 1.286                    | 0.714                   | 0.271*            |
|                      | High x Level 1     | 0.720*  | 0.888                    | 0.567**                 | 1.258             |
|                      | High x Level 3     | 0.505**   | 0.752                    | 0.605**                 | 0.983             |
| PEER_INF x HSQ       | PEER_INF x None    | 1.023**   | 1.018**                  | 1.012**                 | 1.057**           |
|                      | PEER_INF x Level 1 | 1.014**   | 1.014**                  | 1.009**                 | 1.002             |
|                      | PEER_INF x Level 3 | 1.009   | 1.014*                   | 0.999                   | 0.989**           |
| GENDER x ETHNIC      | Male x Maori       | 0.450**   | 0.744**                  | 0.744**                 | 0.872             |
|                      | Male x Pasifika    | 0.308**   | 0.709**                  | 0.716**                 | 0.723             |
|                      | Male x Asian       | 0.613   | 1.570**                  | 0.851                   | 1.194             |
|                      | Male x Other       | 0.746   | 0.799                    | 0.801                   | 1.113             |
| ETHNIC x DECILE      | Māori x Medium     | 0.968   | 0.861                    | 0.739*                  | 1.113             |
|                      | Māori x High       | 1.285   | 0.865                    | 0.722*                  | 1.163             |
|                      | Pasifika x Medium  | 1.223   | 0.833                    | 0.812                   | 1.093             |
|                      | Pasifika x High    | 0.616   | 0.707                    | 0.455**                 | 0.681             |
|                      | Asian x Medium     | 0.875   | 0.983                    | 0.755                   | 1.714**           |
|                      | Asian x High       | 0.189**   | 0.612*                   | 0.455**                 | 1.150             |
|                      | Other x Medium     | 2.459   | 1.067                    | 1.903                   | 1.534             |
|                      | Other x High       | 3.205   | 0.913                    | 1.803                   | 1.531             |
| PEER_INF x DECILE    | PEER_INF x Medium  | 0.991*  | 0.990**                  | 0.989**                 | 0.994             |
|                      | PEER_INF x High    | 0.990*  | 0.996                    | 0.989**                 | 0.988*            |

Notes:

1. \*, \*\* represents significant at the 5 percent and 1 percent levels of significance, respectively.



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## Appendix C: Technical Note - Measures of achievement in NCEA qualifications

### C.1 Introduction

The purpose of this technical note was to analyse a number of possible measures that can be used in characterising a student's achievement in National Certificate of Educational Achievement (NCEA) qualifications as a means of analysing the relationship between academic achievement at secondary school and participation and achievement in tertiary education. This includes using the measure(s) as a predictor in regression models looking at the school to tertiary transition.

There was a need to look at measures of academic achievement at secondary school other than the level of NCEA qualification attained. The level of qualification attained has a limited capacity to capture, for example, the range of ability between those just passing and those passing easily.

For example, the vast majority of school leavers who go on to university to study a degree have attained NCEA level 3.<sup>11</sup> It was therefore not possible to look at this group of school leavers and say how their academic achievement differed using the level of NCEA qualification attained as the measure. Alternative measures may allow the academic achievement for this group of school leavers to be placed on a continuous scale.

It should be noted that these measures of academic achievement have been developed for analytical use only.

### C.2 Potential measures

There were a number of measures that could potentially be used. These measures capture two aspects of academic achievement in NCEA qualifications, quantity and quality. Quantity is measured through the number of standards or credits attained by a student while quality is measured through the results they receive in these standards. The total credits achieved measure captures just the quantity aspect, as does the level of NCEA qualification attained. The grade point average and expected percentiles capture just quality, while the total credits achieved at merit or excellence and cumulative score capture both aspects of academic achievement. These measures are described below:

#### *Total credits achieved*

The total credits achieved measure was the total number of all the credits a student achieved in all standards. This measure does not add much more information than the level of NCEA qualification attained measure and was therefore of limited value.

