

# Staying the Distance – Strategies to Improve Student Retention

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## Structured Abstract

### BACKGROUND

The University of Newcastle's Faculty of Engineering and Built Environment has investigated the effectiveness of three key strategies to improve student retention: a strategic communications plan to build a strong, integrated staff, student and professional community; the delivery of tailored support to specific segments of the student population at key points in their study cycle; and a direct approach to addressing mathematics background issues.

### PURPOSE

The purpose of this project was to identify effective retention strategies and improve student satisfaction in engineering programs at the University of Newcastle.

### DESIGN/METHOD

Our strategy has been to engage our staff, students and the broader community by creating rich social media content that starts conversations, celebrates achievements and tells stories about our people and their projects. A multi layered communications approach has been implemented to reach and connect these audiences across digital, social and physical environments.

Increasingly, at key points in the student life cycle, we are delivering personalized communications and tailored support and social experiences to improve retention. These initiatives have included one-to-one touch points for low socio-economic status and other at-risk first year students; events and communications for our high achieving students; and special events and activities for female students.

Like many other institutions, a high proportion of our engineering students enter their degree without sufficient mathematics background. Evidence shows that in previous years around 85% of those students with a general mathematics, or low 2U NSW HSC background, attempting our standard first year mathematics course, MATH1110, failed or attrited that course. Naturally this situation compromised both their student experience and their program progression. In 2014 we introduced a prerequisite for MATH1110 to manage these preparedness issues and enforce long standing preparedness advice.

The researchers are investigating whether, in combination, these strategies will lead to a better student experience and greater retention.

### ACTUAL OUTCOMES

Since the project's commencement in 2011 the Course Experience Questionnaire results for our Faculty's Overall Satisfaction and Good Teaching have improved each year. Take-up of five new social media channels for optional student communication has been high with 2078 followers showing a high level of engagement. Pre census attrition has dropped by 20% in one program between 2011 and 2014 and many other programs are showing a decrease in attrition over the same period.

### CONCLUSIONS

The introduction of a strategic communications strategy, coupled with tailored support services at key points in the student cycle have significantly improved student satisfaction and had a positive impact on retention. Early indications are that the introduction of a prerequisite for our first year mathematics course has reduced attrition, showing potential to further improve retention.

### KEYWORDS

Student engagement, communications, retention, mathematics

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## Introduction

The University of Newcastle's Faculty of Engineering and Built Environment has investigated the effectiveness of three key strategies to improve student retention: a strategic communications plan to build a strong, integrated staff, student and professional community; the delivery of tailored support to specific segments of the student population at key points in their study cycle; and a direct approach to addressing mathematics background issues.

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## Discussion

### Student satisfaction and attrition in Engineering disciplines

According to the 2013 Graduate Careers Australia Course Experience Questionnaire (CEQ), Australian engineering bachelor degree graduates rated the quality of teaching in their degrees lower than students from any other discipline and were less satisfied overall than those from all but one other discipline (Architecture and Building). In a 2008 report prepared for the Australian Council of Engineering Deans, R. King reported that:

*On average, male Australian engineering students have about 52% likelihood of successful graduation from a bachelor level engineering program, and females about 60%.*

It stands to say that improving engineering student engagement and retention are key issues for most Australian engineering faculties.

In 2012 the myuniversity.gov website was launched, providing a government endorsed website that allowed users to directly compare CEQ results for specific fields of study at Australian Universities. This highlighted the University of Newcastle's comparatively poor CEQ results in some engineering disciplines, for example civil engineering, where we ranked last in the country for Overall Student Satisfaction. This emphasised the need for the Faculty to develop a student engagement strategy.

In recent years, like many other institutions, the University of Newcastle has increased its investment in and focus on student engagement. This has involved a broad range of initiatives, university-wide and Faculty specific, ranging from improved social spaces on campus and better signage, to strategic efforts to improve satisfaction with teaching.

