



Starpath

A University of Auckland Partnership for Excellence



**THE UNIVERSITY
OF AUCKLAND**

NEW ZEALAND

Te Whare Wānanga o Tāmaki Makaurau

Factors Influencing University Entrance Success Rate



Starpath Project

The University of Auckland
Epsom Campus, Faculty of Education
Private Bag 92019, Auckland 1142
starpath@auckland.ac.nz
www.starpath.auckland.ac.nz

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All enquiries should be directed to the Director, Starpath Project, at starpath@auckland.ac.nz .

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1. EXECUTIVE SUMMARY

“Factors Influencing University Entrance Success Rate” is a research project undertaken within the broader scope of The Starpath Project for Tertiary Participation and Success in order to gain a clearer understanding of the influence of a number of variables upon the rate at which students attain the qualification for entry to university commonly called University Entrance (UE)¹. In particular, the study examines the effect of socio-economic status (using a school’s decile rating as the proxy indicator), the number of students in Year 13, and the ethnicity of the students on their rate of success in attaining the qualification for entry to university, UE.

This quantitative study employs data on success rates for UE for 2006 and 2007 obtained from two databases – the NZQA website database, which reports aggregated Year 13 student data for each school in 2006 and 2007, and a Starpath database, which contains data for individual Year 13 students in 2006 and 2007. The first database was used to explore questions about school effects (i.e., decile and number of students in Year 13) while the latter was used to explore questions about the effects of ethnicity.

The results are reported in two parts – Part One contains the results for secondary schools in Auckland, while Part Two contains the results for New Zealand secondary schools.

For Auckland schools, the key findings are:

- For both roll-based and participation-based data across each decile, there is strong evidence of a linear relationship between school decile rating and UE success rate, such that as the decile rating increases, the UE success rate also increases. That is, the decile rating of a school is a strong predictor of the UE success rate of students at that school.
- For each unit increase in decile rating, the increase in UE success rate is between 5 and 6 percent.
- There is one striking anomaly in the pattern of increasing success rates as decile increases. Students in decile 8 schools in Auckland had a UE success rate that equates with that of students in decile 5 schools in Auckland.
- The number of students in Year 13 is, by itself, also a significant predictor of the UE success rate in Auckland schools.
- However, when decile and the number of students in Year 13 are combined, only decile has a significant effect on UE success rate. That is, the number of

¹ Although this is the minimum qualification for applying to enter university, there are usually additional requirements for limited-entry courses.

students in Year 13 does not add to the predictive power of decile on UE success rates.

- There is a noticeable similarity between the UE success rates of Pākehā and Asian students as school decile increases, and these success rates generally increase with an increase in the decile rating.
- There is a marked similarity between the UE success rates of Māori and Pacific students across the decile ratings, and these success rates also generally increase with an increase in the decile rating.
- There is virtually no difference in the **rate of increase** in UE success rates for students of the five main ethnic groupings as school decile increases.

The key findings for New Zealand secondary schools were very similar to those found in Auckland schools.

- As decile increases, the UE success rate of school students increases. The rate of increase is similar to the rate of increase in Auckland schools – for each unit increase in decile rating, the UE success rate increases by about 5%. Nationally as well as in Auckland, decile is a strong predictor of UE success rates.
- In general, there is an increase in UE success rates for all ethnic groupings as the decile rating of the school they attend increases.
- The rate of increase is similar for each ethnicity. Pākehā and Asian students have a very similar pattern in their UE success rates as school decile increases. Likewise, Māori and Pacific students have a similar pattern in their UE success rates as school decile increases.
- As for Auckland schools, there is however, a marked and persistent difference in the success rates between the Māori and Pacific students, and Asian and Pākehā students.

These results affirm other research that demonstrates the strong links between decile and levels of achievement, and highlight the challenge that teachers in low-decile schools are faced with in providing their students with similar chances of success for access to a university education that students in higher decile schools have. The lower levels of success for Māori and Pacific students in Auckland and throughout New Zealand in all schools is again demonstrated in these results. *Ka Hikitia* – Managing for Success 2008–2012 (Ministry of Education, 2008c) and the *Pasifika Education Plan* (Ministry of Education, 2008d) have recently been introduced to improve the educational opportunities and success of Māori and Pacific students. For example, *Ka Hikitia – Managing for Success* sets four conditions for Māori enjoying success as Māori, including keeping Māori students engaged in early secondary school which will

then enable them to progress successfully to upper secondary school and gain essential qualifications such as UE.

Given that schools cannot ordinarily change the ethnic background or socio-economic status of the students entering through their gates, educators should focus on those things that are within their grasp – such as the courses they offer, the quality of teachers and teaching, their expectations of their students and curricula programmes, and their management of behaviour - that are known to have a positive impact on student learning.

This report provides further evidence (in this case, with respect to UE success rates) about the inequalities that exist for students in low-decile schools, and for Māori and Pacific students (in all schools) when compared with their Asian and Pākehā peers.

2. INTRODUCTION

Starpath is a pioneering research project focused on transforming educational outcomes for groups of New Zealand students who are currently under-achieving at secondary school and are under-represented in tertiary education, in order to address New Zealand's comparatively high rate of educational inequality. In New Zealand, Māori, Pacific and 'Other' students, as well as students from low socio-economic backgrounds, have significant rates of educational under-achievement compared to their peers. This report outlines an analysis of three demographic factors that influence students' chances of gaining university entrance (UE) via the NCEA qualification. The factors investigated are school decile, the number of students in Year 13 in each school, and students' ethnicity, particularly for Māori and Pacific students.

