Admission and success for low SES university students

Report on a HEPPP 2018 National Priorities Pool Project

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It will be more informative if citations refer to chapters within the report. For example, Chapter 1 can be cited as:

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Chapter 4

Method for the quantitative modelling

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Variables and database

The databases used for the study were the universities' student record systems. Some variables, such as GPA, were taken directly from the databases. Others such mode of study, SES and remoteness took the entry in the database and coded a numerical variable suited to the SEM analysis.

Mode of study was based upon the proportion of units a student had enrolled in, which were classified by the participating universities as either online or on-campus. In the student record systems, study mode is classified by units using a dichotomous classification of online or on-campus. Units classified in either category could, and usually did, have some degree or type of blended learning. For UTAS students, study mode was coded depending on the proportion of online and on-campus units the students talk. The students were classified as online if more than 75% units were taken online, and on-campus if more than 75% of units were taken on-campus. The remainder were coded as mixed. Coding was; 1 = on-campus, 2 = mixed, 3 = online. The coding, therefore, reflects a progression in the degree of teacher-student contact from most to least. In view of the empirical evidence of the impact of teacher-student contact on integration and attrition, it, therefore, seemed reasonable to treat mode of study as a continuous variable.

Basis of admission score was used as a measure of entry qualifications. This variable was preferred to the ATAR or other Tertiary entrance scores. Many of the low SES and other students admitted following the lifting of the admission cap were admitted on a basis other than ATAR score. If ATAR scores were used as a measure of admission qualifications, many low SES and other students admitted following the lifting of the admission cap would have been excluded from the study. Basis of admission score was based upon an ordering of admission categories from completion of secondary education, and the attainment of an ATAR score, to less formal qualifications. The admission categories are used by admissions officers in a hierarchical manner. Admission officers choose what they consider to be the highest ranked type of qualification the student has and admit the student according to that admission category. Highest in the hierarchy are the highest ranked formal qualifications; lowest are informal experience-based qualifications. In view of this hierarchical coding, it was reasonable to treat the variable as continuous.

The remoteness index is a measure of the remoteness of students' term address. It is based on an analysis of postcodes using the Accessibility/Remoteness Index of Australia (ARIA+), which is the official Australian measure of remoteness. A high proportion of the Australian population is concentrated in a small number of major cities. At the other extreme of remoteness and population density are vast areas with

very few residents. The ARIA+ index reflects this demographic position, by being a five point scale ranging from Major City to Very Remote.

Socio-economic status (SES) is a measure of wealth and social status. In Australia it is calculated for defined geographical areas (SA1), using sets of weighted measures from census data. The measure of socio-economic status used in this study was the ABS Index of Education and Occupation (IEO) which takes into account the level of education, whether further education is being undertaken, employment / unemployment, and the distribution of occupations based on the Australian and New Zealand Classification of Occupations within a given area. IEO was calculated based on the student's home address, rather than the term address. Coding was in terms of the three categories of low, medium and high, which appears to have become the standard way of reporting SES in higher education. Universities have to report SES in terms of these three categories, therefore, record SES this way in their student record databases. As the databases were the source of data for the SEM analysis, the three-category measure was used in the modelling for this report. The SEM modelling in Kember, Leung and Prosser (2019) used original IEO data for SES in SEM modelling for UTAS. The SEM models were very similar to that reported in the next chapter.

The two intervening variables are age and year of study. Values for these were taken directly from the student record database. Year of study is the number of years since enrolment.

The grade point average (GPA) is based upon the student's average grade point in their units of study, weighted by the credit weighting of each unit of study. GPA scores range from 0 to 7. A student who dropped out from, or failed, every unit would receive a GPA of 0. A student with a high distinction grade in every unit would have a GPA of 7. GPA can, therefore, be interpreted as a measure of academic success, as well as an indicator of dropout.

The Universities of Melbourne and Wollongong both use weighted average mark (WAM) instead of GPA. The models for these universities, therefore, use WAM instead of GPA. WAM is also, like GPA, a measure of both success and attrition however it is important to note that WAM takes into account the credit points assigned to each unit (in essence the required 'workload').

The Dropout variable is based upon whether the students dropped out during the year of the analysis, so were not included in the subsequent year's enrolment file. The other two categories were for continuing students or those who had completed their studies. The three categories, therefore, constitute a continuous variable.

Proportion of units completed is effectively a measure of a student's progress through the degree in which they are currently enrolled. To control for differences in the number of units required to successfully complete a given degree both within and between institutions, this was calculated as the ratio between the total credit points required to successfully complete the degree within which the student was enrolled and the number of credit points the student had achieved towards this at the point in time that the sample was taken.

Structural equation modelling

This study used structural equation modeling (SEM), a statistical technique which can be used to examine complex patterns of interactions between many variables in real-life

phenomena. The goal of SEM is to determine the extent to which a theoretical model is supported by the sample data collected to test a set of hypotheses (Schumacker & Lomax, 1996). In SEM, if the theoretical model is not supported by the sample data, the original model can be modified and then tested again or alternative theoretical models can be posited, developed, and then tested. An attractive feature of SEM is its ability to consider simultaneous equations with multiple variables in addition to the recognition of the importance of accounting for measurement error (Bollen & Long, 1993). Another attractive feature of SEM is its use of diagrammatic representations to present the models that are being tested. This makes it possible to communicate findings to non-specialists, in forms which are readily comprehensible. Data for SEM commonly comes from questionnaires, which involve Likert type responses to items, or from existing databases.

There are very significant advantages to the SEM approach, as it will produce far more evaluative and diagnostic information than a conventional test of the power of an intervention. Firstly, SEM uses tests of how well the data fits the model to assess the effectiveness of the combined contributions of all the elements included in the tested model. Secondly, the standardised coefficients of the final tested model give an indication of the causal contribution of each element of the model. In the case of the model hypothesised in this project, there will be a test of how each element of the model impacts upon each of the measures of outcomes.

Tests of models

The hypothesised path models were tested to assess the goodness of fit of the hypothesized model. Path analyses were performed by the EQS 6.0 package (Bentler, 2006) and with Stata (StataCorp, 2017), using the maximum likelihood estimation with a robust procedure to adjust for the non-multivariate normality of the data (Satorra and Bentler, 1994).

Goodness of fit of SEM models is based on fit indices. Assessment of goodness of fit of the model to the data was based on three fit indices: (a) robust Comparative Fit Index (R-CFI), (b) standardized root mean squared residuals (SRMR), and (c) robust root mean square error of approximation (R-RMSEA). The level of fit is determined by whether values for fit indices exceed accepted values in the literature. R-CFI shows whether the model has a good fit to the data, and has an accepted threshold values of R-CFI > 0.95 for a good fit to the data. SRMR and R-RMSEA are measures of the degree of error in a model. A good fit is, therefore, indicated if values are lower than the threshold. SRMR < 0.08, and R-RMSEA < 0.06 indicate a good fit (Hu & Bentler, 1999).

SEM has a facility, called Modification Indices (MI), which indicate whether the fit of the model could be improved by adding or deleting paths. The baseline models were all tested and then MIs calculated to see whether improvements could be made. It is good practice to only accept modifications to the hypothesised model if they are theoretically plausible.

Discussion of models

The main purpose of the discussion sections is, firstly, to discuss the model as a whole and how it can inform our practice. The second main purpose is to consider the

variables within the model and their relationship to other parts of the model. The aim is to interpret how the various parts of the model inform understanding of the attrition processes of retention and success. As the models are composed of variables relevant to the transition between elite and mass higher education, there should be insights into how the advent of mass higher education has impacted on retention and success.