### Staff and Student Engagement

The term student engagement is often used to describe students' willingness to participate in routine activities, such as attending class and completing assessments, as well as their involvement throughout the learning environment, including participation in curriculum design, and in extra-curricular activities. Kuh, Cruce, Shoup and Kinzie (2008) state that:

*Engagement represents both the time and energy students invest in educationally purposeful activities and the effort institutions devote to using effective educational practices.*

Krause and Coates (2008) explain the concept of engagement in terms of a relationship between students and institutions:

*Institutions are responsible for creating environments that make learning possible, that afford opportunities to learn. The final responsibility for learning, however, rests with students. The nature and degree of learning is dependent on how the student makes use of their environmental resources... Student engagement develops from the dynamic interplay between student and institutional activities and conditions.*

Staff engagement usually means staff involvement in and enthusiasm about their work, with an emphasis on how their engagement will thus further their organisation's interests. Harter, Schmidt and Hayes (2002) state that:

*Employees are emotionally and cognitively engaged when they know what is expected of them, have what they need to do their work, have opportunities to feel an impact and fulfilment in their work, perceive that they are part of something significant with co-workers whom they trust, and have chances to improve and develop.*

The common theme of these definitions is that engagement is about enthusiasm, commitment and willing involvement in a mutually beneficial activity.

The implementation of an integrated staff and student communication strategy in the Faculty of Engineering and Built Environment at the University of Newcastle has demonstrated that timely, relevant communications can support and stimulate engagement. Further, rich content in a social media environment can help connect people to each other, to ideas, and to their professional community.

In a research intensive Faculty, asking academic staff to focus on teaching quality to support a positive student experience has required considerable strategic effort. The most challenging but impactful change that could be made to improve the student experience was to create a positive culture around teaching and learning. To help drive this change, a Student Experience and Engagement Committee was established, with representatives from all disciplines. This group has had the added benefit of encouraging cross-disciplinary information sharing, showing the beginnings of a collegial community of practice. As much as anything the value of this is in maintaining enthusiasm amongst those who are truly passionate about teaching and learning matters.

The project also focussed on increasing student engagement with and staff responsiveness to our Student Feedback on Courses (SCF) surveys. Staff and student communications were introduced to publicise the top courses each semester, as rated by students responding to the survey question about 'overall satisfaction'. Communications included html emails, posters, Blackboard announcements, Facebook posts and articles in the Faculty staff newsletter. Top scoring course coordinators receive letters of appreciation from the Pro Vice-Chancellor and are invited to join him at a 'thank you' lunch and, in addition, announcements are made through all channels to celebrate our "Top Teachers".

A formal process for follow up on SFC results was introduced, specifying the measures that should be taken to respond to student feedback, including action plan templates to support teaching improvement for those staff who repeatedly receive low student satisfaction scores. To close the feedback loop Faculty course outlines now include notes on student feedback from the previous offering and the changes that have since been made to improve the course.

The Faculty has also introduced Faculty Teaching Awards with peer and student nominations. The awards have proved very successful in unearthing some of the truly inspiring teaching practices across the Faculty. These good teaching practices are showcased each year and the winners receive their awards at a high profile ceremony.

## **Strategic Communications**

To support the cultural change required to improve engagement, the Faculty has taken a more strategic approach to staff communications. The concept of customer-based brand equity, defined as the influence that a customer's knowledge of a particular brand effects their response to marketing activity (Keller, 2013), has influenced this strategy. The goal of much of the current stages of the Faculty's approach to strategic communications is to build

staff and student resonance, that is identification with and loyalty to (Keller, 2013) the Faculty and its brand by improving access to and presentation of information.

The dozens of ad hoc 'all staff' emails have been replaced with a regular, 'Pro Vice-Chancellor's update' - a fortnightly html newsletter created in the free e-marketing platform, MailChimp. It contains some good news stories acknowledging staff and student achievements, but also delivers messages about internal and external training; funding, grant and award application processes; events; and community engagement opportunities. The average read rate is 39%, which is considered excellent, given that our distribution list includes all professional and academic staff, including a high proportion of part-time and casual staff members. Since implementation, the audience has expanded as staff from other areas of the University, including our executive committee members, have subscribed.

Alongside the improvements to staff communications, an integrated online and offline student communications strategy was introduced. The Faculty website was reviewed and refreshed and new communication channels were developed, including digital signage, discipline level blackboard 'portals' and social media channels including YouTube, Facebook, and Twitter. Through these channels we deliver a diverse array of targeted, proactive, timely student communications ranging from Faculty announcements and messages from industry, guest lectures, social events, scholarships, job opportunities, student and staff achievements and topical issues. A part-time designer was employed to develop a strong visual identity for the Faculty's communications and to build the Faculty's brand identity with professional and consistent application.