It is well established that socio-economic status (for which we use the school decile as a proxy) is strongly correlated with educational outcomes. It has been found that on a range of measures of student engagement and achievement, students in high-decile schools do better, on average, than those in mid-decile schools, who in turn do better than those in low-decile schools. For example, compared to students in lower decile schools, students at high-decile schools are more likely to achieve NCEA qualifications at each level, and to gain University Entrance (Ministry of Education, 2008e, 2008f, 2008g, 2008h). They make the transition to tertiary education – particularly degree-level study – directly from school at higher rates (Ussher, 2007). They do better, on average, on standardised tests of achievement, such as PISA, which assesses the mathematics, science and reading literacy of 15 year olds (Caygill & Sok, 2008; Sturrock & May, 2002). Students in high-decile schools are less likely to be stood down, suspended, excluded or expelled from school, or to be frequent truants, and report higher levels of academic motivation (Meyer, McClure, Walkey, McKenzie, & Weir, 2006; Ministry of Education, 2007, 2008a, 2008i).

While reports highlighting the association between school decile and student achievement and engagement are common, nearly all of these group deciles in some way – generally either in quintiles (so that deciles 1 and 2 are combined, as are deciles 3 and 4, and so on) or into categories of low (1-3), mid (4-7) and high (8-10) decile schools. In such analyses, if one or more decile does not fit the overall trend, this may not be apparent, because the data on individual deciles have been combined.

Therefore we have analysed the data for all ten decile ratings, rather than for aggregated decile groups.

In addition, there has been little attention given to whether the relationship between school decile and student outcomes varies with ethnicity (or other subgroups). However, some indicators published by the Ministry of Education do disaggregate achievement data according to decile (or rather quintile) and ethnicity (Ministry of Education, 2008b, 2008e, 2008f, 2008g). These show some unexpected results, particularly for students in deciles 3 and 4. Specifically, Pacific students from schools in deciles 3 and 4 are more likely than Pacific students from schools in deciles 1 and 2 to leave school with little or no formal attainment, and are less likely to gain NCEA Level 1, NCEA Level 2, and University Entrance. In contrast, Asian students attending schools in deciles 3 and 4 are less likely to leave school with little or no attainment and are more likely to gain NCEA Level 1, NCEA Level 2, and University Entrance compared to Asian students in schools in deciles 5 and 6. In other words, Pacific students at decile 3 and 4 schools seem to do worse than would be expected given the general tendency for student achievement to increase as decile increases, while Asian students at these schools seem to do better than would be expected.

The effect of school decile and school size (or of school decile and average class size) on achievement has received even less attention. The report on TIMSS 1998/1999 for Year 9 (Chamberlain & Caygill, 2002) compared mean mathematics and science scores by school size and by three decile bands (low, medium and high). Chamberlain and Cargill showed that students in high-decile schools had either significantly higher scores or scores that were not significantly different from those of students in medium and low-decile schools for each of the four school size bands examined. Likewise, students in medium-decile schools had either significantly higher scores or scores that were not significantly different from those of students in low-decile schools for each of the four school size bands examined. These results indicate that school decile had a greater impact on TIMSS achievement than school size. PISA reports (Caygill & Sok, 2008; Sturrock & May, 2002) provide disaggregated data by the size of the community the school was located in or the number of students at a school (school roll). However, these reports do not combine these with a measure of socio-economic status (such as decile) to give an indication of how socio-economic status and school size interact, and whether school size is predictive of student success at school.

Nearly all domestic students who obtain entrance to university in New Zealand do so through one of three routes - the National Certificate of Educational Achievement (NCEA), the Cambridge International Examination (CIE), and the International Baccalaureate (IB). The overwhelming majority of students follow the NCEA route², and it is this route to University Entrance that will be explored in this study.

For students who follow the NCEA pathway, the criteria for the UE qualification are:

- i. a minimum of 42 credits at Level 3 or higher on the National Qualifications Framework, including
 - (a) a minimum of 14 credits at Level 3 or higher in each of two subjects from the "approved subject" list, with
 - (b) a further 14 credits at Level 3 or higher taken from one or two additional domains on the National Qualifications Framework or approved subjects and
- ii. a minimum of 14 numeracy credits at Level 1 or higher in Mathematics or Pāngarau on the National Qualifications Framework and
- iii. a minimum of 8 literacy credits at Level 2 or higher in English or Te Reo Māori; 4 credits must be in reading and 4 credits must be in writing. The literacy credits must be selected from a schedule of approved achievement standards and unit standards.

In this report, the phrase UE success rate is interpreted in two ways:

- **roll-based** – the fraction of students who gained the UE qualification out of the number of students enrolled in Year 13 or above (as reported in the 1 July roll return to the Ministry of Education in the relevant year).
- **participation-based** – the fraction of students who gained the UE qualification out of all students in Year 13 or above who completed one or more standard at Level 3 or above.

² All state and state integrated secondary schools with Year 13 students are required to provide the NCEA qualification for their students. However, some schools also opt for the CIE programme (33 schools nationwide in 2006, with 14 of those schools in Auckland, and 40 nationwide in 2007 with 18 of those schools in Auckland), or for the IB programme (approximately 10 schools nationwide in 2006 and 2007). State and state integrated schools involved in one of these two programmes will also offer NCEA to their students.

3. METHOD

This study was conducted using data for students who were in Year 13 or above and were entered for the 2006 and the 2007 NCEA qualifications, and provides results firstly for Auckland schools only, and then for all schools in New Zealand. The data were obtained from two sources – the NZQA website, which provides aggregated school-level data about NCEA and University Entrance success, and from the Starpath database, which contains individual student data for the same cohorts of students. Data collected from the NZQA website displays aggregated results of the number of students enrolled in each Year level at each school, and the number of students who gained UE in each Year level. The NZQA dataset aggregates all students in Year 13, whether they were studying at Level 3 or not. The Starpath dataset includes only those students in Year 13 who attempted credits in one or more Level 3 standards. These data are at the level of the individual student. Readers should bear this in mind when interpreting the results of these analyses.

Three predictor variables are used in the regression analyses: school decile, number of students in Year 13, and student ethnicity.

