5. How are They Going?: A Project to Monitor Student Engagement

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Abstract

The transition from school or work to university studies is not always a smooth change for many students. The university context may appear threatening, strange, and isolating for some students, whether the courses be offered in on-campus or online contexts. While most modern day universities offer a raft of support services for students, including both academic and non-academic services, problems of low retention and high attrition rates still plague some institutions and some sections of particular institutions in the higher education sector. This chapter presents an innovative program that uses technology-supported strategies within a regular learning management system (LMS) to arrest problems that may lead to students withdrawing from their courses. By focusing on students engaged in their first year of study, early intervention systems, known as the Virtual Mentoring Program (VMP) and the Learning Engagement Analytics Platform (LEAP), are presented as examples of how higher education institutions can reduce attrition and increase retention.

Purpose

This chapter considers the rationale for and the processes involved in developing two programs, the Virtual Mentoring Program (VMP) and the Learning Engagement Analytics Platform (LEAP), which aim

to enable faculty teaching staff to determine how well their students are engaging with their studies through the application of technology-supported strategies. Through the use of virtual tools, teaching staff are able to see measures of their students' engagement and then provide strategic support to students. By providing guidance and encouragement to students before they reach the point of no return, the programs focused on reducing the risks associated with students withdrawing from their university courses. The programs utilize the institution's learning management system (LMS), extending its potential beyond a transmission of learning materials and learning environments. The LMS is used as a tool to identify students who are experiencing problems or who are not engaging in their studies. Because the actions of such students increase their risk of poor performance or failure, it is this point of risk that the programs aim to address. The strategies are most relevant to online learning students who, by their remoteness, have the potential to add an extra dimension of ambiguity.

Perspective: The Australian Context

Since the 1970s there has been considerable research on issues related to student retention and attrition, and their effect on higher education institutions, as well as on individual students (for example, Masika & Jones, 2016; Tinto, 1999). The motivation for these investigations is not purely pedagogic; it is also pragmatic because universities lose funding if they lose students. Furthermore, attrition rates contribute to a university's reputation. Research confirms the adverse impacts of students withdrawing from university before they obtain their degree and this is evident both nationally (Krause, Hartley, James, & McInnis, 2005; McInnis, Hartley, Polesel, & Teese, 2000) and internationally (Tinto, 1999; Yorke, 2000). In many cases, whether a student's decision to leave university is caused by financial or personal considerations, rising attrition rates may be reduced if intervention occurs early enough. Because of the current higher education contribution scheme (HECS) in Australia, students who withdraw from their university courses often leave with an accrued debt. This provides yet another reason to channel resources into programs that aim to reduce attrition rates.

Pitkethly and Prosser (2001) echo the concerns of McInnis, James, and Hartley (2000) who found that one third of all university students contemplate withdrawing during their first year of study. The work of McInnis, James, et al. (2000) is regarded as seminal and is still

relevant as first year students, according to Krause (2005), vacillate between the three sometimes competing tensions of:

- relevancy to themselves of the program they are enrolled in;
- perceptions of themselves as clients (from the marketing and service dimensions of their institution); and
- the disciplinary and academic integrity standards required by academic teaching staff.

These tensions arguably contribute to students withdrawing from university. Several models have been suggested in the effort to explain how student retention and attrition occurs, numerous approaches aimed at reducing attrition have been explored and implemented, and these approaches continue to be investigated, especially for students in the first year of their university studies (Kift, 2015; Krause, 2005; Krause, Hartley, James, & McInnis, 2005; McInnis, Hartley, et al., 2000). Strategies that have been trialled include increasing levels of student engagement, creating learning communities, and implementing strategies to promote academic and social integration. These initiatives have been shown to have a positive impact on student retention (Tinto & Goodsell-Love, 1993; Zhao & Kuh, 2004).

The *Review of Australian Higher Education*, the report commissioned by the Australian Government known as *The Bradley Review* (Bradley, Noonan, Nugent, & Scales, 2008), recommended new directions in higher education including the aim that, by 2020, forty percent of those aged between 25 and 34 years would attain a higher education qualification. For this target to be met, universities need to include students from non-traditional backgrounds in their student populations, contributing to a larger and more diverse student population.

Another factor that complicates the increase in students entering university is the additional factor of online and blended education. Interestingly, students who choose to enrol in online courses are often those who have no experience in tertiary study. They enrol in an online mode of study because it suits their complex lifestyle; they may already be employed and have family commitments. Such students confront the dual issues of learning at the university level and learning in a new learning environment because many of them choose to study online. For universities offering undergraduate degrees, these students with diverse needs, across large classes, present additional challenges.

