

# Get Set, Go! Preparing for success in first year engineering

Lorelle J. Burton  
Faculty of Sciences, University of Southern Queensland

## Abstract

*The Get Set quiz is a two-part battery of online tests developed to enable students to self-assess their readiness to enter first year engineering programs in five Australian universities: The University of Southern Queensland, the University of Queensland, the University of Technology, Sydney, the University of Newcastle, and the University of New England. The first part consists of maths, physics, chemistry, and spatial ability multi-choice items. Part 2 evaluates non-cognitive traits such as personality, approaches to learning, and interest in and motivation for studying engineering. Students gain most value from the quiz when they complete it prior to commencing their first semester of study.*

## Introduction

The landscape of higher education is constantly changing and providing new challenges for educators and learners alike. The global expansion of numbers of students choosing to access further study and the opening of higher education to a wider demographic distribution has resulted in increases in the number and diversity of the student population (Keenan, 2012). The subsequent simultaneous decrease in resources can provide barriers to student success. This is no less evident in engineering schools across Australia than in other disciplines, and effective management of issues relating to progression and retention rates are therefore of vital importance for educators in this field.

It is of long-running concern that students are most likely to experience failure and drop out of their courses during the first year of study (Godfrey & King, 2011; McInnis, 2001), and it has been shown that attention paid to the First Year experience (Keenan, 2012) and transition pedagogy (Nelson et al., 2011) reaps dividends in improving progression and retention rates at university. However, the student experience starts long before the commencement of the program of study. Selecting relevant subjects at school or in pre-entry programs, making appropriate career and study choices, selecting study modes that best fit busy lifestyles or remote locations, developing an effective approach to learning, preparing for the transition to student life: all these are tasks to be negotiated by students before they arrive at day one of their studies.

This pre-enrolment phase will be managed more or less effectively by various students and the student population will arrive on admission with a range of specific individual needs, motivations and skills. They will also arrive with varying expectations of their student experience (Keenan, 2012). Students justifiably expect their lecturers to have subject matter expertise, and to present that information in an effective and enthusiastic manner (Pithers & Holland, 2006). A longitudinal study of first year students (ACER, 2005) found a high overall level of satisfaction with their tertiary experience, thus implying that those expectations are generally met. Other less realistic expectations, given limited resources and large class sizes in most engineering courses, are that lecturers would be available to provide

individualised assistance such as ready and extensive consultation, and to read and provide feedback on assignment drafts (Crisp et al., 2009).

While such lecturer-student interaction is necessarily constrained, students need to be advised on ways they can manage their own learning, and be directed to sources of assistance that will meet their needs and provide them with the feedback essential for their confident progression. Providing such information prior to the commencement of study should help set students on a more productive pathway to achieving their academic goals. The Get Set quiz is a two phase instrument by which students can self-assess their cognitive and non-cognitive readiness to commence studying engineering. They can also be informed about how they can access support and advice as required.

## **Development of Get Set**

### *Development through collaboration*

The Get Set quiz was developed as a collaborative project by educators at five partner universities that cover the spectrum of Australian universities and engineering programs. This national project is funded through the Australian Government Office for Learning and Teaching. The University of Southern Queensland (USQ) is a regional university with 80% of its students studying part time by distance education; the University of Queensland (UQ) is a Group of Eight university whose students are predominantly school leavers who study full time, on campus; the University of Technology Sydney (UTS) is an Australian Technology Network university whose students study on campus, many in part time mode; the University of Newcastle (UoN) is part of the Innovative Research University group with more than half its students arriving via other higher education and TAFE pathways; and the University of New England (UNE) is a regional university with a small engineering school. Most of their students enter directly from high school with industry funded cadetships.

This diversity across the partner institutions means that the needs of a wide variety of students are being considered and addressed in this project. All these universities were facing issues relating to first year attrition and were dealing with this in varying ways relative to their specific contexts. The project team formed to devise a project that would work towards achieving their common goals of developing strategies to enhance enrolment, progression, and graduation rates in their engineering programs.

### *Designing the Get Set quiz*

All partner universities were already conducting some form of diagnostic pre-testing of their first year intake. For the most part, the testing was primarily designed to alert first year teachers to knowledge gaps of specific cohorts and to help them tailor their teaching as needed. However, UQ lecturers noted that the real benefit of the online testing that they conducted was that students completed it prior to the commencement of their studies and were thereby alerted to their own pre-entry knowledge gaps (Kavanagh, O'Moore, & Samuelowicz, 2009). Armed with such information, students were able to address their own specific weaknesses by accessing relevant information, revising school text books, or undertaking some remedial study prior to commencing their course.

