The Predictability of Enrolment and First Year University Results from Secondary School Performance

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This paper is part of the ongoing work of *Starpath: Project for Tertiary Participation and Success.* Starpath is a Partnership for Excellence led by the University of Auckland in partnership with the New Zealand Government. The project is dedicated to bringing about a dramatic transformation in education and economic outcomes for those groups of student currently under-represented in degree-level education in New Zealand. The Starpath team works collaboratively with secondary schools and tertiary partners aiming to transform education outcomes for the under-represented students by identifying "choke points" at which the achievement of different groups of students diverges at successive stages in their educational journey. It aims to produce practical strategies for schools and tertiary institutions that will achieve a step-change in current patterns of educational under-achievement. The project is important for New Zealand, because at present, New Zealand has the second highest rate of relative educational inequality in the OECD, with Maori, Pacific and students from low income backgrounds showing high rates of educational underachievement.

This particular study investigates the predictive correlations between the New Zealand National Certificate of Educational Achievement (NCEA) and Cambridge International Examinations (CIE) systems with the university first year grade point averages achieved by first year students in one large New Zealand University. It then evaluates alternative models for university entrance using different attributes of the qualifications for possible entry criteria and ascertains the implications of the best of these models for different groups of students. The best alternative model gives greater weight to excellence and merit in NCEA results and less weight to credit accumulation at minimum pass rates. A combination of this alternative model and the current model provides a merit-based admissions system which would potentially increase the number of under-represented students (Maori and Pacific ethnicities and students from schools in lower socio-economic communities) who are admitted with no necessary decline in the success rate during first year university study.

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The Predictability of Enrolment and First Year University Results from Secondary School Performance

The main criterion for entry to New Zealand universities is some form of evidence of performance which provides a level of confidence that the qualifying students will succeed at university study. Historically this evidence has been via norm-referenced tests, typically taken near the end of the last year of secondary school, where a student's achievement is compared with others in the same cohort. The NZ Bursary, a norm-referenced examination system, was used for this purpose in New Zealand, but this was replaced by a standards-based system, the National Certificate of Educational Achievement (NCEA) in 2002. Some schools have decided to use the Cambridge International Examination (CIE) which has been implemented in New Zealand with some adaptations (Philips, 2003) . Other schools offer a combination of NCEA credits and CIE.

There is much international literature concerning the use of norm-referenced tests and their accuracy in predicting University outcomes. For example, Goldberg and Alliger (1992) completed a meta-analysis of 10 studies investigating the predictability of secondary school achievement against first year University grade point averages (GPA) in Psychology. They found an average correlation of .15 between these two scores. In their meta analysis of 22 studies, Morrison and Morrison (1995) found correlations of .22 and .28 between secondary school results and various university GPAs. In a more recent meta analysis Kuncel, Hezlett, and Ones (2001) used 1753 studies and 6589 effect-sizes and found a sample-size-weighted average correlation of .13 to .38 between secondary school results and undergraduate grade point average. These average correlations of .20 and .35 between various measures of high school performance and GPAs from first year university results have been relatively stable over many years. There is a large literature aiming to understand why these relations are so low (e.g., unreliability of first year examinations, the need to include study skills and personality measures such as effort and perseverance, restriction of range), but exploring these reasons is not the aim of this paper.

The National Certificate of Educational Attainment (NCEA)

Until 2003, New Zealand students who graduated from high schools were assessed by a norm-based assessment (Black, 2001; Dobric, 2005). This involved gaining C grade or higher plus Higher School Certificate, or an "A" or "B" Bursary (University of Auckland, 2001, p. 13). (Although there are other paths into Universities, such as mature-age entry, these are not investigated in this paper.) From 2002 to 2004 the assessment system was progressively changed from this norm-based assessment to a standard-based assessment model, named the "National Certificate of Educational Achievement" (NCEA). This change was a result of a lengthy process which was influenced by arguments that the norm-based assessment system had,

for example, disadvantaged students from certain ethnicities particularly Maori and Pacific and students from lower income families (Dobric, 2005; Strathdee, 2003).

NCEA is a standards-based system that measures students' performance against standards of achievement or competence. The NCEA "achievement standards" assessments include two major components: some undertaken during the year and some completed nearer the end of the year; and the grades are Excellence, Merit, Achieved, and Not Achieved. This system closely mimics first year University study in which the level of competency is measured via assignments during a course and often an examination at the end of the course. The NCEA also includes another form of credits, Unit Standards; these only have a pass/fail level of performance (NZQA, 2004).

