

## Beyond demographics: Predicting student attrition within the Bachelor of Arts degree<sup>1</sup>

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### Abstract

*This paper examines factors linked to first year attrition within the Bachelor of Arts (BA) degree at an Australian university. Drawing on a broad range of institutional data, the authors considered correlations between attrition and several variables. Our research revealed the need to move beyond analysis of geo-demographic factors towards indicators of student choice and educational achievement. While few demographic factors were found to be strong indicators of attrition, two other factors were clearly correlated. These factors – course preference, and first year educational performance – were significant predictors of attrition. Because subject failure is the single strongest predictor of attrition, and because the BA offers a wide range of subjects, developing strategies to ensure consistency and quality across those subjects is imperative.*

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<sup>1</sup> The research in this paper is based on an unpublished La Trobe University management report from 2012, *Understanding first year attrition within the Bachelor of Arts* (Harvey, Mestan & Luckman, 2012).

## Introduction

The need to raise student retention rates confronts the Australian university sector (Long, Ferrier & Heagney, 2006). Meeting this need requires an understanding of the underlying reasons for student disengagement, transfer and withdrawal. Factors influencing withdrawal may relate to the characteristics of the students, their educational background, environmental factors, or their teaching and learning experiences (Crosling, Thomas & Heagney 2008; Quinn et al., 2005; Yorke & Longden, 2008). While some causes of attrition can be identified at the institutional level, retention rates vary considerably by course (Department of Innovation, Industry, Climate Change, Science, Research and Tertiary Education [DIICCSRTE], 2011). This variation suggests a need for sophisticated analysis that focusses primarily on the courses most at risk.

Attrition rates within the Bachelor of Arts (BA) degree are relatively high across the sector, including at La Trobe University where our evaluation was conducted. This paper draws on an internal review of the degree conducted by the authors in 2012, specifically examining factors linked to first year attrition. During the initial evaluation, several areas of potential relevance were analysed, including the geo-demographic characteristics of students, their prior educational background, and their achievement once enrolled in the course. Two particular factors were clearly correlated with attrition: the course preferences of students; and their propensity to fail an individual subject in the course. In this paper we explore each of these findings and provide suggestions to minimise the risks of attrition.

First, we examine the correlation between course preference and attrition. In Victoria Australia, prospective university students may select up to 12 course preferences in their university application. Preference level was found to be significantly correlated with attrition, with students who enrolled in the BA having listed the course as their fourth preference or lower being relatively likely to withdraw from the course. Second, the relationship between first year academic achievement and course attrition is explored. University success is found to be strongly correlated with attrition, with subject failure being a major indicator of likelihood to withdraw.

The manifest relationship between subject failure and course attrition led to further investigation of subject failure rates. Substantial differences were found in first year subject pass rates, and large numbers of students were found to record grades so low as to indicate non-submission of assignments. In addition, a relationship was found between those subjects from which a high proportion of students withdrew before the deadline for payment of student fees (census date), and those that registered relatively high fail rates from post-census students. This correlation, together with high variability amongst subject pass rates, may not be explained by content difficulty, with many variable subjects lying within the same broad disciplinary area. Further research into the causes of subject variability is merited.

Our analysis reveals the need to promote the BA as a destination in its own right, and potentially to identify low preference students as at-risk from the commencement of their studies. For many uncertain students, recruitment cannot be considered final at enrolment or even census date, with ongoing academic and

career support required throughout their first year of study. Secondly, the impact of individual subject failure suggests a need for greater monitoring and benchmarking to ensure horizontal equity among subjects. Subject choice alone should not be a strong predictor of failure and, by extension, course attrition. More broadly, our results underline the potential value of academic analytics in reducing attrition in a course characterised by its breadth of subjects and pathways.

