Give students more information about their prospects for success

Submission to the Higher Education Standards Panel

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Introduction

This submission focuses on the enhancing transparency discussion questions. It argues that individualised information could help students make better higher education choices. Integrated school, vocational education and higher education data would improve our understanding of how prior education experience affects students. A unique student identifier that covers all sectors, and international as well as domestic students, would assist this goal. For prospective higher education students, analysis based on this data should be available on the QILT website.

1   Expanding information to students

The government provides a range of data to students and prospective students to help them choose a course. QILT publishes student satisfaction, graduate satisfaction and employment outcomes of past students. Students can find aggregate information or results by course and university.

In less easily accessible locations, the Department of Education and Training publishes other information that could inform higher education choices. It publishes student course completion rates by institution and by various general student attributes. Commencing student attrition information is also published annually by university and has previously been published by equity group.

The HESP discussion paper adds to previously published attrition information, showing that attrition rates can vary significantly by study mode within the same university.[1] For example the overall attrition rate for commencing domestic bachelor-degree students at the University of New England is about 23 per cent.[2] This result is driven by the large number of external students at UNE, who have a 27 per cent attrition rate, while on-campus students have only a 14 per cent attrition rate. A student considering on-campus study at UNE may be deterred by information that is not representative of their circumstances. More detailed statistics on an annual basis would reduce this problem.

Figure 1: About half of external and part-time students did not complete a degree in 9 years of commencement

Proportion of 2006 commencing bachelor-degree students who did not complete within 9 years, per cent
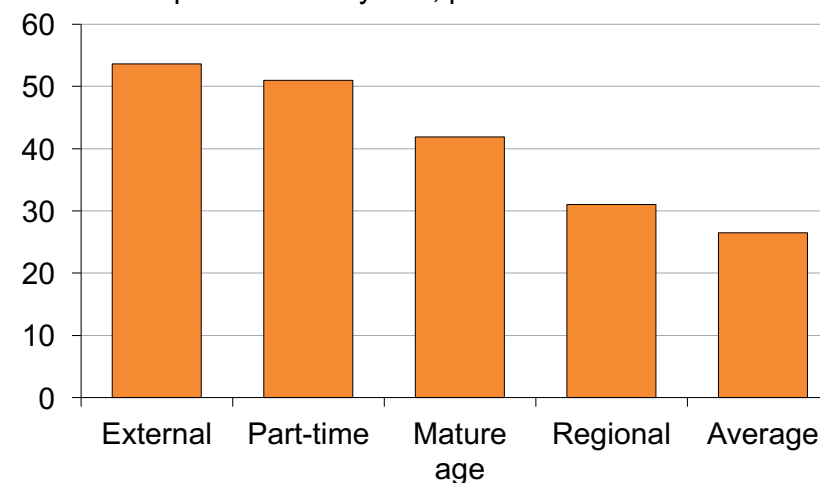
Notes: Bachelor-degree domestic students only. Completion includes any award course.
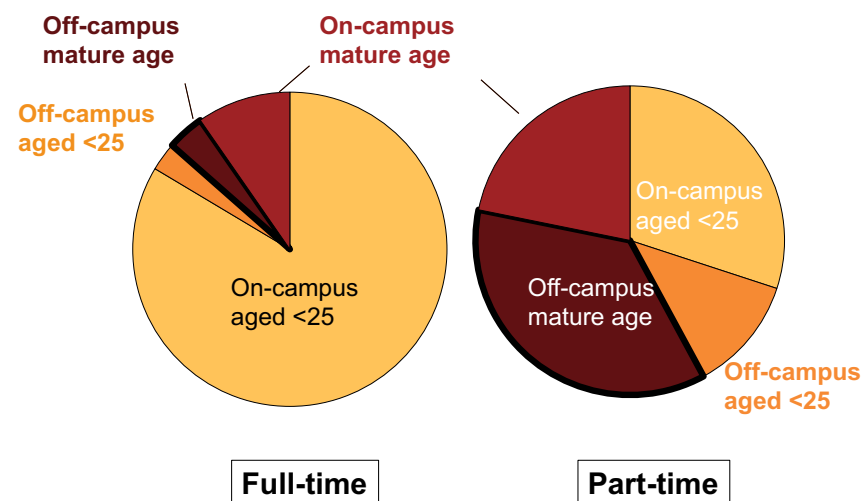Source: Department of Education and Training (2016)

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[1] Higher Education Standards Panel (2017), Appendix C, table 15

[2] Adjusted attrition rate in 2014; ibid.

