

Case Study 3

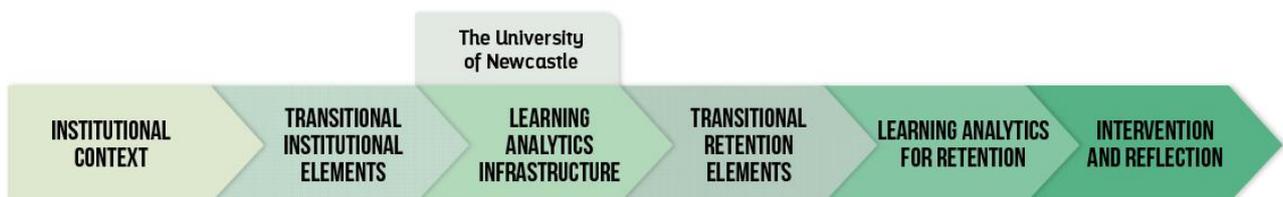
The University of Newcastle

This case study presents a more focused discussion of themes and issues relating to the implementation of vendor-provided learning analytics software that links the LMS and SIS. In the context of the framework this case study is principally focused on the *Learning Analytics Infrastructure* section. One of the key messages throughout the project has been that there is considerable variation in the approaches that institutions are taking with the development of infrastructure to support learning analytics. Some institutions emphasise in-house development and hosting of data and analytics systems, whilst others work more closely with vendors. The Newcastle case study explores challenges and opportunities that relate to implementing a vendor provided product in a self-hosted environment.

One of the central learnings from the project is that each institution will have very different priorities and requirements when it comes to learning analytics. In practice, making decisions about what infrastructure to invest in and how it will need to be customised and refined is exceptionally complex – and even more so where an institution is a first adopter. This case study shows how factors within the *Learning Analytics Infrastructure* section of the framework, like existing systems and expertise, executive sponsorship, and alignment with institutional strategy have a key impact when issues arise in the implementation phase. It also shows that periods of testing, negotiation, customisation and refinement mean that going ‘live’ can take much longer than initially hoped.

Overall, the Newcastle case study provides an open and frank discussion of the complex interplay between the technical and strategic elements that play a huge role in influencing learning analytics implementation.

The figure below illustrates where the University of Newcastle case study fits in relation to the *Let's Talk Learning Analytics and Retention* framework.



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Institutional Context

In 2015, the University of Newcastle (UoN) celebrates its 50th anniversary, having gained independence from the University of New South Wales in 1965. The founders of the University had a clear vision: a bush land campus that blended a traditional university with innovative approaches that stayed connected to the community who campaigned for its creation. Over these 50 years, the University has maintained its connection to the local community as the second largest employer in the Hunter Region. The university has grown from a single campus in Newcastle (Callaghan) to now having four additional satellite campuses at Port Macquarie, Ourimbah (Central Coast), Sydney and Singapore.

The UON has a distinctive identity as a research-intensive non capital-city university serving a large and diverse regional population, including Australia's 7th largest city, Newcastle. In 2014, the University had 40,203 student enrolments, of which 19.6% were international students coming from 117 countries. Sixty-three percent (63%) of students were in undergraduate programs, with 19.8% postgraduate coursework students, 4% Research Higher Degree students and the remaining 13.2% were enabling, ELICOS or non-award students. The University has five faculties (Business and Law; Education and Arts; Engineering and Built Environment; Health and Medicine; and Science and Information Technology) divided into 16 Schools.

Equity of access to higher education is a fundamental principle of the University. This is reflected in its institutional values and demonstrated by its successful history of supporting students from a range of backgrounds to achieve a university education. In 2014, 60.8% of students were female, 2.8% identified as Aboriginal or Torres Strait Islander, 8% had a first language that is not English, and 2.5% were people with a disability. In 2013, 26% of enrolled students were from a low SES background, compared to the national average of 16%.

When the case described below began in 2013, the teaching and student support infrastructure at UoN had an internally-hosted learning management system (Blackboard Learn 9) as well as an internally-hosted student information system (NUSTAR – based on a PeopleSoft platform).