Recognising the value of professional bodies and the benefits students can receive through membership, the Faculty introduced an online process to facilitate membership of Engineers Australia. This is effectively a consent form that sits in our Learning Management System (Blackboard), through which students can give their permission for the Faculty to pass on their details to Engineers Australia for the purposes of membership. The process has been extremely successful in building student participation – resulting in 452 memberships in 2 years, additional to those collected through traditional channels. This, in turn, has led to a closer relationship with the local branch of Engineers Australia, and greater student engagement with their events.

With this baseline communications strategy in place, the Faculty then set about developing more engaging content that would go beyond informing and updating our audiences and begin to stimulate conversations and support the enthusiastic and willing involvement of our staff, students and community.

A particularly successful example of engaging online content is an animation titled *What is Engineering?* <https://www.youtube.com/watch?v=bipTWWHya8A> The concept for this short film came from the Faculty's recruitment team, who used to describe Engineering to prospective students by running through a 'typical' morning and pointing out the many ways that engineering touches our lives. The film is designed not only for recruitment but also to help manage the expectations of new and prospective students to improve their experience once they commence their studies. To bring this concept to life in an entertaining style targeted at high school students, the Faculty produced an animation in collaboration with Melbourne-based illustrator Jeremy Ley and production company Light Creative. The aims were to attract students to the profession, to encourage take up of higher level maths and science subjects in high school, to help manage students' expectations of what engineering entails and to encourage stronger self-efficacy amongst those entering the various disciplines. The secondary goal was to make a piece of online content engaging enough to appeal to a broader audience, thereby extending our brand awareness and engaging with the profession.

The animation has been highly successful; it meets the original educational purposes of supporting student recruitment and managing expectations and is well received by high

school audiences. Its use has also been extended by The Science and Engineering Challenge, a nationwide outreach program designed to inspire students to study science and engineering at a senior level. This video has now been incorporated into their program and is shown offline to thousands of students at their events. Through our YouTube channel it has had more than 150,000 views, 1797 likes and 232 comments from educators, professionals and current and prospective students. Their feedback has been highly positive and it has stimulated an encouraging conversation across this audience.

To build engagement with our current students the Faculty has also implemented the video capture of industry guest lectures, alumni talks and workshops for students. These extra-curricular activities have the potential to add considerable value to the student experience and to build graduate career readiness, however they can be difficult to access because they fall outside of or compete with students' timetabled activities. Engineering students are particularly hard to attract to such events and audiences are often small. By capturing these presentations and distributing them via YouTube, the audience can be extended considerably. For example, the videos from a chemical engineering alumni breakfast event have been viewed more than 1600 times, whereas less than 40 students attended the event itself.

Video capture is also used to document students' work and to celebrate their achievements. By filming interviews and presentations, communications staff have been able to capture and distribute students talking about their final year projects; senior students giving their advice to first year students; three-minute thesis presentations; recent graduates sharing their career advice; indigenous students talking about their love of engineering; and summer research scholars talking about their budding interest in research. Several of the student project videos have received thousands of views. The benefits of these videos are many: students' projects are showcased to a public audience; their peers are inspired and encouraged; the Faculty's reputation is enhanced; and student and staff engagement is improved.

The Faculty's YouTube channel now has nearly 1000 followers. The videos are also distributed through our social media channels and via staff communications. This also helps to build brand resonance with both students and staff by reminding them that they belong to a dynamic community of high achieving academics, scholars and professionals. As a suite, the videos provide a growing library of student support resources.

## **Tailored support**

Increasingly, at key points in the student life cycle, we are delivering personalized communications and tailored support and social experiences to improve retention by encouraging a feeling of belonging and loyalty and to encourage the best outcomes for our students. These initiatives have included: one-to-one touch points for low SES and other at-risk first year students; events and communications for our high achieving students with the intention of building their loyalty, their capacity to inspire their peers and their inclination toward postgraduate research; and special events and activities for female students.

The Faculty has attempted to identify and contact students at risk of attrition since 2010. Initially the project involved analyzing commencing student access to Blackboard, which is used for communication with students enrolled in courses. The process was to email or call any students who had not accessed the course Blackboard site within the first 3 or 4 weeks of the semester. The caller, a Faculty staff member, asked students how they were settling into University, and offered relevant advice and support, aimed to assist their transition into the first semester of their degree. The contact was well received, but the method for identifying students was very manual and time consuming.