While completion data is available in more detail than attrition, the results are too general for students to make robust inferences. The government's latest completion report publishes average completion rates by broad student characteristics within 9 years of commencement.[3] Some of the characteristics are shown in Figure 1. About half of external and part-time students did not complete a degree within 9 years, while the rate is lower at about 40 per cent for mature-age students.

Because these characteristics are often correlated, students cannot disentangle the potential causes of low completion. As Figure 2 shows, less than 15 per cent of full-time students were mature age in 2015. Among part-time students however, over half were mature age. Of these three quarters study off campus. The large overlap between mature age and part-time students suggests that life circumstances, such as work or family responsibilities, lead older students to study part-time. With more detailed data, mature-age students may make better decisions. For example, they may be able to leave a more realistic amount of time for study. Or they may decide that the non-completion risk is too high, and that now is not the right time to enrol.

Figure 2: Some students fall into multiple vulnerable groups and disentangling the effect of each attribute on completion is difficult

Notes: 2015 commencing students. On-campus includes mixed modal. Bachlor-degree domestic students only.
Source: Department of Education and Training (2015)

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[3] Department of Education and Training (2016), table 2

2   Completion predictor

Because completion rates based on group averages are hard to apply to individual cases, the Grattan Institute is working on a statistical model to predict individual completion rates, which will show the risk of non-completion. The model will take into account student personal characteristics like age, ATAR, and student choices such as mode of study and discipline. The project is at an early stage of modelling and will need thorough testing to ensure it can reliably predict completion. It aims to provide individualised information to prospective students and current students on how they can improve their chance of completing a degree. Options include adjusting their study load or changing where or how they study.

The discussion paper includes a statistical analysis of how various student and institutional factors affect attrition. It uses r-squared to describe how well the data and the model explain attrition.[4] The attrition model in table 10 of the discussion paper has an adjusted r-squared of 23 per cent.[5] The paper suggests that this is too low to reliably predict attrition.

But r-squared statistics are inherently low for a binary outcome model like the attrition model.[6] The maximum r-squared for this kind of model is 36 per cent.[7] A 23 per cent adjusted r-squared suggests the model can explain attrition relatively well and that the attrition model has a powerful potential to predict attrition. (There is more detail on r-squared in the appendix.)

As the discussion paper suggests, a completion predictor can only be as good as the underlying data. The attrition model can be improved by including other variables that may affect attrition. Research from NCSEHE led by Ian Li shows that students from equity groups are more likely to consider leaving university than non-equity students.[8] These include students who have disabilities or who were from rural or remote locations. These factors should be included in the model.

As described in the discussion paper, factors related to attrition reflect both student characteristics and their interaction with institution-specific features.[9] For example, some universities may provide more suitable learning environments for mature age students than others. But the model currently cannot capture this. It assumes how student characteristics affect attrition is the same

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[4] R-squared has limitations in how it describes goodness-of-fit. See Kvalseth (1985)

[5] Adjusted r-squared is generally lower than r-squared because it penalises the model for losses of degree of freedom that occurs when a model increases its number of variables; Greene (2012), p. 179

[6] See

Appendix for explanation

[7] Based on when the predicted probability lies within 20 to 80 per cent, which is the range when the linear link function is a good approximation: Cox and Wermuth (1992)

[8] Li and Carroll (2017)

[9] Higher Education Standards Panel (2017), p. 24

across institutions. Modifying the model to include these effects will improve accuracy.[10]

Despite all these possible improvements, the r-squared is unlikely to increase significantly. The attrition model relies on student characteristics prior to entry, their choices in the first semester, and institution effects. There are other characteristics that cannot be measured. What students do after the first semester is also excluded but will impact on their chances of success. Yet this should not deter us from providing this information. The information can help prospective students understand, judge and reduce the risks of attending university.