1. A *school's decile* is a resourcing formulation for schools that gives some indication of the intake of students from low socio-economic communities³. The purpose of the decile ratings is to allow the government to allocate more resources to low-decile schools. A decile 1 school belongs to the 10% of all state funded schools with the highest proportion of students from low socio-economic communities. A decile 10 school belongs to the 10% of schools with the lowest proportion of these students. All state and state-integrated schools have been assigned a decile rating. In 2006 and 2007, private schools were not assigned a decile rating. In many datasets their decile was coded as "99", which effectively served as a "place holder". Given the high tuition fees charged by private/independent schools, the demographic profile of students in private schools is most like decile 10 school students, with only a very small proportion of students from economically disadvantaged households on their roll. Consequently, for the purposes of this analysis, private schools have been grouped together with the decile 10 schools. A school's decile does not completely determine the overall socio-economic mix of the school. It is worth noting that mid-decile schools are subject to more variability in the socio-economic background of students compared to low and high-decile schools. For

³<http://www.minedu.govt.nz/educationSectors/Schools/SchoolOperations/Resourcing/OperationalFunding/Deciles/HowTheDecileIsCalculated.aspx>

example, a decile 5 school will have a much wider mix of students from differing socio-economic backgrounds than either a decile 1 or a decile 10 school. As an indicator of students' socio-economic status, school decile is not a perfect measure but it is the only information that could be readily accessed and is commonly used as a proxy for socio-economic status, for research purposes.

2. The *number of students in Year 13* is explored to determine whether students in schools with a large cohort of Year 13 students would have any advantages (or indeed, disadvantages) in attaining UE over students in schools with smaller Year 13 cohorts. For the sake of consistency, we did not include Year 12 or younger students⁴ who gained UE in this analysis because although some students do achieve UE before they reach Year 13, most pre-Year 13 students do not attempt enough Level 3 credits to achieve UE.
3. Effects of *student ethnicity* are of particular interest to the Starpath project. The five main ethnic categories used in New Zealand educational statistics were utilised: Pākehā, Māori, Pacific, Asian, and Other. The Starpath dataset was used exclusively to analyse the effects of ethnicity on the UE success rate, as it was the only dataset that provided individual student-level data. The ethnicity categories are derived from self-reported responses held by NZQA. These categories have been shown to be problematic when used by young people to self-classify their ethnicity, particularly where a student has reported more than one ethnicity (Kukutai, 2008; Thomas, 2001). In this report, only one ethnic category was recorded for each student for the purposes of analysis. The order of priority in recording ethnicity (as is used by the Ministry of Education) was Māori, Pacific, Asian, Other and New Zealand European/Pākehā. In other words, if a student reported Māori as one of their ethnic identities, then they were recorded as Māori. If Māori was not reported, but one of the Pacific nations was, then Pacific will be entered, and so on. A student will be recorded as New Zealand European/Pākehā only if they did not indicate any other ethnic affiliation.

As noted above, the analysis is in two parts – for secondary schools in Auckland (where proportions of Māori and Pacific students are high), then across all secondary schools in New Zealand.

⁴ From the Starpath database, we note that Year 12 and younger students comprised 38% of the students who were entered for one or more Level 3 standard(s), and 1.3% of these Year 12 or younger students actually achieved the criteria for UE.

4. RESULTS

4.1 Part One: Auckland schools

There are 102 schools listed in the NZQA datasets⁵ as Auckland schools for 2006 and for 2007. These schools cover the region from Warkworth in the north to Tuakau in the south⁶. Some of these schools were excluded from analysis because they participate in the Cambridge International Examinations (n=13 in 2006 and n=15 in 2007)⁷, the International Baccalaureate (n=1 in both years), or provide university bridging courses only (n=1 in both years). In addition, there are four new schools listed on the website that did not have Year 13 students in either year, as well as an additional eleven schools that are small and had no Year 13 candidates for either of the two years. Thus the number of Auckland schools examined in this analysis is 70 for 2006, and 68 for 2007.

The analyses conducted consisted of fitting weighted linear regression and non-parametric “smooth” models to the Auckland schools datasets for the years 2006 and 2007. The response variable was taken to be “success rate” (at achieving UE) and is defined in two ways – **roll-based**, and **participation-based**. **Roll-based** analyses used the total number of students in Year 13 who were on the school roll at 1 July as the denominator. **Participation-based** analyses used the number of students in Year 13 or above who attempted at least one Level 3 standard in that year as the denominator. The predictors used in these models are decile, student ethnicity, and the number of Year 13 students at the school (referred to as “number of students in Year 13”). Analyses involving the “number of students in Year 13” variable were completed for the Auckland data only.

For analyses involving the decile variable and the ethnicity variable, the results are fundamentally consistent across years, definitions of success rate, and school-by-school or aggregated decile data.

⁵ <http://www.nzqa.govt.nz/qualifications/ssq/statistics/index.html>

⁶ Thames High School and Onewhero Area School are also listed as Auckland schools on this website, but have not been included in this report as Auckland schools. They do not lie within the larger Auckland geographic region, and identify with the Waikato region.

⁷ Schools that offer Cambridge tend to have a dual pathway policy whereby a substantial number of students in the school take the Cambridge examinations, and the rest take NCEA. This may affect the accuracy of the UE success rates for such schools because the academic performance of students who take NCEA (in a school that also offers Cambridge) may not be representative of the academic performance of all students in that school. As a consequence, Auckland schools that offer a full Cambridge programme were excluded from the analysis.

4.1.1. The decile of a school is a statistically significant (linear) predictor of success rate. UE success rate increases by between 0.05 and 0.06 (between 5 and 6%) for each unit increase in school decile. (Table 1).

4.1.2. The estimates of the coefficient of “decile” are quite consistent whether the model is fitted to by individual school data or to the average success rate for all schools in a particular decile.