#### *Total credits achieved at merit or excellence*

This measure sums the number of credits achieved in achievement standards where a student achieved a result of merit or excellence.

#### *Cumulative score*

In calculating the cumulative score, 0 was assigned for 'not achieved', 2 assigned for 'achieved', 3 for 'merit' and 4 for 'excellence'. For each standard, the student's result value was multiplied by the

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<sup>11</sup> 85 percent of 2004 school leavers who transitioned directly into bachelors-level study had attained NCEA level 3.

number of credits set for that standard. This generates a raw score for each achievement standard. A student's raw scores for all achievement standards were then added to obtain the cumulative score.

### *Grade point average*

The grade point average was introduced by the New Zealand Qualifications Authority (NZQA) to give an indication of what a student's average performance was across a group of achievement standards (NZQA 2005). The grade point average was calculated by dividing the cumulative score for a student by the maximum possible score (the maximum possible score was all excellence results). This number was then multiplied by 100 to make a score on a 0 – 100 point scale.

There is some precedent for using the cumulative score and grade point average as analytical tools. Shulruf et al (2007) used both the cumulative score and the grade point average in their research, while Meyer et al (2006) used the grade point average in their research on student motivation.

### *Expected percentile*

The expected percentile was developed for analysing NCEA results by Michael Johnston at NZQA. This measure was calculated from the results distribution of all achievement standards including the percentage and cumulative percentage for each result. From the cumulative percentages the expected percentile of each result was calculated. This figure was the mean of the percentiles represented by the upper and lower bounds of the result range. An example of these calculations is shown in table 8 below. An average expected percentile was then calculated across all the standards a student has taken.

**Table 8: Results distribution of a sample achievement standard**

| Result         | Frequency | Percentage |   | Cumulative percentage | Expected percentile              |
|----------------|-----------|------------|---|-----------------------|----------------------------------|
|                |           | A          | B |                       |                                  |
| 1 Excellence   | 12        | 10%        |   | 100%                  | $D_i = (C_{i+1} + C_i)/2$<br>95% |
| 2 Merit        | 24        | 20%        |   | 90%                   | 80%                              |
| 3 Achieved     | 60        | 50%        |   | 70%                   | 45%                              |
| 4 Not achieved | 24        | 20%        |   | 20%                   | 10%                              |

Note: This sample standard is an externally assessed achievement standard with 120 results.

## C.3 Types of standards

One of the key questions in calculating these measures of academic achievement at secondary school was which standards to include. There are three types of standards:

- Unit standards (22% percent of all standards for 2004 school leavers)
- Achievement standards (77% percent of all standards for 2004 school leavers)
- Scholarship (less than 1 percent of all standards for 2004 school leavers)

However, unit standards do not differentiate between the levels of achievement in that standard, with just achieved and not achieved results being awarded. They were therefore of little value in calculating measures that include an aspect of quality. We were left with just achievement standards to calculate these measures.

Achievement standards can be assessed internally within a school or externally through an examination. Schools will not be required to submit 'not achieved' results for internally assessed

standards until 2008. However it was possible to use the credit-gaining results from internally assessed achievement standards in measures that include an aspect of quality. Of the achievement standards reported to NZQA for 2004 school leavers, 60% were externally assessed and 40% were internally assessed.

Excluding internally assessed standards would exclude a lot of information and potentially bias the results for certain groups (for example low-decile schools, which have a higher proportion of internally assessed standards). However, in using internally assessed achievement standards, not achieved results will not be able to be used in the measures because there has been no consistency in the reporting of these results.