## Context

The costs of attrition in higher education are well-documented. A study by Adams, Banks, Davis and Dickson (2010) estimates the total cost of domestic student attrition to the Australian higher education sector to be as high as \$1.2 billion per annum, while Vincent Tinto has also shown that non-completing students receive little financial benefit from their studies (Tinto, 2012, p. 1). In Australia, the importance of student retention in higher education has been further underlined by the introduction of a demand-driven system for Commonwealth undergraduate funding in 2012 as a result of the recommendations of the *Bradley Review of Higher Education* (Bradley, Noonan, Nugent & Scales, 2008). By uncapping student places, the new funding system has led to a rapid expansion of higher education (Norton, 2012), in line with the Australian Government's objective to see 40 per cent of Australians aged between 25 and 34 hold a bachelor's degree by 2025 (Australian Government, 2009). As access to higher education has broadened, some commentators have argued that student attrition could become a more serious problem. The most selective university group, the Group of Eight, believes that "without increased resources and attention to learning needs, attrition will increase or the quality of student

learning outcomes will fall" (Group of Eight, 2012, p. 5). Similarly, Norton argues that attrition levels appear to fluctuate with changes to demand and supply, possibly owing to the academic quality of university entrants rising whenever demand exceeds supply (Norton, 2013).

Central to preventing attrition is the ability to predict attrition. Many demographic characteristics have been analysed to assess potential risk factors, often before students have commenced their courses. In the UK, socio-economic status is commonly found to be correlated with attrition (Quinn et al., 2005; Smith & Naylor, 2001; Yorke & Longden, 2008), though a major Australian study notes that "the available data on students from lower socio-economic backgrounds shows that while access rates are lower, students once enrolled have broadly comparable rates of success, retention and completion" (Krause, Hartley, James, & McInnis, 2005, p. 68). Age has also been examined, with mature age students often recording higher rates of withdrawal than school leavers (Powdthavee & Vignoles, 2007, p. 3). There may be greater difficulties of transition for younger students, while older students typically have more family and work commitments and are more likely to enrol part-time, which is itself a risk factor (Krause et al., 2005, p. 73; Yorke & Longden, 2008, p. 16). Potential links between attrition and gender, disability and ethnicity have also been explored in detail (Broecke & Nicholls, 2007; Powdthavee & Vignoles, 2007; Purcell, Elias, Davies, & Wilton, 2005; Smith & Naylor, 2001). Beyond demographics, the burgeoning field of predictive analytics has facilitated analysis of learning and behavioural indicators, which could enable the identification of at-risk students early in their course and their referral to relevant services and support (Nelson &

Creagh, 2013). While predictive analytics also enable geo-demographic factors to be examined, they typically encompass a broader range of indicators such as course preference and prior educational attainment. For example, much research highlights the importance of course choice (Davies & Elias, 2002; Long et al., 2006). Predictive analytics enable quantitative analysis of such factors, providing a more expansive base than post hoc student interviews. Because retention rates vary substantially by institution and course, understanding the causes of attrition in a specific course requires tailored investigation. While many geo-demographic and behavioural factors have been linked to student attrition, there remain acknowledged differences and several conflicting findings across nations, institution types, and disciplines (Crosling et al., 2008; Grebennikov & Skaines, 2008, p. 60; Powdthavee & Vignoles, 2007).

The Bachelor of Arts is the largest degree program at La Trobe University. In 2011, a total of 2,666 students were enrolled in the degree across the university's five teaching campuses. The main campus is in Melbourne and hosts 84% of the BA cohort, while the other four campuses are situated in central and northern Victoria. In analysing attrition, it is important to distinguish between retention at course, institutional and sectoral level. Attrition in the BA is high relative to other courses, even after considering the broader institutional context. The course retention rate for the BA cohort in the 2010-2011 retention period was 59.8%, which compares with the commencing bachelor course retention rate for La Trobe of 72.1%. The institutional retention rate of the BA was 69.5%, compared with the university commencing bachelor level rate of 82.9%. This means that while one in ten BA students transfers from the degree into

another course within the same university, three in ten students depart the university altogether. Unfortunately, we do not know how many of the departing students transfer to another university within the sector, and how many withdraw from higher education altogether. We are therefore only able to measure course and institutional retention, and not sectoral retention.

Initial benchmarking suggests that attrition within the La Trobe BA is comparable to the 30% average for Australian BAs included in the Associate Deans of Teaching and Learning Network Working Party's benchmarking project (2010). There were 1,124 commencing BA students at La Trobe University in 2010. Of this cohort, 782 students remained enrolled at the university in 2011, creating an institutional retention rate of 69.5% for 2010-2011.