For the predictor to be useful, students need to know where to access it. The QILT website is the only existing source of data already designed to be accessible to students (attrition and completion data is on the Department of Education and Training's website, but hard to find). Because the government already has a website in operation, extending QILT to include the predictor is likely to be the best option. Using QILT would cost less than creating a new website. Many students are already familiar with QILT which should help with ease of access. The government should increase QILT's user base by promoting it through media used by young people.

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[10] The model can account for these effects by adding interaction terms between institutions and student characteristics.

3   Further improvement through linking CHESSN, USI and school student identification

When students transfer to another institution, their student identification number changes. Currently the only way to accurately track higher education students over time is by using the Commonwealth Higher Education Student Support Number (CHESSN). A CHESSN is only assigned to students who receive Commonwealth support, including direct tuition support (CGS) or borrowing through the loan scheme.

Students who do not receive government support can be tracked using a combination of information like their student number, name and date of birth. But this method is less accurate than an identification number because students sometimes have the same name and date of birth. Also, some students change their names.

CHESSN increased our understanding of student behaviour. Before CHESSN, the attrition rate could not account for students transferring between institutions. Figure 3 compares the attrition rate when students can be tracked across institutions compared with when they cannot. When students cannot be tracked (normal attrition), the attrition rate shows a generally worsening trend since 2005. Yet when students are tracked across institutions (adjusted attrition), the attrition rate shows a different story. It declined until 2009 and then has generally increased since. It is now at a similar level to 2005. Without this, we may have concluded that the sector was doing worse than it was and may have misdirected funding or attention.

Figure 3: Comparing attrition rate with versus without tracking students across institutions

First year attrition rate, per cent
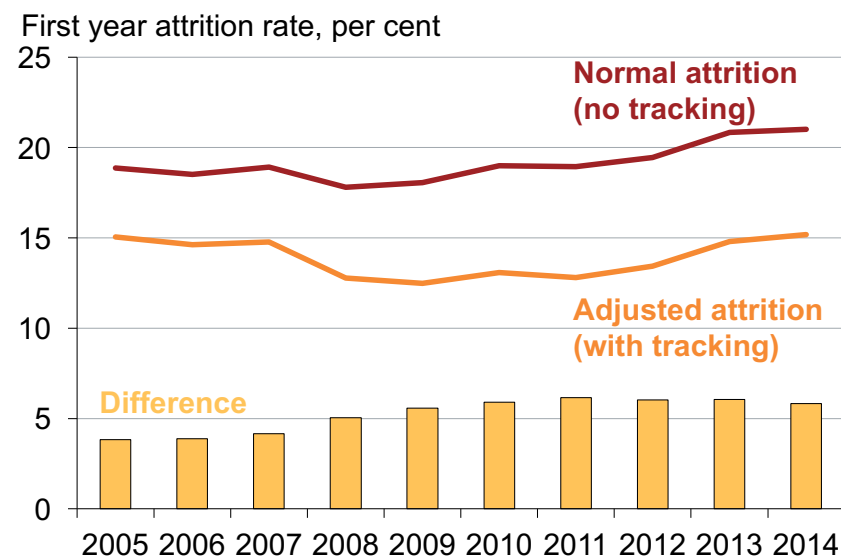
Source: Higher Education Standards Panel (2017), table 1

While the government can now track most domestic students within higher education through CHESSN, our ability to follow the students who move from or to vocational education is limited. About one in five Australians with a bachelor degree also has a vocational education qualification.[11] Their complete study information cannot be directly analysed.[12]

Vocational education students are assigned a Unique Student Identifier (USI) that does not correspond to CHESSN. Currently there is no mechanism to directly link the higher education and vocational education databases. Like for those who do not have a CHESSN, the identifiers may be linked through probabilistic matching using information like name, date of birth and study history. As noted, this can produce errors and is also costly because the matching will need to occur often. As the labour market continues to change, many students are likely to require retraining. Having the ability to track students over time will help the government target resources on factors that drive desirable outcomes.