In second semester of 2011 the Faculty then trialed the process of contacting all commencing students by both phone and email. Again, the contact was positively received by the students. Since then, the process has been further refined. In 2012 the University's Transition and Retention team became involved with coordinating the contact process and

recruited senior current students to make the phone calls. In 2013, support from the University's Strategy, Planning and Performance area, who conducted data modelling of attriting students from 2009 -2011, allowed us to identify and prioritise students who are vulnerable to attrition. The Faculty also shifted the emphasis of the phone scripts to ensure Engineering students' mathematics background and course choices were discussed.

Students that were identified to have significant issues and required further support were referred to Student Experience Officers on the project team for additional support throughout the semester. Data collected from the phone calls and any follow up contact has been recorded by staff into the RightNow Customer Relationship Management system.

The Faculty has also introduced one to one communications strategies for high achieving students again designed to reinforce brand resonance with this cohort. Each semester tailored personalised emails from the Assistant Dean Teaching and Learning are sent to all students who received a High Distinction Grade. Dean's Merit list students are also acknowledged, through congratulatory emails, invitations to special events and subsequent emails from the Pro Vice Chancellor highlighting scholarship opportunities. Such initiatives have helped encourage our high achievers to extend themselves and successfully apply for programs such as the New Colombo Plan Scholarships.

Working closely with both Engineers Australia and the student-driven Women in Engineering (WIE) group, the Faculty has supported communication with and arranged special events for female engineering students. These include social events which bring together current students, alumni and prospective female students with a lecture program designed to provide a glimpse of the professional journey of some of our female alumni. Targeted information sessions for new female engineering students, with advice from female alumni and senior female students, are also included in orientation activities.

### **Addressing Mathematics Preparedness Issues**

Like many other institutions, a high proportion of our engineering students enter their degree without sufficient mathematics background. Evidence shows that in previous years around 85% of those students with a general mathematics, or low 2U NSW HSC background, attempting our standard first year mathematics course, MATH1110, failed or attrited that course. Naturally this situation compromised both their student experience and their program progression. In 2014 we introduced a prerequisite for MATH1110 to manage these preparedness issues and enforce the long-standing preparedness advice.

Studies into engineering program attrition (King & Godfrey, 2011) have identified many issues associated with attrition in engineering programs including mathematics preparedness. The ALTC project ' (Burton, Albion, Shepherd, McBride, & Kavanaugh, 2013) quantified the impact that mathematical preparedness has on students' potential program progression. At the University of Newcastle, the removal of the pre-requisite of extension mathematics from the University Admission Centre (UAC) has seen a dramatically increasing number of students entering engineering degrees without traditionally accepted mathematics skills. The University of Newcastle is not unique in this situation, nor in its attempts to improve student progress and retention, but recently implemented measures are seen as having a positive effect.

The University of Newcastle held an active policy against pedagogical pre-requisites for many years, with courses reliant on publication of 'assumed knowledge' and students' self-regulation. To an extent this is sufficiently functional for most courses, in most programs. This was clearly not the situation with first year, first semester mathematics, with high overall failure rates, due to an inability to enforce student streaming.

Core to all first year engineering programs at the University of Newcastle, are MATH1110 and MATH1120 in Semester 1 and 2 respectively. Whilst the majority of students in these courses are from engineering, these courses are service courses to a broad range of

programs. MATH1110 has been the traditional starting point for all Bachelor of Engineering programs, but has both an assumed knowledge of the New South Wales HSC 2 Unit mathematics, and a ranking in that course of Band 5 or above. Students were formally advised during enrolment that without that level and background that their chances of passing MATH1110 were very low. An existing Mathematics Diagnostic Quiz (MDQ), which required approximately 20 minutes of the student's time, was mandated as part of the students' enrolment process. At the completion of the MDQ students are presented with a numeric score and associated advice on their prospects for MATH1110. A foundation mathematics course, MATH1002, was in place to support students who performed poorly in the MDQ though, until 2014, the advice provided to students was not enforceable. As a result, many students without sufficient mathematical preparedness, as indicated by the MDQ, entered MATH1110 leading to high failure and withdrawal rates.

A contributory problem was in place at the University of Newcastle, whereby data surrounding students' entry skills/scores was not accessible to senior members of the Faculty, preventing a more direct communications strategy from being implemented.