The NCEA standards offered in secondary schools are usually at Levels 1, 2 and 3, depending on their level of difficulty. Typically, but not necessarily, Level 1 is assessed at Year 11, Level 2 at Year 12, and Level 3 at Year 13. Every standard achieved is worth a set number of credits based on the expected number of hours that students need to study to achieve the assessment (NZQA, 2005b). To be awarded a NCEA Level 1 qualification a student must achieve 80 credits, including eight in numeracy standards and eight in literacy. To be awarded a NCEA Level 2 qualification students must achieve 60 credits, plus 20 credits at any level, even if gained for any other National Qualification. To be awarded NCEA Level 3 students must achieve 60 credits at level 3 or above; plus 20 credits at level 2 or above, even if gained for any other National Qualification (NZQA, 2005b; Strathdee, 2003). At the introduction of the NCEA, a Grade Point Average (GPA) was introduced, based on the grade achieved for achievement standards, allowing admission decisions based on this GPA to be made for 'limited entry' tertiary qualifications where there is competition among applicants for limited numbers of places. In calculating the GPA, zero was assigned for "Not Achieved", 2 assigned for "Achieved", 3 for "Merit", and 4 for "Excellence". The difference between Achieved, Merit and Excellence is 1 but the grades 0, 2, 3, 4 do not represent a continuous scale. In this system, 'Merit' is proportionally worth 1.5 more than 'Achieve' (3/2) and 'Excellence' is worth 1.3 more than 'Merit' (4/3). The NCEA framework also includes Unit Standards, which can score only "Not Achieved" or "Achieved". Thus, the contribution of the Unit Standards for the NCEA GPA cannot exceed 2 points per Standard.

The universities in New Zealand and the New Zealand Qualifications Authority agreed on a set of criteria for University Entrance (UE) that differ for open entry and limited entry programs (NZQA, 2006). For 'open entry' programs, a minimum of 42 credits at Level 3 or higher must be attained, including a minimum of 14 credits at Level 3 or higher in each of two subjects from an approved subject list, together with a further 14 credits at Level 3 or higher taken from no more than two additional domains on the National Qualifications Framework. In addition, a minimum of 8 credits at Level 1 or higher in Mathematics or Pāngarau and a minimum of 8 credits at Level 2 or higher in English or Te Reo Māori (4 credits in reading and 4 credits in writing) must be achieved. For programs with a limited number of places, universities have

opted to have additional criteria in their selection systems based on the weighted average scores of the NCEA results (NZQA, 2005a). Applications are ranked according to their best 80 credits at level 3 or higher over a maximum of 5 approved subjects weighted by the level of achievement attained in each set of credits. As noted above, Excellence gains a higher weighting than merit, which in turns gains a higher weighting than achieved. Not achieved gains a 0 weighting. The average scores are weighted for the number of credits attained in each standard to produce a Grade Point Average [GPA] used for 'limited entry' University admission decisions.

Two implications arise from this system for using NCEA results to make University admissions decisions. The first is that for 'open entry' programs, where only University Entrance is required for admission, the main requirement is the acquisition of the correct combination of credits rather than the acquisition of credits at high levels of achievement. Gaining Merit or Excellence does not increase the probability of gaining entry because differential weightings are not given to these higher grades. Some have argued that such a "quantity" based system leads to many students claiming that there was little to motivate them to aim for merit or excellence because these higher grades carried no extra value (Meyer, McClure, Walkey, McKenzie, & Weir, 2006). The second implication applies particularly to 'limited entry' courses, where higher GPA requirements are set for admission into particular degree programmes. As the GPAs are calculated across subjects, with no allowance for potentially different difficulty of the standards or examinations, then attaining achieved, merit or excellence in one standard is assumed to be similar across standards. Students, however, have reported a perception that standards differed in their level of difficulty and the time required for assessment across subjects (Meyer, McClure, Walkey, McKenzie, & Weir, 2006).

Cambridge International Examinations (CIE)

The decision of some New Zealand secondary schools to use the Cambridge International Examinations (CIE), was publicly defended on the basis that NCEA would result in "dumbing down" academic standards (Leathwood, 2005) and demotivate effort (De Boni, 2002) whereas CIE would "raise the bar" (Dye, 2004). Designed in the United Kingdom at the University of Cambridge, CIE examinations were designed to ensure that prescribed content and skill areas were targeted in such a way that meaningful feedback could be produced in each curriculum area. A curriculum framework, rather than a complete syllabus, was produced and tests were constructed accordingly. The tests target the core subjects of English, Mathematics and Science.