Within the context described above, many students "hit the wall" and experience difficulty during the early stages of their university studies. For most students, this sense of experiencing difficulty early in their degree soon passes but for some it remains and characterizes the remainder of their studies. For some of these students, difficulties resurface when they face a challenging issue in their lives such as a sickness, mental illness, or a family tragedy. Other students may experience difficulty when they begin studying a subject that they find very challenging or new. Yet again, some students just struggle with their university experience in general; these students become categorized as "students at risk" or students who, because of any number of factors, are not coping. Such students are likely to fail or drop out, or go unnoticed by the staff of the university. These at-risk students require support, whether on a short-term or long-term basis. If not identified by teachers, these problems may lead to a downward spiral of performance and may eventually result in the student disengaging from their studies. In the worst-case scenario, the student may just "fall between the cracks" and withdraw from their studies altogether. Adventist schools and universities pride themselves on the quality of support they provide their students and aim to create an environment that assists students to succeed in their studies by promoting a teaching and learning environment that is exemplified by its holistic learning and pastoral care. Such an environment can also be promoted in an online context.

Research methodology: Using learning analytics to develop a Virtual Mentoring Program

Tinto (1987) established a list of factors that support students and, subsequently, increase retention. Following are some of those factors identified:

- any institutional actions need to be systematic not pockets of initiative with no alignment with institutional programs, systems, and structures;
- programs address students' needs early;
- programs are student-centred; and
- education is the goal of any support programs (p. 139-140).

The important factor, for the purposes of this chapter, is the impact that early intervention has on the potential success of a student and, therefore, retention of that student. In the modern university context, classes are often very large and it is difficult for a lecturer to deter-

mine the engagement levels of his or her students, especially early in the semester. The ability to detect students who are not engaging in their coursework is a critical factor in both supporting students who are having difficulties but also in enabling students to be successful in their university studies. Learning analytics, data that indicates student activity and non-activity within an online course system, can be accessed to detect students who may be experiencing difficulties in their studies.

According to Booth (2012), "learning analytics is the measurement, collection, analysis, and reporting of data about learners and their contexts, for purposes of understanding and optimising learning and the environments in which it occurs" (p. 1). The application of learning analytics can potentially be transformative in both tracking and supporting students who experience difficulties in navigating university systems and/or courses. Learning analytics can provide a way for college and university leaders to improve teaching, learning, organizational efficiency, and decision making, and, as a consequence, serve as a foundation for systemic change. By tracking levels of student engagement, the use and analysis of learning analytics provides a level of clarity which can dispel uncertainty around how to allocate resources, develop competitive advantages, and, most importantly, how to improve the quality and value of the student learning experience. The project described here is looking to utilize learning analytics and further develop this data into academic analytics, which is the application of business intelligence in education. The use of academic analytics emphasizes analytics data at institutional, regional, and international levels. Konstantinidis and Grafton (2013) stated: "Analytics marries large data sets, statistical techniques, and predictive modelling. It could be thought of as the practice of mining institutional data to produce 'actionable intelligence" (p. 33). Analytics from LMSs offers a rich source of data for monitoring and predicting the success of learners.

Morris, Finnegan, and Wu (2005) compared basic activities related to LMS participation (e.g., content pages viewed, number of posts) and duration of participation (e.g., hours spent viewing discussion pages and content) in LMSs. They found significant differences between "withdrawers" and "successful completers," concluding that "time spent on task and frequency of participation are important for successful online learning" (p. 221). Macfadyen and Dawson (2010)

advocate for early-warning reporting tools that "can flag at-risk students and allow instructors to develop early intervention strategies" (p. 589). This data can serve the purposes of:

- Gaining real-time insight into the engagement and performance of learners; this is important for identifying those students who are at-risk.
- Informing students of their progress against expectations and their peers which benefits their motivation and self-awareness.
- Assisting decision makers in making informed decisions regarding distribution of resources, enabling them to identify those areas of need more readily.

