A Dual admission model for equity in higher education: a multi-cohort longitudinal study

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Abstract

Equity in higher education is one of the major challenges higher education institutions and policy makers face today. The need to enhance equity in higher education raises difficult ethical dilemma such as: how equitable are affirmative admission policies if they are ethnicity or race based? The literature, however, is inconclusive and highlighting the need to re-assess the current paradigms. This study tests a new model entitled “Dual Admission Model” which aims to enhance equity and equality in higher education while addressing many of the ethical dilemmas associated with affirmative action admission policies. Data of three consecutive national cohorts of New Zealand secondary school graduates were used to establish and test the effectiveness of a range of admission models. These datasets include achievements from secondary school assessments and data from the first year at the university. The predictability of the first year university GPA was calculated for different alternative admission models based on the NCEA features. The effect of these admission models on different groups of students was measured across three student leaving cohorts. It was found that the best models give greater weight to the quality of the assessments (i.e. higher grades) and less weight to quantity (i.e. credit accumulation) and particular combinations of subject choices. It was also found that by combining the new model with the current admission model (Dual Admission Model) provides a merit-based admissions system, which would potentially increase the number of under-represented students (e.g. lower socio-economic communities) while maintaining their success in the university academic programmes. These finding were consistent across all cohorts.

It is suggested that this Dual Admission Model (DAM) will increase participation and success in degree programmes for students from traditionally underrepresented groups without having to apply any affirmative action admission policy. Implications for policy makers are discussed.

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keeper i.e. the admission criteria. As a result, a range of admission policies have been implemented aiming to increase the number of students from traditionally under-represented populations in higher education (Rigol, 2003; Skilbeck & Connell, 2000). Among these the most popular admission policies are the open admission policy (Friedlander, 2008; Schmid, 2008), and ethnicity based ‘affirmative action’ policies (Bucks, 2005; Donnelly, 1998; Loury & Garman, 1993; Tienda, Alon, & Niu, 2008). Most New Zealand universities, however, have applied special admission policies for traditionally underrepresented populations, particularly aimed at enabling students of Maori and Pacific ethnicities to enrol in degree programmes even if they have not met all the admission criteria. Nonetheless, a comprehensive synthesis of the evidence of the New Zealand tertiary education outcomes indicates that although the educational attainment of all New Zealanders has increased over the past fifteen years (1991-2005) the gaps social groups remains the same (Smart, 2006). Hence, the DAM concept as introduced in this paper may provide an improved method for enhancing equity in higher education.

The New Secondary School Assessment System in New Zealand (NCEA)

The New Zealand’s NCEA is a standards-based system that measures a students’ performance against standards of achievement or competence. The NCEA “achievement standards” assessments include two major components: some undertaken throughout the year and some completed towards the year end. The ratings for the NCEA are Excellence, Merit, Achieved, and Not Achieved. This system is very similar to first year University study in that the student’s 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; which only rate the level of performance as pass/fail (For details see: NZQA, 2004; Shulruf, Hattie, & Tumen, 2008).

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. Previous analysis has assessed which NCEA admission application provides the best predictive validity for a student’s success in university and evaluated the effects on the socio-economic composition of the student body. In order to do this, ten models were developed to take into account different attributes of NCEA performance (data included 26,161 secondary students of whom 2,832 studied at the university). The most successful model in predicting first year university GPA model emphasised quality by taking into account Excellence and Merit awards while other models emphasised quantity by focusing on the number of credits achieved (for details see: Shulruf et al., 2008). The NCEA GPA model (i.e. quality model) was highly correlated with university GPA (r=.66).

Study 1: Testing the equity: The impact of the models on different student groups

The first study considers the implications of the differential relationship between NCEA models and university GPA, looking at 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 (R² for this model was .44). An alternative entry was simulated for entry to University. The NCEA GPA model was based on fewer credits (36 University Approved credits) and on quality only, namely on the grades within those credits. The university approved benchmark of 36 credits (in comparison to the 42 credits required in the current policy) was established in order to prevent misrepresentation when students achieve very high grades in a very small number of credits which do not adequately test their knowledge base, skills and abilities nor adequately prepare them for University study (only 1% of the students who entered the university had fewer than 36 credits).

A regression analyses (r=.63; with similar simulated GPAs) predicted that those who entered under the alternative model (NCEA GPA) 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 demonstrated 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 admission.