The CIE, a part of the Cambridge Assessment Group, was formally established in 1998 to provide high quality qualifications that meet the ongoing demands of employers and educators across the world (University of Cambridge Local Examination Syndicate, 2004). The 1-3 hour examinations are administered

up to twice a year, and in NZ may target a range of subjects in the fields of Arts, Commerce, Humanities, English, Languages, Mathematics, Science, Technology and Physical Education.

To gain University Entrance using CIE results, a set of criteria approximately equivalent to those for NCEA results has been devised. The university entrance standard for open entry programmes based on the CIE requires applicants to gain at least 120 points with a minimum grade of D in at least three subjects equivalent to those in the list approved for NZUEBS and NCEA at AS, A2 (or Advanced) level (where AS is akin to the highest and A to the lowest level of course), plus a minimum D pass in IGCSE Mathematics; plus a minimum E pass in AS English. For limited entry applicants must meet this standard and they are ranked according to their total accumulated score over a maximum of 6 subject units in subjects at AS, A2 or A level from subjects which match those of NCEA (University of Auckland, 2005). The university calculates the CIE scores using the total score as described in Table 1.

Table 1 Conversion of CIE scores at the A, AS and IGCSE levels to Marks and Grades used in ranking students for entry.

Grade	Marks	A Level	AS Level	IGCSE
A	80-100	120	60	30
B	70-79	100	50	25
C	60-69	80	40	20
D	50-59	60	30	15
E	40-49	40	20	10

Alternative NCEA Models for University Entrance

The current model for using NCEA results to determine entry into open and limited entry University courses as agreed between the NZQA and the universities is only one of a number of possibilities. A major purpose of this study was to assess which possible way of using NCEA results had the best predictive validity for university success and to evaluate the effects on the ethnic and socio-economic composition of the student body. In order to do this, various models were developed to take into account different attributes of NCEA performance. These attributes included giving greater emphasis to quality by taking into account excellence and merit awards on the one hand or continuing to emphasise quantity by counting the number of credits achieved on the other. Another attribute considered was the inclusion or exclusion of failed credits. Given the expressed concerns about the equivalence of standards, one model gave differential weighting to credits that seemed to be easier or more difficult to pass. This last measure was an approximation of a weighting by difficulty through the cumulative frequency of students who achieved each grade of excellence, merit and achieved. Each grade was weighted by the proportion of students who **did not** achieve it. This method is based on the assumption that courses where fewer students across the nation attained "excellence"

or "merit" were harder than those for which many gained these grades. It is possible that some courses were taken by only a few students very different to the rest of the cohort. This possibility, however, is unlikely to significantly affect the models because of the small number of students who took these courses, although it might negatively affect perceptions of the fairness of admission decisions made on this basis.

Table 1 summarises the NCEA models tested in this study. All 'quantity' models assessed the *number* of NCEA Level 3 Credits achieved by students in university-approved subjects. 'Quality' models involved calculating a measure of the Grade Point Average (GPA) of the NCEA results (Excellence = 4, Merit = 3, Achieved = 2, Not Achieved = 0). 'Difficulty' models calculated the total score taking into account the proportion of students who failed to achieve each grade (achieved, merit, excellence) in each standard. The different models were also assessed according to whether "not achieved" credits were included or excluded. Note that all models used results from NCEA level 3 university approved subjects only (i.e., the NCEA model which is in use at present has not been tested, only part of it).

Table 2. List of Models assessed against first year grade point average (all models used NCEA Level 3 results of university approved subjects only)

Model Name	Type of model	Description	Type of measure
Credit model	Credit based	Total number of credits gained. Including only University Approved subjects/standards	Measures quantity only
GPA model	GPA based	Weighted mean of the scores gained in all Standards, weighted for the number of credits of each standard assessed.	Measures quality / level of competency only
Cumulative model	Based on GPA and Credit	Sum of the credits gained each multiplied by the scores achieved	Measures both quantity and quality
GPA with difficulty	Based on Credit and GPA adjusted for difficulty	Weighted mean of the scores gained in all Standards, weighted for the number of credits of each standard assessed.	Measures quality / level of competency only
Cumulative with difficulty		Sum of the credits gained each multiplied by the scores achieved	Measures both quantity and quality
GPA with "not achieved" excluded	As above but excludes "Not achieved"	Weighted mean of the scores gained in all Standards, weighted for the number of credits of each standard assessed.	Measures quality / level of competency only