The lack of linkages between vocational education and higher education sectors extends to the school and early childhood sectors. Many more students attend higher education now than in the past. Having the ability to track and understand what contributes to success is increasingly important. Many studies have shown that school characteristics and performance affect how well students do in higher education.[13] This research is based on survey data, which has limitations. In Australia, the Longitudinal Survey of Australian Youth (LSAY) is the only survey that tracks school students to the age of 25.[14] While LSAY provides useful insights, its limited sample size often constrains our ability to understand transitions, especially for low SES students who tend to leave the survey early.[15]

As part of a new National Education Evidence Base, the government is planning to develop a nationally consistent approach to understanding student pathways.[16] To achieve this, the government should create a national identifier for education. It should include all phases of education. The collection will impose a burden on both providers and the government. Yet as noted by the Productivity Commission's inquiry into the further development of the national evidence base for school and early childhood education, the cost can be reduced by collecting data more effectively and making better use of it through increased data sharing for research purposes.

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[11] Diploma and advanced diploma are included in vocational education: ABS (2016c)

[12] Some information is collected through the Higher Education Management System (HEIMS)

[13] Lim (2015), p. 44; McMillan (2005) show significant effect of school sector. Wooden, et al. (1994) shows effect of self-assessed performance in year 10.

[14] The Household, Income and Labour Dynamics in Australia (HILDA) survey track households and individuals over time. It includes school age students. But because the focus is not specifically on them, the sample size is relatively low.

[15] NCVER (2016), p. 12

[16] Department of Education and Training (2017), p. 14

4 Extending information to international students

International students have increasingly become an important part of the Australian higher education system. In 2015-16, their fee revenue was $6.5 billion – twice of the level ten years ago.[17] But our understanding of their movement across institutions is limited. As for domestic students prior to the introduction of CHESSN, their attrition rate assumes that they do not transfer to another institution.

The government should establish a unique identifier to track international students across institutions and over time. Because of visa restrictions, international students are less likely to transfer and the difference between adjusted and normal attrition rates should be smaller than for domestic students. Given the revenue international students contribute to our higher education system, providing similar quality information that we provide to domestic students on attrition and completion rates should be the standard. The ability to track international students should also help to identify problems and create solutions within our education system.

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[17] Real growth adjusted using CPI; ABS (2016b), table 9.1; ABS (2016a)

5 Appendix

R-squared is often a useful tool. But the results must be interpreted with caution. The maximum r-squared depends on the type of outcome variable the model is trying to explain. A common type of outcome variable is continuous like wages. As the name suggests, it has little restriction in how it can vary. In general, it has a maximum r-squared of 100 per cent. But this does not apply to the attrition model.

Attrition and completion have two possible outcomes – at university or left university and completed or incomplete. The outcome is binary. For binary response variables, a linear least squares model predicts the probability of a scenario occurring. But the data can only take on two numbers rather than a probability which can be any number between 0 or 1. The mismatch between the nature of what is being predicted and the outcome variable limits the size of r-squared to 36 per cent.[18] Of course, very few models would ever achieve the maximum r-squared. An adjusted r-squared of 23 per cent suggests that the attrition model is relatively good at describing variations in attrition.

How well a predictor works also depends on the modelling technique. A least squares model is not the most suitable technique for binary responses. It can produce sensible predictions within a limited range. But often it will produce nonsensical predicted values – probability of below 0 or above

1.[19] The paper includes results based on a logistic model and this should be used as the primary model.

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[18] Based on the range when a linear model provides a good approximation of a logistic model: Cox and Wermuth (1992)

[19] Carter Hill, *et al.* (2010), p. 585-588

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