Under this NCEA GPA model, there were very few additional students who would have qualified for entry to University (false positives = n = 1,623; 5.6%). 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 DAM 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 (current) 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. The results of that simulations clearly indicate that the greatest increase of new students eligible to enrol under the DAM would come from low school and SES deciles (Figure 1). It is noteworthy that, the effect of the DAM would be greater for students in the lower school decile than for students from the lowest individual SES deciles. These results clearly indicate that school characteristics have greater impact on student success in higher education than the individual or family resources for students who live in low income neighbourhoods.

![Figure 1](image_url)

**Figure 1.** Percentage increase of students from each school decile and individual socioeconomic status (SES) entering under the Dual Admissions model compared with the current credit-based model.

### Study No. 2 Multi-cohort analysis

In the second study a criterion based upon the NCEA GPA was formulated (in a similar way used in the first study) for students who sat the NCEA examinations in years 2004, 2005 and 2006. For this analysis an “intake neutral” criterion was created, which means that it would admit exactly the same number of students as were admitted under the “old” (current) criterion. Quantile-quantile plots (not presented) reveal that the tails of the distribution to be a bit “light” (in comparison with a normal distribution) which is unsurprising in view of the fact that the GPA is constrained to lie between 0 and 4. Using an “intake neutral” calculation did not allow any standard or classical techniques for calculating confidence intervals. Hence a simulation technique (Monte Carlo inference, or parametric bootstrapping) was used instead. The results indicated a minor effect on student intake across school deciles and social groups.

The final analysis was to incorporate the DAM which was introduced in the first study. Under this policy students could be admitted to University if they achieved University Entrance under either the “old” or the “new” admission criterion. Obviously the intake of students must increase under a DAM. Plots of the impact of the DAM (where the “new” criterion uses the NCEA GPA cut-off values given above) are shown in Figure 2. The pattern here is similar to that observed in the first study in that there appears to be a positive impact upon the students from lower deciles.

![Study No. 2 Multi-cohort analysis](image_url)
Discussion and summary

The first part of this paper established the robustness of the new NCEA models in comparison with similar secondary school assessment systems. It was found that the best of the NCEA models is up to five times ($0.66^2 / 0.30^2$) more effective in predicting a students’ GPA during their first year at university than most other assessment systems (Morrison & Morrison, 1995). The analysis further investigates features within the NCEA systems that may prove to be highly relevant for policy decisions relating to admission to degree programmes at universities and outcomes within the first year. 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. Hence, if NCEA candidates aspire to succeed in university, it may be appropriate to shift the emphasis from minimum passes in more credits, to higher achievements in fewer credits (Shulruf et al., 2008).

Further analysis revealed that most of the 1,253 additional students who would be admitted under the proposed DAM would come from the most under-represented groups at university (lower school deciles). It is important to note that this is a merit-based model in that students qualifying for university admission under this DAM would be eligible based on their NCEA achievements which would be of sufficiently high quality to predict that they would likely pass their degree level courses. The dual admission approach would thus be likely to maintain high success rates in the student body, while increasing the number of students from under-represented groups at the university.

The second study provides the most important evidence of the usefulness of the DAM. It demonstrates that the effect of the DAM is consistent across three consecutive cohorts and two different statistical analyses as well as across slightly different entry criteria. This finding is striking, particularly by indicating that the NCEA, which has been found to be an excellent secondary school assessment system (Shulruf, Hattie, & Tumen, in review) with unusually high predictive power of student achievements in their first year at the university, has not yet been optimally used to enhance equity in higher education. It is therefore suggested that educational stakeholders reconsider the way in which they use the NCEA results and consider adopting the DAM to enhance equity in the New Zealand Higher Education system. Furthermore, the concept of the DAM is not limited to the NCEA or New Zealand only. In many countries, students from under-represented groups are most likely to study in schools located in low SES neighbourhoods (Young & Johnson, 2004). Studying in such schools has a negative impact on students outcomes (Kao & Thompson, 2003). These effects may relate to many factors (e.g. finance, teaching quality, etc) but the most relevant any educational systems with similar elective curricula is student tracking. Schools in low income neighbourhoods tend to offer programs that are less focused on preparation for further academic studies and tend to encourage students particularly from disadvantage populations towards more vocational pathways (Moscoso, 2000). Hence we suggest that the DAM partially remedies this problem by allowing students who demonstrate likelihood in succeeding at the university level to gain admittance despite not meeting some (mostly administrative) admission criteria.

References