Credit with "not achieved" excluded	Sum of the credits gained each multiplied by the scores achieved	Measures quantity only
Cumulative with "not achieved" excluded	Weighted mean of the scores gained in all Standards, weighted for the number of credits of each standard assessed.	Measures quality / level of competency and quantity
Cumulative with difficulty with "not achieved" excluded.	Sum of the credits gained each multiplied by the related scores	Measures both quantity and quality

Each of these models was assessed in terms of the three objectives of this study. The first was to compare the correlations between the first Year University GPA with each of the models as well as with Cambridge results. The second was to assess how well different NCEA models predicted success and what features of the NCEA have the greatest predictive power, for example were University GPAs more predictable from the 'quality' or 'quantity' of credits. The third objective was to establish whether the implementation of particular models would change the profile of potentially successful students who would be eligible for entry to University. Of particular interest was the potential impact on currently under-represented groups of students (e.g. Maori, Pacific and students from low decile schools).

Method

The data set used in this study included 2004 national NCEA and Cambridge results as well as students' achievement in selected programmes at The University of Auckland in the 2005 academic year. All data came from the University Planning Office and were handled under the strict conditions laid down in the Ethics approval for the Starpath Project. The NCEA results were those provided by NZQA to all universities in New Zealand for their admission processes. Admissions data from the Planning Office included detailed information on all students who had submitted their application to the university including gender, ethnicity, enrolment status at the university, programmes enrolled in, courses taken and related grades, and qualifications gained. Data on the 49 academic programmes in the analysis included students' demographic data, university GPA, academic points gained in 2005 and percentage of programme completion (the percentage of points gained out of the total points required for the degree qualification).

The NCEA results comprised two measures. The first comprised a mean NCEA GPA score which was calculated from University Approved (UA) subjects at NCEA Level 3 (see above). This is similar but not identical with the GPA currently derived by the Universities from NCEA results for admission decisions for limited entry programs. The second was a binary measure that indicated whether a student had qualified for University Entrance. Scores based on the 9 models outlined in Figure 2 were also calculated from these data.

The GPA from first year results were calculated using the University of Auckland prescribed model: A+ = 9, A = 8, A- = 7 down to C- = 1, D or E = 0.

A predicted GPA for each student was calculated by linear regression of the NCEA GPA with the first year University GPA at the university achieved by students who actually studied at the university. The Cambridge scores (also sourced from the university Planning Office) were the total cumulative scores gained by the students over up to three years in schools e.g. Years 11-13 – as outlined above.

The initial sample for this study consisted of 29,695 students who sat at least one NCEA examination at Level 3 or higher in 2004. Of these only students who were older than 16 and younger than 21 years of age (n=29,161) were included in the national cohort analysis. Those students included in the University of Auckland (UoA) analyses were the 2832 students who had records on both NCEA 2004 and UoA 2005 datasets, and 668 who had achievement records on CIE and UoA.

Students' ethnicity was identified from the NZQA dataset. Students could report up to three ethnicities, but if they reported more than one ethnicity a priority rule was invoked whereby one ethnicity was chosen in the following order: Maori, Pacific, Asian, Pakeha, other. It is acknowledged that this system of classification could be contested. In the final sample, the proportion of Asian students was far greater than the New Zealand population statistics, and there were correspondingly fewer Pakeha and Maori students (Table 3).

Table 3. Distribution of students' ethnicity for all NCEA and for University of Auckland first year students

	NZ NCEA		UoA First year students	
	No.	*%*	*No.*	*%*
Pakeha	17242	59.1	1258	43.7
Maori	2866	9.8	118	4.1
Pacific	2019	6.9	212	7.4
Asian	5342	18.3	1137	39.5
Other	1572	5.4	150	5.2
Total	29041	99.6	2875	99.9
Missing	120	0.4	2	0.1
Total	29161	100	2877	100

Results

The first set of analyses related to the predictive power of NCEA results, as modelled in various ways. Figure 1 presents the correlations between the 10 NCEA models and the first year GPA results. The highest correlations with first year GPA were generated by the 'quality-related' models (GPA model .66, GPA with difficulty .66); then the models that incorporate difficulty (Cumulative with difficulty .66, Difficulty .65, Cumulative with "not achieved" excluded .66, GPA + Cumulative with "not achieved" excluded .63); then the NCEA credit model .52, and the GPA with "not achieved" excluded .51. The best predictors are GPA, then difficulty, and the least successful predictor excludes the "not achieved" weightings. These predictive correlations for NCEA contrast markedly with the correlation between the Cambridge results and GPA, which was only .30; similar to other international systems based on end-of-year examinations.