Table 1 Coefficients of decile in linear models for UE success rates in Auckland schools in 2006 (n=70) and 2007 (n=68)

| Year | Success ratio | By | Slope coefficient estimate | SE | 95% CI |
|------|---------------|-------------------|----------------------------|-------|----------------|
| 2006 | Roll-based | Individual school | 0.057 | 0.004 | [0.049, 0.065] |
| 2006 | Roll-based | Decile aggregate | 0.057 | 0.003 | [0.051, 0.063] |
| 2006 | Participation | Individual school | 0.057 | 0.004 | [0.049, 0.065] |
| 2006 | Participation | Decile aggregate | 0.057 | 0.004 | [0.049, 0.065] |
| 2007 | Roll-based | Individual school | 0.055 | 0.005 | [0.045, 0.065] |
| 2007 | Roll-based | Decile aggregate | 0.055 | 0.004 | [0.047, 0.063] |
| 2007 | Participation | Individual school | 0.052 | 0.004 | [0.044, 0.060] |
| 2007 | Participation | Decile aggregate | 0.052 | 0.004 | [0.044, 0.060] |

4.1.3. The value of R^2 for linear models with decile as the (only) predictor is around 0.7 for models fitted by individual school, and around 0.95 for models fitted to the decile aggregates (Table 2).

4.1.4. The fit of the smooth model shows a statistically significant improvement over the straight line fit in some cases, but not in others. However, even in the cases where the improvement is statistically significant, the resulting increment in the R^2 value is negligible. Hence the data appear to be adequately modelled by a straight line fit.

Table 2 Comparisons between straight line and smooth models for UE success rates in Auckland schools in 2006 (n=70) and 2007 (n=68)

| Year | Success ratio | By | p-value Smooth v. Linear | R^2 | |
|------|---------------|-------------------|-----------------------------|--------|--------|
| | | | | Linear | Smooth |
| 2006 | Roll-based | Individual school | 0.298 | 0.724 | 0.741 |
| 2006 | Roll-based | Decile aggregate | 0.096 | 0.972 | 0.990 |
| 2006 | Participation | Individual school | 0.084 | 0.731 | 0.756 |
| 2006 | Participation | Decile aggregate | 0.037 | 0.959 | 0.991 |
| 2007 | Roll-based | Individual school | 0.210 | 0.695 | 0.715 |
| 2007 | Roll-based | Decile aggregate | 0.037 | 0.964 | 0.992 |
| 2007 | Participation | Individual school | 0.052 | 0.691 | 0.725 |
| 2007 | Participation | Decile aggregate | 0.004 | 0.947 | 0.995 |

A noticeable feature of the data, revealed by graphical analysis (Figure 1)⁸, is a dip in the average UE success rate at decile 8. There were only three decile 8 schools in the Auckland datasets (for both 2006 and 2007) and the UE success rate of these schools did not conform to the projected linear pattern. Graphs of the data indicate that these schools perform on average more like decile 4, 5 or 6 schools.

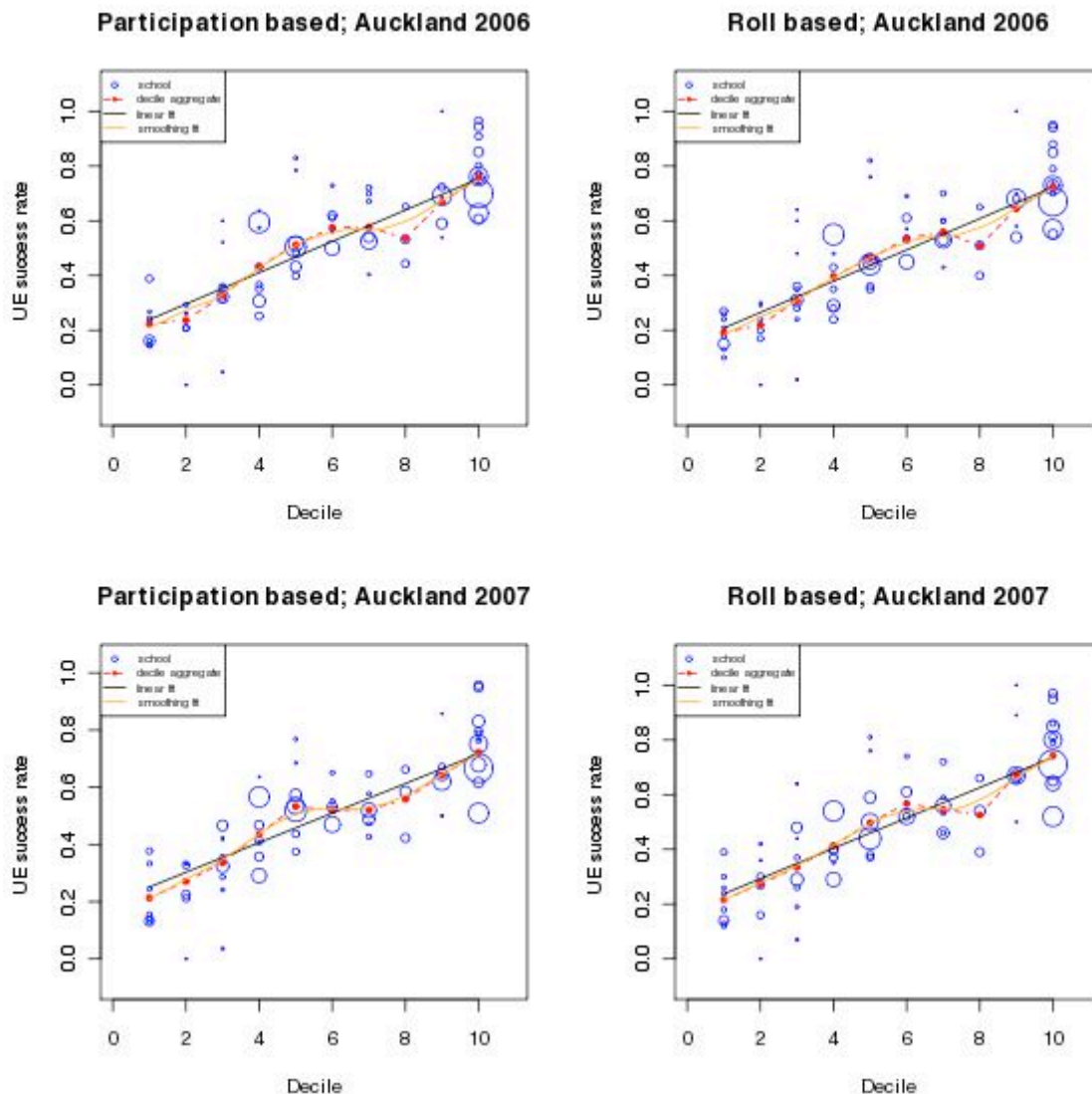


Figure 1 Scatter plot of UE success rates by school decile in Auckland schools in 2006 (n=70) and 2007 (n=68)

⁸ The diameter of the circle representing each school is proportional to the number of students in Year 13 at that school.