The Project

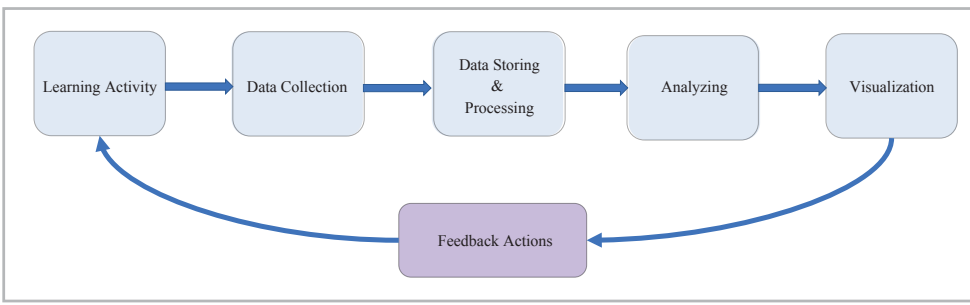
Following is a brief description of the project in which we are currently immersed. In order to carry out comprehensive analytics, data is generally extracted from various institutional systems, including:

1. **LMS-based engagement reporting tools.** These tools sit within the LMS and generally assist in analysing LMS data only. They provide simple indications of a student's progress. Examples of these tools include Blackboard's Retention Centre and Moodle's Engagement Analytics plug-in.
2. **LMS-centric analytics systems.** These systems were developed by LMS vendors. They combine data from the LMS with data from the Student Information System (SIS) to enable more extensive analysis. Examples of these systems include Blackboard's Analytics for Learn ™ (A4L) and Desire-2Learn's Insights.
3. **SIS-centric analytics systems**. These systems sit alongside the SIS but may also draw in data from the LMS, providing learning analytics alongside wider business intelligence. Examples include Ellucian's Student Retention Performance, and Compass' Promonitor.
4. **Generic business intelligence systems.** These systems were developed to provide better analysis in any business but have not been specifically designed for education. They sit outside both the LMS and SIS but draw data from those and other systems, often in conjunction with a data warehouse. Examples include QlikView, Tableau, IBM Cognos, HP Autonomy, and AWS Quicksight.

The College's partner is the Association for Continuing Higher Education (ACHE) mobileLearning.io who have researched and developed a range of LMS-based engagement reporting tools, LMS-centric analytics systems, and generic business intelligence systems to automate and scale learning analytic processes. To bring these systems into a small institution provides a number of challenges; to assure the successful development and adoption of the systems a project plan needed to be employed. The process established for this project involves a four-stage process including the design, development deployment, and evaluation of the fully integrated Learning Engagement Analytics Platform (LEAP).

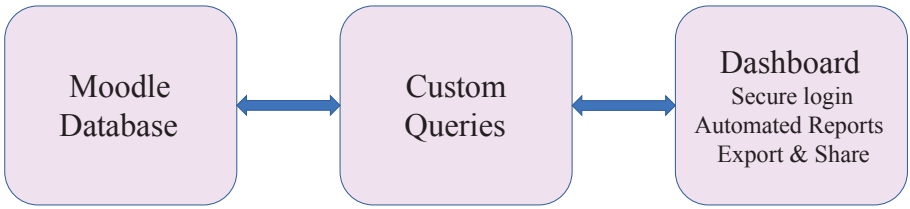
The LEAP system will involve behind-the-scene gathering of data which will enable the presentation of data in a readily accessible and usable form for teachers to analyze. This will enable academics to utilize the data in supporting their students. The process of developing the feedback loop for teachers is presented in Figure 5.1:

Figure 5.1 The LEAP system process



The design of an automated process follows a standard project management process and involves the data from the LMS being interrogated, using predetermined protocols to provide ready access to academics through a dashboard, a data visualization tool displaying the current status of student engagement metrics on a single screen providing easy access for the academics. This process is presented in Figure 5.2:

Figure 5.2 Automated process design



The System Integration Protocols

As indicated above, the LEAP system requires the development of a set of protocols that guide the process of identifying learner analytics data which can subsequently inform faculty staff. Avondale has, for a number of years, operated a Virtual Mentor Program (VMP) aimed at identifying and, consequently, assisting students who were experiencing problems. The person in the Virtual Mentor (VM) role was employed on a part-time basis. The role involved monitoring students' progress and making contact with those students who appeared to be experiencing problems. When a student failed an assessment item, or did not engage with LMS activities, the VM contacted the student (usually by email, infrequently by phone) and noted the student's lack of progress. The VM was responsible for:

- monitoring students' progress by noting the grades a student obtained for their assessment items as they were recorded in each LMS Gradebook (a facility which stores the grades for each assessment item in the course students are enrolled);
- monitoring students' online engagement; tracking LMS engagement statistics allowed the VM to identify how often students accessed the LMS and which options they selected;
- contacting students who have failed an assessment item or had not participated in an online activity;
- maintaining subsequent and regular contact with at-risk students;
- tracking at-risk students across all the courses they were enrolled in;
- liaising with course coordinators and alerting them to problems their students were experiencing;
- keeping records of tracked student activities;
- analysing records and providing feedback about trends to the

Faculty and Program Convenors;
- identifying best practice to support students during their first year at university;
- facilitating student-staff relationships; and
- raising the visibility of at-risk or failing students.