The correlations between the NCEA GPA and first year GPA for each of the Bachelor programs (with sufficient sample size) showed that the GPA model works well in many courses but models based on the quality of results or difficulty of courses were more successful (Figure 1; note that the vertical axis represents correlation between NCEA and first Year performance not level of achievement). The NCEA GPA model is the best for Bachelors degrees in Arts, most of Commerce, Architecture and Engineering, and Health Science. The Credit based model rarely exceeds the predictive correlations, but is slightly more predictive for health Science (although the GPA model still predicts greater than .60). These results give much support for using the NCEA GPA model for deciding entry to Bachelor degrees at the University of Auckland.

The impact of the models on different student groups

A particular concern is the predictive correlations between the Credit and GPA NCEA models across the 10 ratings of socio-economic status for NZ secondary schools. It can be seen (Figure 2; note that the vertical axis represents correlation between NCEA and first Year performance **not** level of achievement), that one of the features of the GPA method is that the predictive correlations are systematically higher than the Credit-based model, particularly for the lowest two deciles (although it is noted that the predictive correlations for the lower decile schools is much lower than those for higher decile schools, and this needs further research to understand why this might be so). Using the Number of Credits model, the correlation remains above .5 for students coming from decile 3 schools and above, but drops to .36 for decile 1 students (Figure 2). It is likely, therefore, that the NCEA GPA model will allow more Maori and Pasifika students to enter, as these students are dominant in schools from the two lowest deciles. We next turn to such an analysis.

Figure 1. Correlations between the quantity credit-based model, quality NCEA GPA based model and the first year UoA GPA in various degree programs

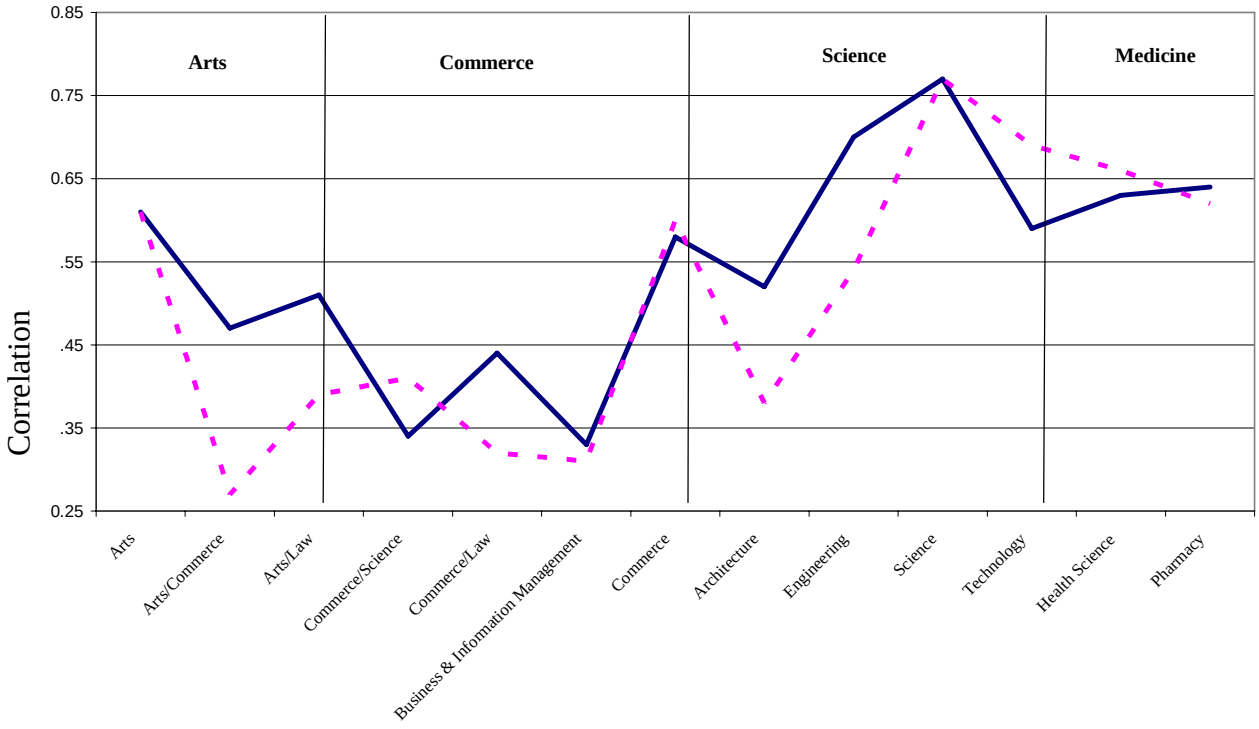
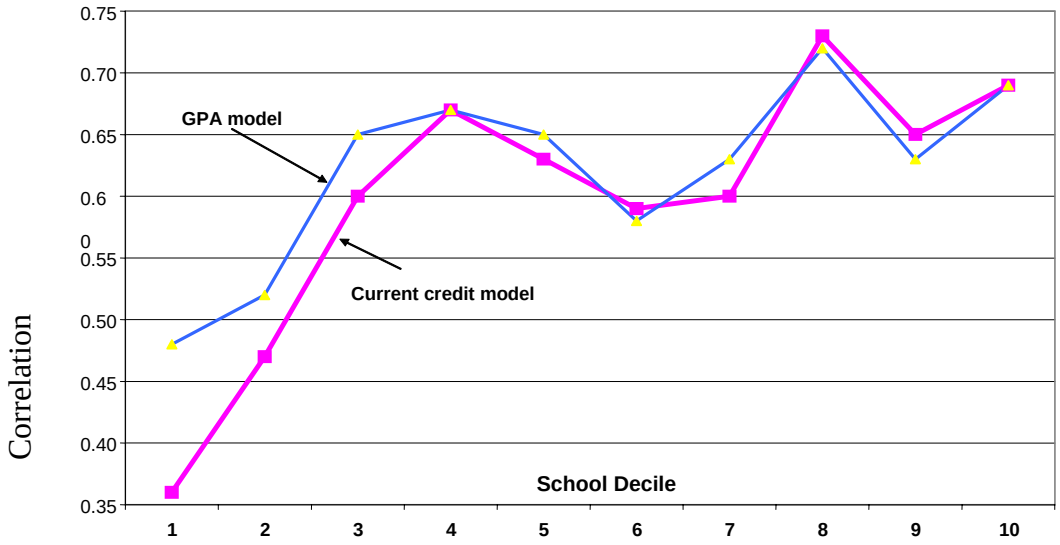