4.1.5. Ethnicity, in conjunction with decile, is a statistically significant predictor of UE success rate, with the p-values being less than 10⁻¹³ in all cases. Table 3 shows that in some cases there appears to be statistically significant evidence that the lines corresponding to different ethnic groups have different slopes across the decile range (i.e., there is an “interaction” between ethnicity and decile). In other cases there appears to be no such evidence. However even in those cases where there is evidence of different slopes the increment in the R² value is negligible. Hence a parallel lines model appears to yield an adequate fit to the data. In effect, the rate of increase in success rate as decile increases is similar for each of the five ethnic groups – the difference in UE success rates that exists at decile 1 remains fairly constant at each decile level.

Table 3 Comparisons between parallel and different slope models for five ethnic groups in Auckland schools in 2006 (n=70) and 2007 (n=68)

| Year | By | p-value Interaction | R ² | |
|------|-------------------|------------------------|----------------|------------------|
| | | | Parallel | Different slopes |
| 2006 | Individual school | 0.038 | 0.673 | 0.684 |
| 2006 | Decile aggregate | 0.031 | 0.934 | 0.949 |
| 2007 | Individual school | 0.376 | 0.658 | 0.663 |
| 2007 | Decile aggregate | 0.403 | 0.928 | 0.935 |

There are some noticeable features in the plots of success rates by ethnicity as decile increases for Auckland students (Figure 2). First, the success rates of Asian and Pākehā students are very similar across the decile range, and the success rates of Māori and Pacific students are also similar, with students classified as Other in between these two groupings. Second, the dip in success rates at decile 8 noted above appears to apply to each of the five ethnic groupings in these schools – there is an impact on the success rates of all students in those schools. Third, in 2006, of students in decile 1 schools, Pākehā students have the lowest rate of success, but in decile 2 and decile 3 schools, their success rate is the highest of the five groups. In 2007, on the other hand, the success rates of students classified as Other varies considerably from decile 1 through to decile 3, and they have the lowest success rates in decile 8 schools.

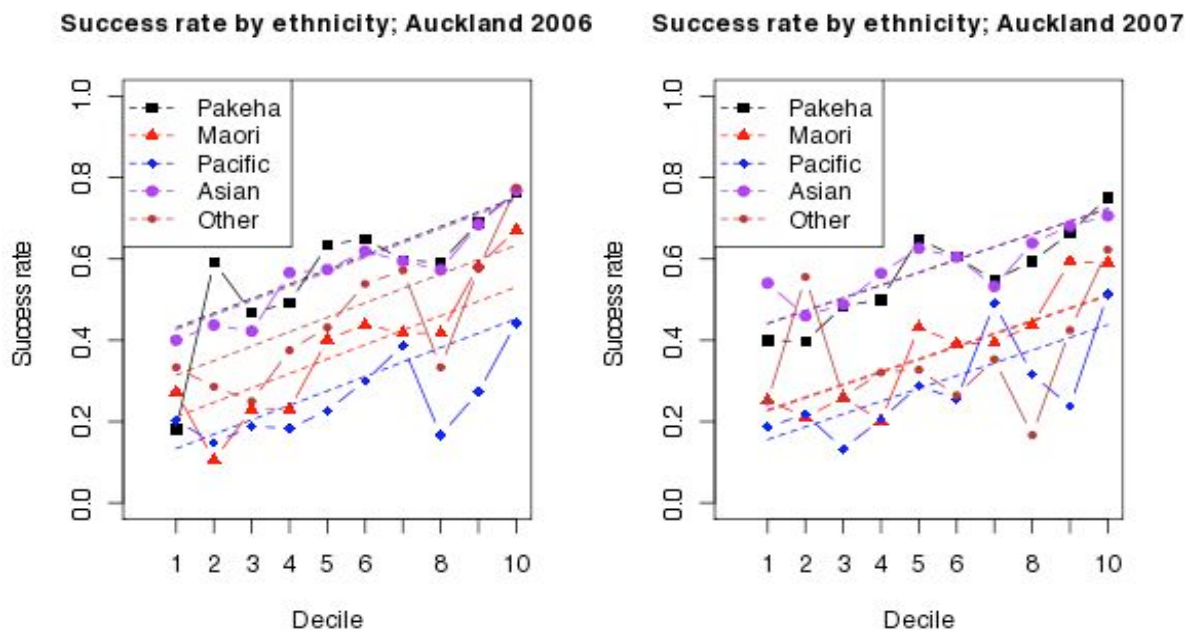


Figure 2 Scatter plot of UE success rates by school decile for five ethnic groups in 2006 (n=70) and 2007 (n=68).

4.1.6 The number of students in Year 13 is, on its own, a statistically significant predictor of success rate, but adds no significant predictive power when added to a model that already includes decile as a predictor (Table 4). The increment in R^2 provided by adding number of students in Year 13 to such a model is small, increasing only at the third decimal place. There is in the Auckland region a single, very large school with a Year 13 roll in excess of 500. When this school is omitted from the dataset being analysed, number of students in Year 13 is no longer a significant predictor of UE success rate in any of the cases being investigated.