Automating the VMP protocols in LEAP

The existing VMP utilizes a number of protocols to measure students' progress and students' levels of engagement for the purpose of identifying students who were exhibiting signs of disengagement or failing. The LEAP system utilized the lessons learned from the VMP, especially the engagement indicators which were used to track students' engagement levels. The lessons learned from the VMP informed the development of protocols within the LEAP system which made information about student engagement available to teachers. These protocols, referred to as engagement indicators in the VMP, included:

1. Access to LMS before the end of Week 2.
2. Downloaded "Course Outline" document before the end of Week 2.
3. Download additional "Student Information" booklet before the end of Week 3.
4. Access "News Forum" (course announcements) before the end of Week 3.
5. Frequency of access during Weeks 4-6.
6. Click count during Weeks 4-6.
7. Submission of Assessment Task 1 (and, if relevant, extension request).
8. Submission of Assessment Task 2 (and, if relevant, extension request).
9. Submission of Assessment Task 3 (and, if relevant, extension request).

Through the process of monitoring these activities, the VM was quickly able to identify students who were not performing to the expected standards or who demonstrated signs of failure. The VM followed a pre-determined process that ensured each student was treated equitably. The VM would send an informal message to any student who failed to achieve any of the engagement indicators.

The aim of this current project is to develop an automated approach, making students' progress transparent to academics through the appli-

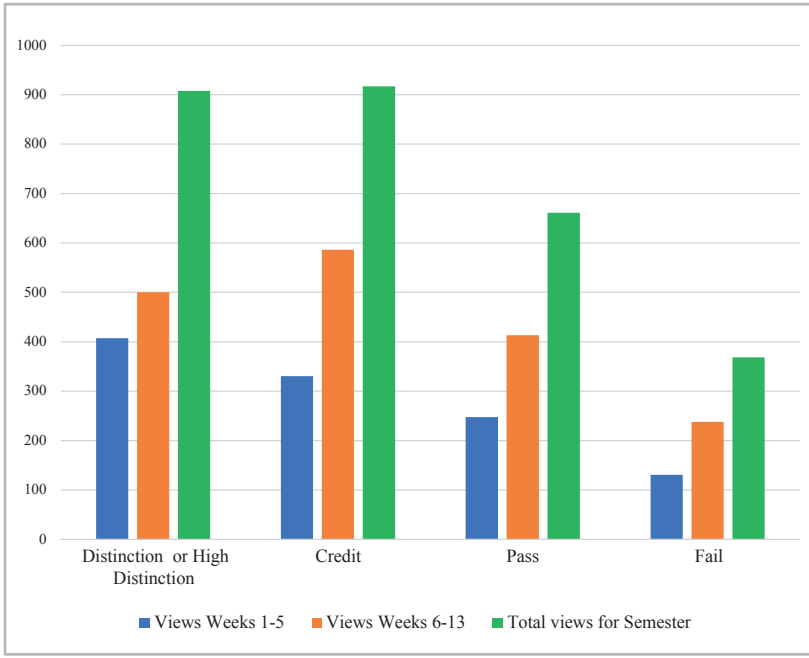
cation of the LEAP system through harnessing the latent data in the LMS, which were so successfully used in the manual processes in the VMP. Avondale is now aiming to provide teachers with 'live' data that reports on their students' performance against the engagement indicators. Avondale, with the Mobile Learning Company, will utilize the engagement indicators used in the VMP, to inform the extraction of relevant data from the LMS. The extraction of these data enables a report to be provided to each faculty member through a dashboard.

Results

Over the past few years, the VM project has worked well and has been proven to support students who were experiencing difficulty. However, it was very labour-intensive and limited in scope. Despite this, the benefits far outweighed the negative aspects of that program. The institution's current plan is to utilize the proven protocols, as used in the VMP, for identifying levels of student engagement, by incorporating them into the LEAP system which utilizes automation of the data in the LMS and makes these data, and the analysis of them, accessible to class teachers.