Figure 2. Correlations of selected models with university GPA across the 10 socio-economic deciles of secondary schools



An important implication of the differential relationship between NCEA models and university GPA is whether a different composition of students with a higher probability of passing university courses would be eligible for entry to university if different models were used. Given that a NCEA GPA score could be calculated for every student in the national database, a regression equation was used to estimate their University GPA (R^2 for this model was .44). An alternative entry was simulated for entry to University. Recall that the current credit-based model requires gaining 28 Credits in two university-approved subjects (14 in each) and another 14 Credits in no more than any two other subjects, in total 42 Level 3 Credits. The students under this alternative model also had to meet numeracy (level 1) and literacy (level 2) criteria.

The alternative NCEA GPA model developed was based on fewer credits (36 University Approved credits) but based on quality only, namely on the grades within those credits. The benchmark of 36 university approved credits was set up because without such a benchmark, it is possible to achieve very high grades in a very small number of credits that do not adequately test knowledge base, skills and abilities of students nor adequately prepare them for University study. As only 1% of the students who entered the university had fewer than 36 credits (these students made it through other admission criteria than the regular NCEA track) it was decided that 36 credits were enough to evaluate students' secondary school performance. It is noted that the decision to require 42 credits made up of some from university-approved subjects; others from non-university-approved subjects; and some compulsory credits for literacy and numeracy was made as much for breadth as well as predictive and other reasons. Thus it is acknowledged that the features of the models in this paper are informed more by statistical than academic judgements; and that for this reason the universities are unlikely to depart from the current 42 credit model without consideration of these other features.

In terms of quality, the current admissions policy requires only 28 credits from university-approved subjects while the other 14 credits can come from approved or non-approved subjects. The regression analyses (r=.63; with similar simulated GPAs) predicted that those who entered under the alternative model would have had the same high probability of passing first year courses should they have been allowed (and chosen) to enter and study. The regression analysis showed that a minimum NCEA GPA of 2.32 (falling between achieved and merit) predicted first year university GPA of 2.0 or higher, therefore, this NCEA GPA (2.32) was set as the minimum for entry provided that at least 36 credits were obtained from university approved subjects together with a minimum of 8 credits in Level 1 in numeracy and 8 credits in Level 2 in literacy.

Under this alternative NCEA GPA model, there were very few additional students who would have qualified for entry to University (false positives = n = 1253; 4.3%). Similarly very few students who currently qualify for entry would be excluded by the adoption of the new model (false negatives = n=1,623; 5.6%). Thus if the current criteria through which the entry to University is awarded were replaced with the new NCEA GPA model, the total number of students who would gain entry to University would be reduced by 1.3% (370 students). This is probably not a desirable outcome so it is assumed that an additive approach would be taken in any reconsideration of university entry criteria, that is, a Dual Admission model would be adopted which included both the current credit-based model and the alternative GPA NCEA-based model. In practice, students' achievement would be assessed against both the credit and the quality models and students who met the university entrance criteria by at least one of the models would be admitted to the university.