For the 2013 commencing cohort, data surrounding the students' preparedness was obtained allowing cross-correlation between student enrolment and their background. This process identified some 200 students that were inappropriately enrolled into MATH1110. These students were emailed direct, but unenforceable, instruction to change course. This was reiterated in lectures with a moderate percentage of students heeding that advice.

Throughout 2012 and 2013 work was in progress to implement a formal pre-requisite for MATH1110 which was finally approved, after changing University policy, for implementation in 2014. The implementation was such that students with current NSW HSC Mathematics 2U scores Band 5 or above (including Extension 1 and Extension 2 Maths) were granted automatic entry to MATH1110. Students not meeting this criteria due to: insufficient level of achievement; more than 1 year since completing high school; and /or from outside New South Wales, were automatically blocked from direct entry and were required to sit the Maths Diagnostic Quiz, now renamed as the Maths Placement Test. As a result of this process, the student numbers in MATH1002 (preliminary maths) increased from 337 to 493 from 2013 to 2014 with a corresponding reduction in MATH1110.

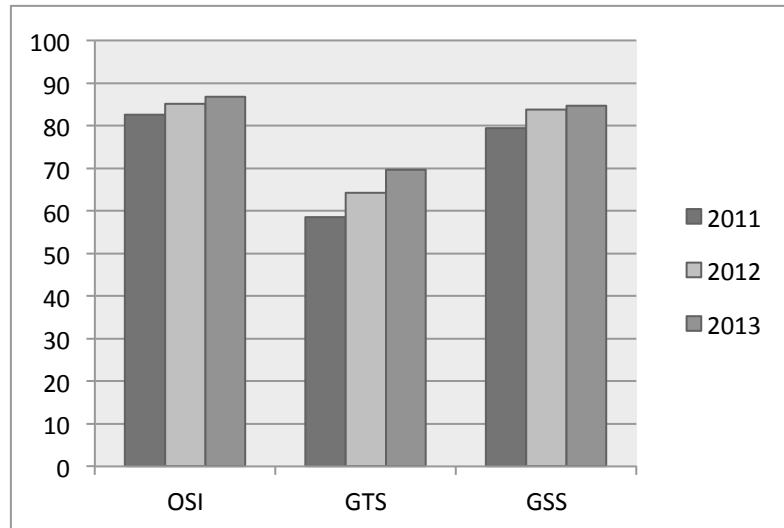
The number of students who withdrew from MATH1110 after the HECS census date dropped from 70 in 2012/2013 to 25 in 2014 indicating that the pre-requisite has reduced the number of 'soft fails'.

The anecdotal evidence from the Mathematics department was of a more engaged cohort of students with a capacity to investigate more deeply some of the presented concepts. Grade distribution in MATH1110 was slightly improved across all grade bands.

Clearly with the implementation of the pre-requisite in 2014 it will be several semesters before the full benefit of this action can be more rigorously evaluated as these students move into higher level mathematics and engineering courses.

## Results

Whilst the full impact of our measures to address mathematics preparedness have yet to be realised, our staff and student communications strategies and efforts to improve teaching and learning have been well received and have had a clear impact on student satisfaction. Graduate Careers Australia offers all graduating students the opportunity to complete the CEQ survey and each year approximately 500 students graduate with degrees undertaken through the Faculty of Engineering and Built Environment at the University of Newcastle. Figure 1 presents CEQ data for this cohort which shows improvements to student experience over the past three years as measured by actual scores in the Course Experience Questionnaire's Overall Satisfaction Index (OSI), Good Teaching Scale (GTS) and Generic Skills Scale (GSS).



**Figure 1: University of Newcastle, Faculty of Engineering and Built Environment Course Experience Questionnaire scores**

Additionally in 2013, the University of Newcastle scored significantly higher than the national mean percentage agreement scores in all three categories, which, for the discipline of Engineering and Related Technologies, the average scores were OSI 79.5, GTS 56.5 and GSS 80.7 (Carroll, 2014).

## Conclusion

The introduction of a strategic communications strategy with a focus on customer-based brand equity, coupled with tailored support services at key points in the student cycle have significantly improved student satisfaction and had a positive impact on retention. Early indications are that the introduction of a prerequisite for our first year mathematics course has reduced attrition, showing potential to further improve retention.

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