#### C.4 Level of standards

Using different levels of NCEA and school year levels there were many different methods of calculating the measures described earlier. Table 9 below lists a number of different ways. Given that not all school leavers undertake achievement standards, the table also lists the coverage of 2004 school leavers each method would provide for those measures that use only achievement standards. And finally table 9 also lists how well each of these methods represents the total school leaver cohort in terms of some key demographics

**Table 9: Credits attempted from achievement standards**

| Method                      | Coverage | Percentage of achievement credits | Female | Māori | Decile 1 or 2 |
|-----------------------------|----------|-----------------------------------|--------|-------|---------------|
| Level 1/year 11             | 89%      | 84%                               | 50%    | 17%   | 10%           |
| Level 1/all years           | 94%      | 79%                               | 50%    | 17%   | 10%           |
| All levels/year 11          | 89%      | 82%                               | 50%    | 17%   | 10%           |
| Level 2/year 12             | 65%      | 77%                               | 54%    | 13%   | 8%            |
| Level 2/all years           | 71%      | 70%                               | 53%    | 14%   | 9%            |
| All levels/year 12          | 70%      | 69%                               | 53%    | 14%   | 9%            |
| Level 3/year 13             | 47%      | 91%                               | 53%    | 10%   | 6%            |
| Level 3/all years           | 49%      | 86%                               | 55%    | 11%   | 7%            |
| All levels/year 13          | 53%      | 78%                               | 54%    | 11%   | 8%            |
| All levels/all years        | 98%      | 77%                               | 50%    | 17%   | 10%           |
| All levels/last year (2004) | 94%      | 71%                               | 50%    | 17%   | 10%           |
| 2004 school leavers         | 100%     | 77%                               | 50%    | 17%   | 10%           |

Two things become clear from table 9 above. Firstly, there were groups of methods that have very similar coverage and representation of the school leaver cohort.<sup>12</sup> For example, school leavers with level 1 attainment in year 11 were a very similar cohort to those with both level 1 attainment in any year and any level attainment in year 11. This was not a surprise, given that, despite the flexibility of NCEA qualifications, level 1 is the usual level of study for students in year 11. In fact, around 99 percent of all achievement standards taken in year 11 were at level 1, while around 94 percent of all level 1 achievement standards were taken by students in year 11. The similarity of the groups covered by these methods suggests that the predictive power in determining transitions into tertiary education will also be very similar.

We have therefore chosen to keep just one of these methods – single level/all years - and discard the other two. We have chosen to keep the single level/all years method for two reasons. Firstly, given the flexible nature of NCEA qualifications, in that any of the three levels may be studied in any school

<sup>12</sup> Transition rates into the various types of tertiary education and the average cumulative score and grade point average were also found to be very similar for these groups of methods.

year, this seems the intuitively acceptable method. Secondly, overall these methods appear to provide the best coverage of the school leaver cohort of the three methods.

Also included was a method that calculates the measures of academic achievement for all the achievement standards a student took in their last year of secondary school (in this case 2004) and so creates a final year academic achievement measure. The advantage of this method was that it provides a latest measure of academic achievement and, given that achievement for an individual student can vary over years, this could be beneficial.

What was also apparent in table 9 above was the different structure of the cohorts covered by the higher-levels of NCEA. The same trends that exist for transition into tertiary education (Ussher, 2007) were showing through here. For example, males and Māori were under-represented in the cohort with credits at level 3 of NCEA. This was not surprising given that we know that these were groups that have a high proportion of students who under-perform at secondary school and leave school before completing year 13. But what it did show was that the cohort with credits at level 1 of NCEA was most representative of the total cohort of 2004 school leavers.

By looking at all school leavers' achievement in standards at level 1 of NCEA we can compare almost 95 percent of the total school leaver cohort across a common qualification (barring differences in standard difficulties, which in any case were not measurable). Higher level standards do not provide as much coverage of the school leaver cohort and the strong associations between the varying levels suggest that little benefit would be gained from using these higher levels over level 1.

There were strong correlations between the different methods of calculating a measure. For example there were very strong correlations between the grade point averages at the three levels of NCEA as shown in table 10. Therefore a high grade point average at level 1 generally leads to a correspondingly high grade point average at level 2 and level 3. It was not surprising that high achievers in the early years of secondary school generally go on to also be high achievers at the end of secondary school.