The test used at UQ, an online competency quiz called Preparing for First Year (PFFY), provided individualised feedback relating to specific aspects of the first year engineering program. The PFFY formed the basis of the project quiz and was adapted to incorporate items

required by other team members. The newly developed Get Set competency quiz consisted of 20 maths items, 14 physics items, 12 chemistry items, and 6 spatial ability items. The quiz items were presented as a multi-choice online quiz which took approximately one hour to complete.

However, acknowledging that non-cognitive factors also play an important role in students' success (Tait, Entwistle, & McCune, 1998), the team also incorporated into the Get Set quiz aspects of personality, approaches to learning, and motivation for and interest in engineering. The 50 item version of the International Personality Item Pool (IPIP; Goldberg, 1992) was used to assess personality; the Approaches to Study Skills Inventory for Students (ASSIST; Tait et al., 1998) was used to indicate the extent to which students' learning was deep, surface, and strategic; and a 31-item scale entitled Motivation and Interest in Engineering Quiz was developed by the project team to assess attitudes to engineering. This second battery of items was presented online as a follow up to the competency quiz. Students responded to each item on a 5-point Likert scale, and phase 2 testing took about 20 minutes to complete, on average.

### *Implementation*

Information about the Get Set quiz was sent to students enrolling in engineering at UQ with their admission information, and was provided to students at the other four institutions at orientation or as soon as possible after week 1 of semester. The project team experienced some regrettable but unavoidable delays due to ethics processes at some universities and technical complications associated with the deployment of the online quiz.

This variability in timing of the quiz demonstrated the significance of having it available prior to the commencement of the first semester. Table 1 shows that participation and completion rates were lower for those students who were invited to participate at orientation or after commencing their course. Follow up focus group discussions with students confirmed this, with students admitting that once the semester had started, social and study commitments took precedence. They agreed that they would have been more motivated and have had more time to complete the quiz if the invitation and link had been sent with their enrolment materials.

University	Time of administration	% of students logging in to commence quiz	% of students completing quiz
UQ	Prior to commencement of semester	45	36
USQ	At orientation	28	13
UNE	At orientation	34	17
UoN	In first week of semester	14	5
UTS	In third week of semester	7	2

Note. These rates are approximations only as enrolment numbers fluctuate early in the semester.

### **Table 1. Participation rates of Get Set quiz**

#### *Assessing the effectiveness of Get Set*

Despite the disappointing response rates from some institutions, a total of 505 students completed the Get Set quiz across the five partner universities, which did enable some preliminary analysis of the data. However, the respondents did not represent the diversity which had been hoped for, with 80% of the sample being male and aged 20 or less, 92% being enrolled in 4 year or equivalent programs, and 86% studying on campus. A second round of data collection in 2013 should yield better results as the lesson about timing has been well heeded by the research team. Information about and a link to the quiz will be sent with enrolment material to prospective students at each of the partner universities in the summer of 2012/2013.

Preliminary analyses of the 2012 Get Set results are positive. The majority of students who completed the quiz reported it to be a useful experience, indicating that it flagged things they needed to revise (82% of respondents) and gave them insight into what was needed for first year (60%). Most were also intending to take steps to revise things they had forgotten, with the most common actions being to revise their high school notes (59%) and to find a relevant textbook (40%). At least a quarter of those who responded found it a confidence-boosting experience.

Students were given extensive individualised feedback after both phases of testing. Feedback from the phase 1 competency quiz included links to information relating to each skill item, and indicated the courses for which specific skills would be relevant. Students could see at a glance where their skill gaps might cause them difficulties in courses for which they were enrolled. They could then change their enrolment pattern if that was practicable, or follow up on acquiring those skills from any of the resources accessible as direct online links or through on campus learning support.

Detailed individualised feedback was also provided following phase 2 non-cognitive skills testing. This feedback included an indication of the extent to which students used deep, surface, or strategic learning approaches, and provided information on how their study habits could be optimised. Webster (2002) found that students believe it helpful to understand and pay attention to their particular learning approach. Knowing how to study more effectively helps students become more proactive and independent learners. Feedback was also provided about their personality profile and how their particular traits could be used most effectively in their educational and career contexts.

#### **Where to from here?**

Further refinement and evaluation of the Get Set quiz will occur over the following months. A number of other institutions have already expressed interest in adopting Get Set with their first year engineering students. A pilot study is being undertaken with the University of Sydney to see how readily the quiz can be customised to meet the needs of other institutions. If easy to follow deployment and customisation instructions can be developed, it is hoped that Get Set might be used more broadly and achieve its stated goals of better preparing students for success in their first year and beyond.

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## Questions for discussion

In what ways could such a pre-enrolment approach be useful for other disciplines?

Should such pre-testing be compulsory? What impact might this have on the effectiveness or otherwise of the strategy?