Table 4 Effect of number of students in Year 13 on roll-based and participation-based UE success rates for Auckland schools in 2006 and 2007 with and without one very large school

| | Roll-based | | Participation-based | |
|--|------------|----------|---------------------|----------|
| | 2006 | 2007 | 2006 | 2007 |
| All Auckland schools | (n=70) | (n=68) | (n=70) | (n=68) |
| Number of students in Year 13 only (p-value) | .025, * | .041, * | .017, * | .025, * |
| Number of students in Year 13 after decile (p-value) | .320, ns | .248, ns | .468, ns | .451, ns |
| Number of students in Year 13 + decile R^2 | .730 | .701 | .733 | .693 |
| Decile R^2 | .726 | .695 | .731 | .691 |
| Auckland schools minus one very large school | (n=69) | (n=67) | (n=69) | (n=67) |
| Number of students in Year 13 only (p-value) | .112, ns | .215, ns | .075, ns | .093, ns |
| Number of students in Year 13 after decile (p-value) | .612, ns | .290, ns | .873, ns | .785, ns |
| Number of students in Year 13 + decile R^2 | .721 | .686 | .726 | .685 |

4.2 Part Two: New Zealand Schools

A total of 394 schools throughout New Zealand (including all of the Auckland schools reported above) in 2006, and 404 in 2007 were included in the analyses. There were 389 schools that were included for both years. Five schools that appeared in the 2006 dataset were not present in the 2007 dataset⁹. Fifteen schools appeared in the 2007 dataset that were not in the 2006 dataset¹⁰. As with Part One of this report, schools which offered the Cambridge International Examinations (CIE) in 2006 (n=33) and/or 2007 (n=37)¹¹ were excluded, as were those schools that had no Year 13 students in the respective year.

The data were analysed in a similar manner to the Auckland data. However, data on the number of students in Year 13 in each school were not readily available on a nationwide basis, so roll-based success rates are not studied in this part of the report. Only participation-based success rates, obtained from the Starpath database, were studied. As for the Auckland data, the results were fundamentally consistent in all instances.

4.2.1. The decile of a school is a statistically significant (linear) predictor of success rate. The UE success rate increases by slightly more than 0.05 (5%) for each unit increase in school decile (Table 5).

4.2.2. The estimates of the coefficient of “decile” are quite consistent whether the model is fitted by individual school or to the decile aggregates.

Table 5 Coefficients of decile in linear models for UE success rates in New Zealand schools in 2006 (n=394) and 2007 (n=404)

| Year | By | Slope coefficient estimate | SE | 95% CI |
|------|-------------------|----------------------------|-------|----------------|
| 2006 | Individual school | 0.053 | 0.002 | [0.049, 0.057] |
| 2006 | Decile aggregate | 0.053 | 0.004 | [0.045, 0.061] |
| 2007 | Individual school | 0.050 | 0.002 | [0.046, 0.054] |
| 2007 | Decile aggregate | 0.052 | 0.004 | [0.044, 0.060] |

⁹ One school closed at the end of 2006, three schools transferred to the CIE programme, and one was a small school that had Year 13 students in 2006, but not in 2007.

¹⁰ Two new schools had their first intake of Year 13 students in 2007, and there were 13 very small schools that had Year 13 students in 2007 but none in 2006.

¹¹ One new school had Year 13 students for the first time in 2007, but joined the CIE programme without ever offering NCEA.

4.2.3. The value of R^2 for linear models with decile as the (only) predictor is between about 0.55 and 0.73 for models fitted by individual school, and between about 0.95 and 0.99 for models fitted to the decile aggregates (Table 6).

4.2.4. The fit of the smooth model evinces a statistically significant improvement over the straight line fit in all cases. However the increment provided to the R^2 value is at most about 0.05. Hence the data appear to be adequately modelled by a straight line fit.

Table 6 Comparisons between straight line and smooth models for UE success rates in New Zealand schools in 2006 (n=394) and 2007 (n=404)

| Year | By | p-value Smooth v. Linear | R^2 | |
|------|-------------------|-----------------------------|--------|--------|
| | | | Linear | Smooth |
| 2006 | Individual school | 0.002 | 0.691 | 0.725 |
| 2006 | Decile | 0.031 | 0.947 | 0.995 |
| 2007 | Individual school | 0.001 | 0.546 | 0.564 |
| 2007 | Decile | 0.030 | 0.959 | 0.991 |

The plots of success rates for 2006 and 2007 (Figure 3) indicate a slight upwards deviation for decile 4 schools, and a downwards deviation for decile 8 schools, the latter of which was noted in the Auckland data.

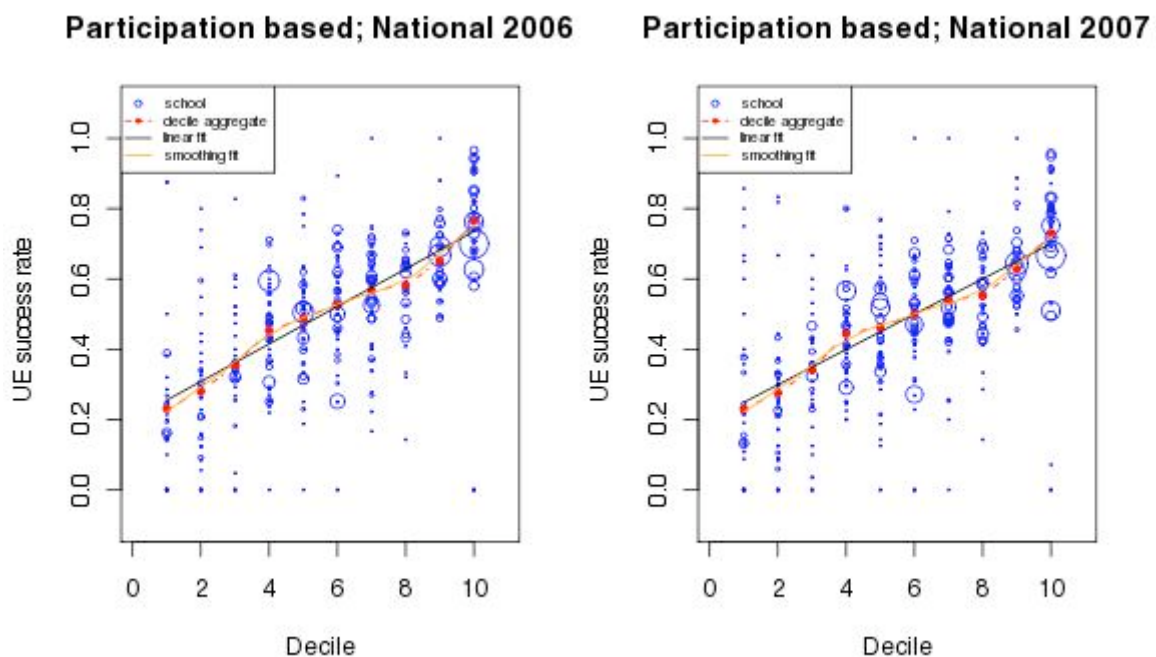


Figure 3 Scatter plot of UE success rates by school decile in New Zealand schools in 2006 (n=394) and 2007 (n=404)