## Methodology

This project is based on the Australian Department of Education definition of retention, which is employed by all Australian higher education institutions. The Department's retention rate formula comprises the following elements:

Students=All students in the relevant group and reference year  
Completed=All students who complete a course in the reference year  
Base="Students" minus "Completed"  
Retained= Number of students from "Base" who had enrolled the following year  
Retention Rate="Retained"/ "Base"

While this measure is widespread in institutional and government reporting, it has a number of limitations. The Department's retention definition uses the Student Identification Number to track

enrolments between years. However, this methodology does not take into account deferrals, legitimate leave of absences and the sizeable body of students who transfer to another institution (Department of Education, Employment and Workplace Relations [DEEWR], 2012). Since 2010, with the development of statistics utilising the Commonwealth Higher Education Student Support Number (CHESSN), the Department has developed a new measure of retention which takes transfers into consideration, and this measure was published in the Base Funding Review final report (Lomax-Smith, Watson, & Webster, 2011). Unfortunately, individual institutions remain unable to factor transfer between institutions into their retention calculations and data using this approach remains limited.

Our study uses the 2010 commencing Bachelor of Arts student cohort as the base and confirms if those students were retained in 2011. The data were predominantly sourced from the university's Student Information System (SIS). Data compiled for the project were used in a correlational analysis of retention against variables collected from the SIS.

The correlational analysis is based on a dichotomous variable which has been coded to 0=retained and 1=left the university. A positive correlation coefficient suggests that an increase in X would reflect an increase in attrition, while a negative correlation coefficient suggests that a decrease in X would result in a decrease in attrition. To test the correlation between attrition and interval (continuous) level data, such as weighted marks, tertiary rank and age, the point biserial correlation was used. For nominal (categorical) level data such as socio-economic status (SES), gender, and first in family status, the Phi correlation was used.

All categorical variables were recoded to a dichotomous variable of 1=category membership and 0=non membership.

The authors tested a range of geo-demographic factors, including SES, gender, age, and regionality, but found no significant relationship between them and student attrition within the sample. For example, SES revealed a non-significant relationship with attrition (Pearson's  $r=0.005$ ), as did age ( $r=0.022$ ). There may be a number of reasons for the lack of geo-demographic correlation, including potential paucity of variability within the sample size. The research sample was exclusively focussed on students from a specific course at a mid-tier Australian university. Krause et al. (2005) also note that within the Australian context: "Overall, the attitudes towards the academic aspects of the transition to university study and the attitudes towards teaching and learning are very similar across the SES subgroups" (p. 69). Indeed, low SES students at La Trobe University actually report slightly higher retention rates than for the entire domestic cohort at the university (DIICSRTE, 2011). International research is mixed on the relative influence of demographic variables by discipline and institution (Powdthavee & Vignoles, 2007) and as this study is quantitatively focussed, we did not explore the geo-demographic correlations further.

Similarly, prior educational achievement is excluded from this paper. Much has been written about the relationship between university achievement and the Australian Tertiary Admissions Rank (ATAR). The Commonwealth's 2011 Base Funding Review finds a direct correlation between ATAR and attrition (Lomax-Smith et al., 2011), while a number of studies have also examined the connection between ATAR and first year academic performance (Birch

& Miller, 2005; Dobson & Skuja, 2005; James, Bexley, & Shearer, 2009; Palmer, Bexley, & James, 2011). While our own study found some correlation between prior academic achievement and attrition, it was not as strong as that reported in other research (Birch & Miller, 2007; McMillan, 2005). We found no meaningful correlation when considering all available students with ATARs, while when we selected for recent school leavers only, we found a significant but minor correlation between attrition and ATAR:  $r = .13$ ,  $p < .05$ . School leavers comprise less than a third of commencing BA enrolments, and we do not explore this finding further here given the constraints of space.

## Course preferences

The first clues to attrition can be found at recruitment. School completers receive a ranking (ATAR) out of 100, and most undergraduate university courses base student selection on these rankings. Typically, popular courses with the highest ATAR cut-offs are also those that record the lowest attrition. For example, Physiotherapy and Dentistry at La Trobe University maintain ATAR cut-offs of 95 and 99 respectively, and have attrition rates of less than 3.5%, compared with the university average of 17.1%. The university cut-offs are based on supply and demand, so that the high ATARs in a course such as Physiotherapy are a reflection of popularity (and limited supply). Large numbers of students list such courses as their first of twelve preferences when making their course applications through the Victorian Tertiary Admissions Centre (VTAC). Applicants who do not obtain the rank required for admission into their first preference course typically gain admission into a course of lower preference.