**Table 10: Pearson correlation coefficients for different levels of grade point average**

|             | GPA level 1 | GPA level 2 | GPA level 3 | GPA total |
|-------------|-------------|-------------|-------------|-----------|
| GPA level 2 | 0.6927      |             |             |           |
| GPA level 3 | 0.5771      | 0.6623      |             |           |
| GPA total   | 0.9540      | 0.8416      | 0.7918      |           |
| GPA 2004    | 0.7204      | 0.7989      | 0.9509      | 0.8539    |

## C.5 Best measures

It should be noted that there were also strong correlations between the different measures of academic achievement looked at in this technical note as shown in table 11. This shows that there may be very little difference between any of the possible measures discussed in this paper when it comes to modelling transitions into tertiary education.

**Table 11: Pearson correlation coefficients for different level 1 measures**

|   | Total credits achieved | Total credits achieved at merit or excellence | Cumulative score | Grade point average |
|---|------------------------|---|------------------|---------------------|
| Total credits achieved at merit or excellence | 0.7491                 |   |                  |                     |
| Cumulative score                              | 0.8802                 | 0.9355  |                  |                     |
| Grade point average                           | 0.6987                 | 0.8448  | 0.8358           |                     |
| Expected percentile                           | 0.6560                 | 0.8802  | 0.8333           | 0.9167              |

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In order to further analyse the suitability of these measures they have all been included in a simple regression model to see which one produces the best results in terms of explanatory power in predicting transitions into tertiary education. This regression model included the following variables: geographic access, school roll size, peer influence, gender, ethnic group, years at secondary, school decile, school authority and school gender. It has not been determined yet whether this might be the best model for predicting transition into tertiary education but it has been designed similarly to the model used by Maani (2006).

Interestingly, throughout all the models the level of NCEA qualification attained measure was the strongest predictor of transitions in tertiary education. The placement of the level of NCEA qualification attained measure in the model results in a better model than, if say, grade point average or cumulative score for NCEA level 1 was placed in the same model. On reflection this is perhaps not surprising for transition into bachelors-level study where entrance is restricted by level of school qualification, but it is perhaps a little surprising for lower-level tertiary study, in particular industry training, where summary statistics show little difference in transition rates between school leavers with different school qualifications. It should also be pointed out that the explanatory power of the bachelors level models were superior to those models for lower-level qualifications.

Other than the level of NCEA qualification attained there was not much between the other measures in terms of predictive power in determining transitions into tertiary education. The grade point average and expected percentile had better predictive power than the other measures but the differences were not great and could not be considered significant.

It should be remembered that we are trying to find the best measure of academic achievement at secondary school, not the best predictor of transitions into tertiary education. While it was interesting to look at how well each of these measures predicts transitions, the most important thing is that the measure is intuitively acceptable in measuring academic performance at school. So while the grade point average and expected percentile do not predict transitions into tertiary education any better than highest school qualification, it does provide an intuitively acceptable measure of academic performance at secondary school in standards-based assessment and measures it slightly differently to highest school qualification attained.

## C.6 Preferred option

The preferred option was to use the expected percentile measure. The distinguishing feature of the expected percentile is that it provides a relative measure, ie one that is referenced against the performance of all others who did that standard. A student with the same result for particular standards can have different expected percentiles depending on how they did relative to their peers. The expected percentile would be calculated using level 1 achievement standards whatever school year they were taken in, which will give the most coverage and representation of the 2004 school leaver cohort as well as providing a consistent level of qualification to measure all students across. There is also the potential to use the expected percentile with level 3 achievement standards when looking at transitions into bachelors-level study as well as the final year expected percentile. The use of the expected percentile, which is a measure of quality, would also allow the use of a quantity measure, such as level of NCEA qualification attained, without concerns of multicollinearity.

It should be noted that this technical note has been prepared to look at the relationship between academic achievement at secondary school and participation in tertiary education. The measures deemed best in this technical note may not provide the best measures of academic achievement in determining relationships with other things such as performance in tertiary education.





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