4.2.5. Ethnicity in conjunction with decile is a statistically significant predictor of UE success rates, with the p-value being less than 10^{-15} in all cases. In three of the four cases there is statistically significant evidence that the lines corresponding to different ethnic groups have different slopes (i.e., there is an “interaction” between ethnicity and decile) (Table 7). In the fourth case, there appears to be no such evidence. However even in the first three cases the resulting increment in the R^2 value is negligible. Hence a parallel lines model appears to yield an adequate fit to the data, indicating that the rate of increase in UE success rate as decile increases is very similar for each ethnic group.

Table 7 Comparisons between parallel and different slopes models for five ethnic groups in New Zealand schools in 2006 (n=394) and 2007 (n=404)

| Year | By | p-value Interaction | R^2 | |
|------|--------|------------------------|----------|------------------|
| | | | Parallel | Different slopes |
| 2006 | School | 0.000 | 0.531 | 0.539 |
| 2006 | Decile | 0.043 | 0.939 | 0.952 |
| 2007 | School | 0.009 | 0.503 | 0.508 |
| 2007 | Decile | 0.107 | 0.945 | 0.954 |

The patterns observed in the Auckland data for success rates by ethnicity are repeated in the national data (Figure 4), with a very clear separation between the Asian/Pākehā group and the Māori/Pacific/Other group in 2007. Nevertheless, the differences between the groups remain fairly consistent as decile increases.

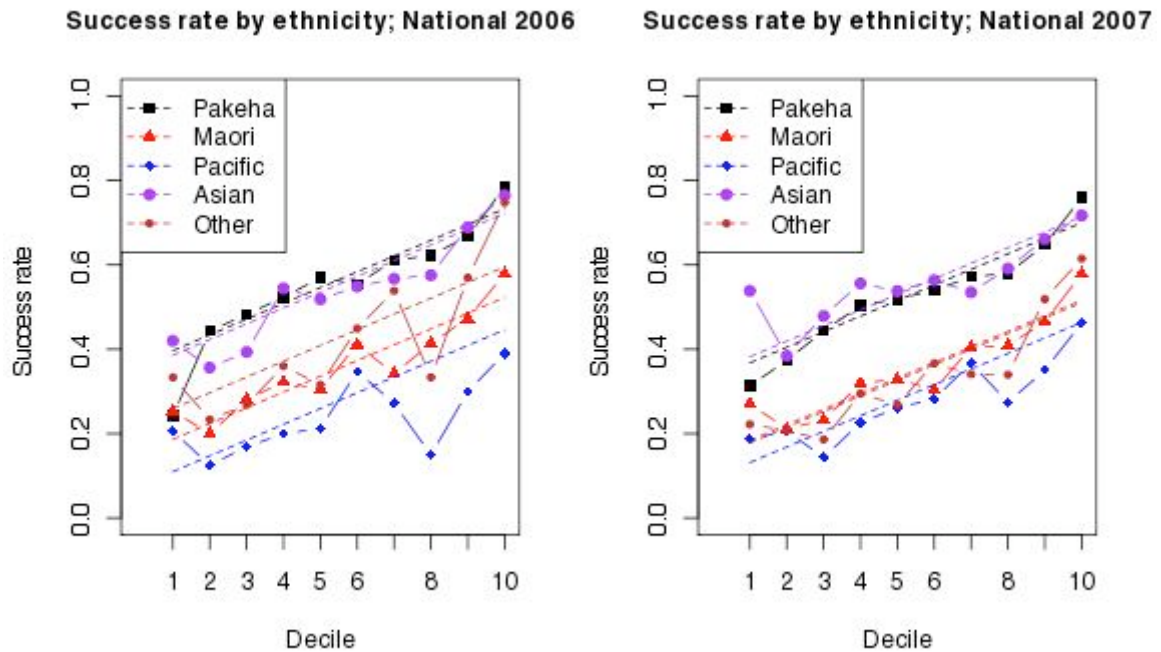


Figure 4 Scatter plot of UE success rates by school decile for five ethnic groups in New Zealand schools in 2006 (n=394) and 2007 (n=404)

5. CONCLUSION AND DISCUSSION

The Starpath project has a particular interest in finding and removing the roadblocks to degree-level study for students from low-decile schools, especially Māori and Pacific students. To this end, we have looked at the rate at which students from differing schools are successful in meeting the criteria for the New Zealand UE qualification through NCEA.

In summary, the analyses in this report on UE success rates in 2006 and 2007 have used two datasets – data from the NZQA website, and data from the Starpath dataset. The analyses in this report for both Auckland and New Zealand schools suggest that UE success rates can be strongly predicted by school decile, whether using a roll-based formula or a participation-based formula. The increase in the average UE success rate with each additional increase in school decile is similar for Auckland schools and schools nationwide. In analysing the Auckland data, we found that number of students in Year 13 (strictly speaking, the number of students enrolled in Year 13) is a significant predictor of UE success rate on its own, but adds no significant additional predictive power over school decile. This phenomenon can be partially explained by the positive correlation between number of students in Year 13 and school decile. Overall, Pākehā and Asian students have higher UE success rates compared to Māori and Pacific students in Auckland as well as nationally. The rate at which UE success rates increase is relatively similar for each ethnic group as decile increases.