As an example of how the indicators present themselves in the classroom, student engagement levels were monitored as indicators and predictors of future success, as had been done in other studies (Atherton, Shah, Vazquez, Griffiths, Jackson, & Burgess, 2017; Saqr, Fors, & Tedre, 2017). Before the LEAP system was implemented, a class was monitored, manually, through the LMS, to look at how many times students were viewing their subject material, engaging with the activities, and accessing online resources on their LMS course site. This was simply measured by student "click counts" or views of LMS pages. Clicks were recorded over two periods during the semester: during Weeks 1-5 and Weeks 6-13. Figure 5.3 displays the relationship between the number of LMS views during those two periods and compares these with the total number of views for the semester with the final achieved grade.

Figure 5.3 Comparison of number of learning management system (LMS) views with grades achieved



It is evident that there is a relationship between the number of clicks made by students in their LMS in Week 5 of the semester with their success or failure. Students with less than 200 clicks during the first five weeks of the semester invariably failed the class. At the Week 5 point in the semester, this is evident but it could be postulated that this would be evident at Week 2; this issue requires further study. Because these data about students' engagement, or non-engagement, in the first few weeks of the semester currently exists in the LMS, this project will provide ready access to such data for additional future investigations.

Scholarly Significance

The purpose of the project is to gain data defined by the engagement indicator protocols and bring them together in a dashboard which will present all the data in an easily understood form for the teachers to monitor the level of their students' engagement for the purpose of identifying students who are displaying problems in their

studies, so early intervention is possible. The initial reports we have developed show that there is data of significance emerging which is giving us insight into our students' level of engagement with what we are teaching; but, more importantly, it is how early in the semester we are able to identify those indicators that appears to matter most.

Conclusion

This chapter has outlined two programs, one that has been used in the past and one that is under development. Both programs aim to decrease student attrition and, subsequently, increase student retention through empowering teachers to monitor student engagement. By using locally available technological tools, along with the institution's LMS, student engagement and non-engagement indicators are tracked to identify students at risk. This research adds to our knowledge of the importance of identifying students with problems before such problems grow to a point where they result in students withdrawing from their university studies. The strategies and programs outlined in this chapter may be of interest to university administrators who are responsible for arresting growing attrition rates or academic teaching staff who are interested in implementing some simple strategies, using an institution's LMS, to identify and support students at-risk.

Anthony Williams

Anthony Williams recently joined the University of Wollongong Global Enterprises Unit. The unit manages universities and colleges in four locations in Wollongong, Dubai, Hong Kong and Malaysia. Anthony manages the Academic Governance and Performance Portfolio across the institutions. Before taking up the Wollongong assignment, he was at Avondale where he was Vice President (Academic and Research) of Avondale College of Higher Education. He provided leadership in research and scholarship. Prior to that role, he held the position of the Head of School of Architecture and Built Environment at the University of Newcastle NSW. He has extensive experience in project management in the domain of professional education. He is a winner of multiple University Teaching Awards as well as a National Award for Teaching Excellence. He is highly regarded in this area having worked as a curriculum consultant nationally and internationally.

Maria Northcote

Maria Northcote is the Director of the Centre for Advancement of the Scholarship of Teaching and Learning (CASTL) at Avondale College of Higher Education. Maria is an experienced higher education teacher, leader and researcher and has successfully led an Office for Learning and Teaching Extension Grant through to completion during 2014-2015, and is currently a co-researcher on an Office for Learning and Teaching Seed Grant focusing on higher education assessment. She has led and contributed to a range of research projects in three higher education institutions between 1999 and 2015. Before beginning her work at Avondale, she worked at Newcastle and Edith Cowan Universities, in lecturing, research and staff development roles. She was recently appointed a Fellow of the Higher Education Research and Development Society of Australasia (HERDSA) in recognition of her service to higher education and her commitment to ongoing professional development to enhance teaching and learning.

John Reddin

John Reddin is a digital products and media professional with over 25 years of experience in production, product and service executive management roles. John has worked for and partnered with a range of enterprises from media, entertainment and technology companies like Google, Apple, Foxtel, YouTube, Amazon, BBC, and Sony, and with clients that range from major performing artists, artist management companies, and record labels, through to manufacturing and consumer brands. John is a co-founder and Director of Operations for mobileLearning.io, providing innovative mobile solutions to higher education institutions and public and private enterprises.

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