In the remainder of this section, the profile of 1253 students who would qualify for entry to university under the alternative NCEA GPA model but do not currently do so are considered. As can be seen from Table 4 the model has proportionately greater impact on Maori students eligible for entry than other ethnic groups (n=138, 16% of the 2004 cohort entering UoA). There would also be a small percentage increase in the number of Pacific students (n=62, 14% of 2004 the cohort entering UoA). The percentage of Pakeha and Asian students would decrease slightly although their actual numbers would potentially increase (832 Pakeha, 162 Asian, and 66 Other).

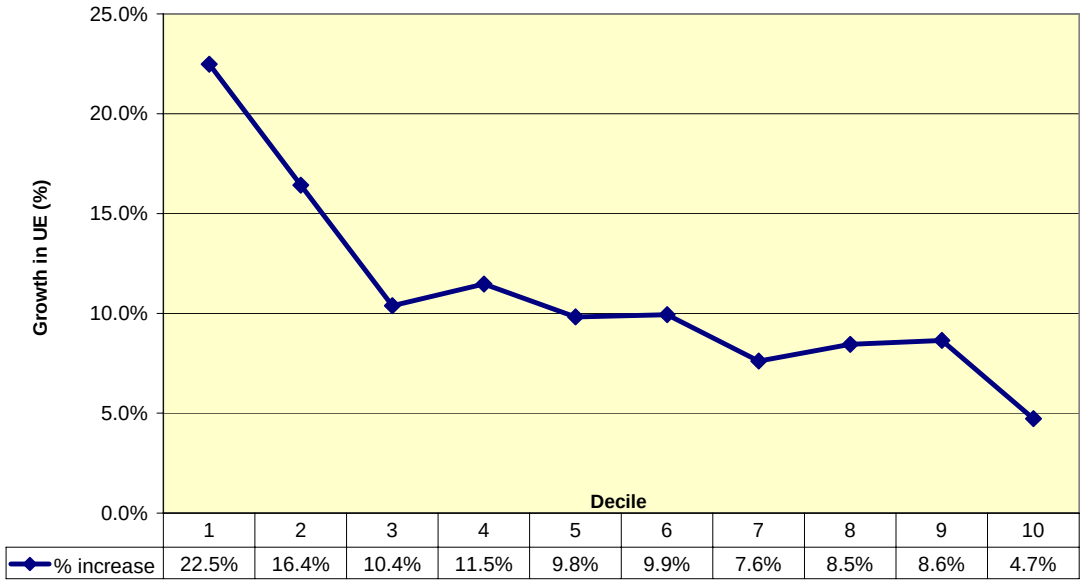
It is noted that the above analysis used data from one university only but the national sample included 29,161 students. This means that the students who would be awarded with university entrance by the Dual Admission model would have university entrance for any university, assuming that the correlations between the NCEA GPA and university first year GPA is not significantly different across universities. Although there is no reason to believe that this assumption is unlikely, further research using data from other universities may clarify this issue.

Table 4. Number and percentage of students in the New Zealand NCEA level 3 cohort, and those eligible for entry under the current credit-based model and the alternative Dual Admission model

	NZ students		Current Credit model		GPA model		Dual Admission Model	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Pakeha	17242	59.4	10320	68.2	10351	68.4	11143	68.0
Maori	2866	9.9	872	5.8	891	5.9	1010	6.2
Pacific	2019	7.0	437	2.9	435	2.9	499	3.0
Asian	5342	18.4	2817	18.6	2758	18.2	2979	18.2
Other	1572	5.4	697	4.6	707	4.7	763	4.7
Total	29041	100.0	15143	100.0	15142	100.1	16394	100.0
Missing	120		4				6	
Total	29161		15147		15142		16400	

Given the higher percentage of Maori and Pacific students in low decile schools, not surprisingly, higher percentages of these new students would come from decile 1 and 2 schools as shown in Figure 3.

Figure 3. Percentage increase of students from each school decile entering under the Dual Admissions model compared with the current credit-based model.