Although decile ratings for schools are a less than perfect measure of the socio-economic status of the students attending a school, in this study, deciles provide a clear indication that in general (in Auckland as well as nationwide), students from schools in higher socio-economic suburbs have higher UE success rates than students from schools drawing on low socio-economic catchments. For each unit increase in decile, the success rate increases by between 5% and 6%. This is in line with those comparative studies that show a clear connection between academic success and school decile (Ministry of Education, 2008e, 2008f, 2008g, 2008h).

There is an interesting anomaly with the UE success rate of students in decile 8 schools. Whether considering Auckland secondary schools or all secondary schools nationwide, students in decile 8 schools buck the trend and have a much lower UE

success rate than would be predicted from the linear model, and perform more like students in mid-decile schools. It is also noticeable that in schools throughout New Zealand, Pākehā and Asian students in decile 8 schools perform well above the predicted level of success. This is in contrast to the situation in Auckland schools. Pacific students have their lowest levels of success in decile 8 nationwide and very low levels of success in decile 8 schools in Auckland. In other studies that group school decile into three categories (low, mid and high), or into quintiles, this anomaly is hidden from view. The results of this study suggest that this phenomenon deserves further exploration.

It was also thought that the number of students in Year 13 could be related to UE success rates. If there are more students in a Year level at a school, it seems likely that they will generate more classes taught at Year 13, that classes may be more likely be taught by specialist teachers in that subject, and that the number of students may develop a critical mass that fosters academic competition within the school to the benefit of all students. However, the results of this study indicate that the number of students in Year 13 in a school did not add any predictive power to UE success rates over and above the predictive power of school decile. In other words, having more students in Year 13 did not have the concomitant effect of increasing UE success rates. There appears to be no undue disadvantage to students simply because of the small number of students in Year 13.

The trend for increasing success rates as decile increases applies to each of the five ethnic groupings. There is a fairly persistent trend for Asian and Pākehā students to perform better than their Māori, Pacific and Other peers at each decile level, whether in Auckland or nationwide (Ministry of Education, 2008f). When examining the rate of increased success as decile increases however, we have noted that all ethnic groups enjoy a similar rate of increased success in achieving UE. The existence of this “ethnic gap” is not a new phenomenon, but what is interesting and important is that it remains fairly constant across deciles.

In this report, we have used the number of students in year 13 as the denominator for calculating success rates, and have shown that there are differential UE success rates for students from low decile schools, and for Māori and Pacific students. These students (i.e., students from low decile schools and Māori and Pacific students) are also disproportionately represented in the statistics of students who leave school

without any qualification (Ministry of Education, 2008f). Therefore, it is almost certain that the disparities in UE success rates that we have noted would be even greater if the denominator had been the number of students in the age cohort, rather than the number of students in the Year cohort. Thus, the situation regarding possible entry to university is exacerbated for Māori and Pacific students when their lower average educational attainment is added to the mix (Maani, 2004; Ministry of Education, 2008g, 2008h).

The task of overcoming under achievement in low decile schools and by some ethnic groups is a complex one. However, this is an international phenomenon and research has identified some of the strands that can generate widespread student success irrespective of the ethnic and socio-economic composition of a school (Johnson, 2002; Kirst & Venezia, 2004; Lick & Murphy, 2007). Several promising paths forward come from other Starpath research. Madjar, McKinley, Jensen & van der Merwe (2009) highlighted the effects of systemic and structural constraints on subject/course selection processes in low to mid-decile schools, and the implications of these constraints on the possibilities of academically-able students qualifying and entering into university education. Students with the potential to succeed in tertiary education can find the way forward blocked, and they are unable to meet the criteria for UE because they have insufficient credits or are taking subjects that do not credit towards UE. It is important for students, family/whānau and schools to acknowledge the constraining effects of subject/course selection, and build processes that remove these road-blocks such as timely and adequate academic counselling, and fostering better understanding of the complexities of the NCEA system. A second Starpath approach is being developed along the lines of the Massey High School model of academic counselling and target setting (McKinley, van der Merwe, Smith, Sutherland, & Yuan, 2009), where student progress towards NCEA is carefully monitored to ensure that students do not “slip under the radar” and reach the end of the year without the prospect of enjoying academic success. This programme was very effective in enhancing outcomes for students in Year 11 (i.e., Level 1 of NCEA), but has not yet been tested with students in Year 13. Nevertheless, the Massey model holds the potential to be just as effective in monitoring progress towards UE, and this is currently under review. Such an approach requires a substantial re-alignment of resources in schools to plan and implement a set of effective processes and procedures which involve students, teachers and family/whānau.

There are considerable implications arising from lower levels of success in meeting the UE criteria for students in lower decile schools or for Māori and Pacific students who have the potential to succeed in higher education but have difficulty making it to the starting line. Higher education opportunities will be constrained, which in turn can lead to lower levels of paid employment (Johnston, 2004a; Ministry of Education, 2008j), lower average income (Ministry of Education, 2008b) and increases in other negative social indicators such as crime, anxiety disorders, anti-social disorders, suicide, teenage pregnancies, cigarette smoking and health problems. New Zealanders with post-school qualifications have a significantly lower mortality rate than those with no qualifications or school qualifications only (Johnston, 2004b). While there may be later-in-life opportunities to enter higher education (such as foundation courses and open entry after 20 years of age), they become harder to realise, requiring considerable sacrifice on the part of the individual.

Therefore, it is vital that secondary schools take all possible steps to ensure that all students with potential are given the best possible opportunity to meet and exceed the criteria for UE. While these criteria are a necessary condition for entry to university, they do not guarantee entry to students' preferred courses – the requirements for entry to many first-year university courses often exceeds the minimum criteria for UE. Without UE however, students stand little chance of entering and succeeding at university.

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Starpath Project

The University of Auckland,
Epsom Campus, Faculty of Education
Private Bag 92019, Auckland

starpath@auckland.ac.nz

[**www.starpath.auckland.ac.nz**](http://www.starpath.auckland.ac.nz)