The BA receives a lower proportion of first preferences than the average La Trobe course, which means that many enrolled students would prefer to be in a different course but did not receive the required rank. Fewer than half of the students enrolled in the BA in 2011 listed the course as their first preference. In some cases, students explicitly want to study an alternative offering, while in other cases the BA is operating as a default option for those who aspire to university but lack specific career plans.

Receiving a relatively low proportion of first preferences carries two risks. The first and most obvious risk is that in a demand-driven system, more students will receive an offer for their first preference course, damaging enrolment numbers in those courses which rely on second and third preferences. However, the other unstated risk with courses reliant on lower preferences is that of attrition. International evidence reveals high withdrawal rates among students who believe they have made the wrong choice of field of study or course (Quinn et al., 2005; Yorke, 2000; Yorke & Longden, 2008). Australian research supports this finding (Long, et al., 2006), and also reveals that just under one-third of students feel ill-prepared to choose a university course on leaving school (Krause et al. 2005, p. v).

Our study found a statistically significant correlation between preference number and attrition. For all BA students examined, the correlation was  $r = .14$ ,  $p < .01$ . For regional students only, the correlation was  $r = .41$ ,  $p < .01$ . Although we were only able to match a VTAC preference to 668 students within our sample, of the students who entered the BA having listed it as their fourth preference or lower, attrition rates averaged a high 43%. If the course is not in

their first three preferences, students who enrol in the BA are almost as likely to withdraw as to remain enrolled into the second year of the degree.

The implications of this finding are twofold. While the need to increase course attractiveness to prospective students is clear, a parallel need exists to provide pathways and assurance for the large cohort of uncertain students. To some extent, the La Trobe BA reflects a broader reality that there are comparatively high rates of course change and attrition amongst people studying in the field of society and culture (McMillan, 2005, p. 21). A long view must be taken of recruitment into the BA. Many students enter the course with limited commitment and/or with the explicit intention of transferring courses, and the recruitment of many students to the BA remains incomplete even after the census date. Transition commonly occurs over months rather than weeks. Post-enrolment strategies still need to highlight the purpose and value of completing the degree, including explicit advice around potential careers and postgraduate pathways.

### First year academic performance

The strongest correlation found in our analysis was between attrition and first year performance in the BA. The study examined a combination of first year performance variables including Success Rate (the number of subjects passed divided by the number of subjects attempted) and the Weighted Average Mark (WAM) for the student for the full year and by semester. A relatively strong relationship was found between poor marks/failure rates and attrition.

While the Australian attrition literature has focused largely on the predictive validity of the ATAR, there is comparatively little discussion on the link between attrition and university marks. Birch and Miller (2007) purposely excluded first year academic performance from their analysis of university attrition out of concern that the “inclusion of this variable would introduce into the behavioural relationship aspects of the university rules regarding academic progression, as students are often excluded from continuing university on the basis of poor academic performance” (pp. 14-15). As our analysis is attempting to find general factors that are correlated with attrition, we did not share this concern. Our finding of a strong relationship between poor university achievement and attrition is supported by a similar study by Grebennikov and Skaines (2008) into attrition at the University of Western Sydney, which also found a strong association between grade point averages and attrition.

The correlation between Success Rate and attrition in our study was substantial ( $r = .44$ ,  $p < .01$ ) as was the correlation between first year Weighted Average Mark and attrition ( $r = .42$ ,  $p < .01$ ). For the regional course subgroup, the correlations between attrition and Success Rate ( $r = .49$ ,  $p < .01$ ) and attrition and Weighted Average Mark ( $r = .45$ ,  $p < .01$ ) were marginally stronger.

The nature of the relationship between first year marks and attrition is likely to reflect both cause and effect. As a cause, it is conceivable that students become increasingly alienated from the course as a result of sustained poor grades. Alternatively, poor grades may result from students withdrawing mid-semester and failing not because they are submitting substandard work but because they are not

attending class or submitting assignments at all. In many cases, the high proportion of fail grades below 25 marks indicate non-completion.