	1	2	3	4	5	6	7	8	9	10
% increase	22.5%	16.4%	10.4%	11.5%	9.8%	9.9%	7.6%	8.5%	8.6%	4.7%

Discussion

The first objective of this study was to compare the relationship between the GPA of students during their first year at university who gained university entry qualification through the National Certificate in Educational Achievement (NCEA) and Cambridge International (CIE) examination systems. It was found that the best of the NCEA models is almost five times ($.66^2/.30^2$) more effective in predicting first year students' GPA during their first year at university than the CIE[1]. This pattern of low correlations between secondary school performance on this type of examinations and university success has long been documented

[1] We have explored in several ways what it would take to reduce a correlation of 0.66 to 0.30 by selection effects and other artefacts. With a sample of 668 CIE students whose CIE and University records could be matched, statistical error (sampling variation) can explain a difference in the correlation of approximately 0.05. Another contributor could be attenuation due to selection effects. Suppose that the predictive ability of NCEA and CIE scores were identical but that students entering with CIE were from a narrower (e.g. higher) ability range. The observed correlation between CIE and university GPA would be lower than for NCEA as a direct consequence of such a selection effect. While CIE-entering students do have higher university GPAs on average than NCEA-entering students (indicating that they are a higher-ability group on average), however, the difference between the grade distributions of the two groups is modest rather than dramatic, so this effect is also modest. On the basis of such evidence, so large a difference in predictive ability between NCEA and CIE cannot be accounted for simply in terms of artifacts such as student-ability selection effects and statistical error.

with little progress made in improving the relationships (Goldberg & Alliger, 1992; Kuncel, Hezlett, & Ones, 2001; Morrison & Morrison, 1995). The higher correlation between the NCEA and university success may be due to the similarities in the assessment and the subsequent washback on the teaching systems. Both require ongoing assessments involving a variety of tasks (projects, essays, portfolios) throughout the year, together with a final examination. This NCEA correlation is important particularly because the NCEA is a new assessment system recently introduced to New Zealand and there have been too few investigations into its predictive relationships. As Strachan (2001) suggested "What must be ensured is that the potential for improvement offered by the NCEA does achieve the aims sought by the change, and does not repeat the negatives of the past".

The current study further investigated features within the NCEA systems that could be most important for decisions relating to admission to degree programmes at the university and the first year results. It was found that the level of competency (NCEA GPA) that students achieve may be as important as reaching the required number of Credits. The NCEA GPA models had the highest correlations with first year GPA at the university. Aiming for higher GPA may increase motivations beyond merely collecting Credits, and place more attention on the discriminations between the Excellence and Merit levels (all the meaningful information under a Credit model needs to be between Achieved and Not Achieved, which is not necessarily what was desired when the four levels were introduced). Teachers have suggested that it would be better to reduce the number of Credits to allow increased quality of teaching and learning leading to higher grades in the NCEA (Hipkins, Vaughan, Beals, & Ferral, 2004). Much of the criticism of NCEA has been targeted at a perception by students that there is little to motivate them to aim for excellence because these higher grades carried no extra value. Rather the emphasis has been on credit accumulation (Meyer, McClure, Walkey, McKenzie, & Weir, 2006). If NCEA candidates aspire to succeed in university, it may be appropriate to shift this emphasis from minimum passes in more credits, to higher achievement in fewer credits.

Further analysis of the1,253 additional students who would be admitted under the proposed Dual Admission model showed that this would increase the numbers from those groups most under-represented at university. In proportion to the 2005 University of Auckland cohort, 16% more Maori and 14% more Pacific students would have qualified for entry to the university, with the greatest proportion of extra places given to students coming from low decile schools. It is important to note that this is a merit-based model, in that students qualifying for university admission under this Dual Admission model would be eligible because their NCEA achievements were of sufficiently high quality to predict that they were likely to pass their degree level courses, and not because of their ethnic affiliations or the decile level of the schools they had attended. The dual admission approach would thus be likely to maintain the success rates in the student body, while increasing the number of students from under-represented groups at the university.

Nonetheless, it is recognised that the NCEA was introduced with many more aims that preparing students for entrance to University and rightly so. It may be appropriate to undertake similar studies relating success in NCEA to other forms of post-school study and vocations. Further, it is important to note that this study is based on a single cohort of students entering one university in the first year of a new examination system. However, this study indicates that at least for those wishing to succeed at university, that schools teachers and students consider the appropriateness of examination systems that reflect the two extremes. One extreme involves relying solely on a norm-based end-of-year examination that both nationally and internationally shows a .20-.35 relationship to first year university GPA. The other extreme is accumulating credits at minimum levels of achievement in a standards-based system. Although this system has a higher relationship with university success than systems relying on end-of-year examinations, it is not as powerful as predictor as a standards-based system where quality counts.

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