The strong correlation between university achievement and attrition supports the development of an effective academic early warning system to identify students at risk of withdrawing. The results also reveal a need for further research into the specific causes of low achievement within the BA, including disengagement, inadequate academic preparation, dissatisfaction with teaching and learning, financial and work-related reasons.

### Variable subject failure rates

Given the centrality of first year academic performance to attrition, the variability of achievement across individual BA subjects is of concern. In 2011, there were 13 first year units where less than 70% of students passed.<sup>2</sup> This compares with a 78% average pass rate of first year BA units. There exists significant variability in pass rates across first year subjects. While most units have a pass rate of between 75 and 80% of students, there is a significant minority of units where only between 55 and 65% of students pass. Conversely, there is also a significant minority of units where 90% or more students pass, including some units with a 100% pass rate.

It could be argued that the reason why some subjects have higher fail rates is that their curriculum is more complex and the assignments more difficult. However, many of the “outlier” subjects are within the same discipline as subjects with average fail rates. There is little evidence that mathematics requirements, for example, are impeding students. Rather, different fail rates are often found within the same broad discipline, such as history. A curriculum and assessment benchmarking process may help to elucidate subject variability.

Interestingly, the subjects that record high withdrawal rates before the census date tend to be the subjects with high failure rates after the census date. We found a relatively strong correlation ( $r=.40$ ,  $p<.01$ ) between the pre-census withdrawal rate and the failure rate for subjects. There are at least two plausible explanations for this correlation. Challenging subjects may cause some students to withdraw before census date, and the others who persist to struggle academically with the material. Alternatively, students may initially enrol in a subject because of their interest, but as they become disengaged with the teaching some may withdraw before the census date, and others who persist may lose interest subsequently and not submit assignments.

Non-submission of assessable work appears to be prevalent within the BA. There are two obvious ways to fail a subject: by submitting work that is not considered acceptable; and by not submitting work at all (yet remaining enrolled). Data reveal that a relatively high number of failing students receive grades below 25, which indicates that they have probably not submitted one or multiple assignments. Indeed, around 17% of overall average marks were under 25.

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<sup>2</sup> Language units have been excluded from this analysis. Unlike all other first year subjects offered within the BA, language units have as many as three levels of variable difficulty: beginner, intermediate and advanced. As a result, language units report high transfer rates during the initial period of the semester as students find the subject that best fits their level of competency.



While we do not have this evidence by subject level, the high rates of failure in some subjects probably reflect a number of students failing to submit assignments rather than submitting sub-standard work. Taken together, the high number of pre-census withdrawals and the prevalence of sub-25 WAMs provide an area for further investigation. These data indicate that many students have become disengaged well before the semester finishes.

## Conclusion

Our analyses found two main factors correlated with attrition in the first year of the BA at La Trobe: course preference; and first year university achievement. The study found a significant relationship between course preference and attrition. This is especially problematic for the BA because relatively few enrolled students listed the course as their first preference during the applications process. At least two implications of this finding are clear. First, there is a need to continue efforts to redesign and promote the BA as a course of first choice and a destination in its own right. Second, a long view of recruitment must be taken. Many students enter the BA degree with limited commitment and/or with the explicit intention of transferring courses. Preventing attrition may require ongoing strategies which include explicit advice around the purpose of the course, potential careers and postgraduate pathways.

Secondly, we found that first year academic performance is a much stronger predictor of attrition than any demographic factors or educational background. Many poor grades are probably a result of students withdrawing mid-semester and receiving failure grades not because they are submitting substandard work but because they are not submitting work at all.

Academic early warning systems linked to scaffolded support are important in mitigating this attrition risk, but the prevention of disengagement may also require more fundamental reform of teaching, learning and student engagement strategies.

Indeed, when we conducted an analysis at subject level, we found highly variable failure rates. Often, subjects which record high failure rates are the same subjects from which many students withdraw before the census date. Our analysis suggests that failure rates are influenced not only by the difficulty level of the curriculum but by other factors such as academic disengagement. Given the clear connection between subject failure and institutional attrition, further investigation is required into the causes of variability among subjects. In courses such as the BA, which are defined by their subject breadth, it is imperative to understand why some particular first year subjects record relatively high failure rates. More broadly, our evaluation highlights the need for granular analysis. Attrition is an institutional problem, but its causes often lie at the lower levels of course and subject.

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