A management information system (MIS) was available through the Planning Quality and Reporting unit that aggregated data from a number of systems including NUSTAR, Human Resources, Admissions and Enrolments and the Course Tracking System. This system had been progressively developing into a more diverse data warehouse and included student demographic and load information, research and grant capture information, detailed program outcomes and human resources data. Learning analytics were not available through the MIS, but student demographic information and grade statistics were available. No learning analytics systems were directly accessing Blackboard but many academics did track student activity through the built-in Blackboard functionality. At this point, all courses were required to have a Blackboard site available to students, but course coordinators were not required to use the Gradebook within Blackboard. UoN's virtual learning environment (UoNline) also included Turnitin© text matching software and ECHO360© lecture capture in most large and many smaller teaching spaces.

Learning Analytics Initiative

For a number of years, The University of Newcastle had been focused on several related initiatives to analyse data for student support through existing systems – especially the Student Information System. Great gains had been made with the use of pre-admission data sets and other coordinated data. The university decided, however, that richer data as could be gained from integrating

additional sources, especially from the learning management system and associated systems. It was believed that this additional insight into student circumstances, needs, and activities could allow new and increasingly effective support to be provided to students. In 2013, the Centre for Teaching and Learning (CTL) recommended to the Executive Committee that UoN should embark on securing the capacity to perform formal Learning Analytics functions in order to assist with the improvement of student retention and success.

In 2013 CTL secured funding to purchase a one-year license for Blackboard’s Analytics for Learn© (A4L) in order to conduct a pilot of the potential functionality and benefits of the emerging analytics technology. At the time of purchase of the license, UoN was poised to be the first Australian university to implement Blackboard’s Analytics for Learn. At that time the strategy for the utilisation of the analytics data was in an early stage of development as a general proposal had been developed regarding academics’ and students’ use of the information to improve student engagement, retention and success. Some administrators were also interested in the potential use of A4L to evaluate the success of curriculum design in specific courses as well as teaching practices.

A consultant was contracted to determine which data, functionalities and reports would be useful and practical, for teaching academics and other senior administrators to access. The applicability of the out-of-the box reports for the use of course coordinators and students was also reviewed. It was determined that most teaching academics would have little appetite for doing their own detailed analyses, but would require reports to be generated from their class data and forwarded to them with detailed suggestions for their use. The general analysis of the A4L data that was available to UoN is represented in the table below and is exemplary of the fact that there are a number of approaches and uses for learning analytics depending on the primary requirements of the end user. This has resulted in a number of different, but equally compelling business questions:

Table 1: Business Questions Across Different Levels

Category	Definition / Purpose	Example
Students	To reflect on their achievements and patterns of behaviour in relation to others	How many times did I use Blackboard compared to other students?
Intervention	To identify individual students requiring extra support	Which students are at risk of failing? Which students did not submit any assignments?
Diagnostics	To help course coordinators and lecturers plan supporting changes for groups or teaching improvement within the current course	Why are all the students in a particular school doing poorly compared to others? Can we improve their tutorials?
Course Improvement	To help course developers to seek improvements to current courses or develop new curriculum offerings	Are there course tools that are not used? Should we use the online discussion groups when only 10% of the class used them in the past?
Administrators	In order to help make decisions on matters such as marketing and recruitment or efficiency and effectiveness measures of course offerings	Which courses have the lowest pass rates? Is there a correlation between access and final grades for students?
University	For quality assurance, recruiting, and comparisons between systems (regional, state national and international comparisons)	How does UoN learning management system (LMS) use compare to other universities for first year students?

The final project was approved in July 2013 and in August, Blackboard offered revised pricing which included a 30% discount for the software and a 20% discount for the Pyramid© advanced analysis and report generation software, with the intention of having A4L fully integrated into the virtual learning environment and all data from Blackboard active by the beginning of Semester One, 2014.

The requisite IT project was chartered the Blackboard contract signed after a one-month period of negotiation. In September 2013, installation and migration into UoN's virtual learning environment began. This included the preparation of student information system data that needed to be integrated into Blackboard A4L.

In the early days of the installation of Analytics for Learn (Blackboard's first Australian installation) it became apparent that there were a number of issues of translation for this American-based product. During Blackboard's initial visit in December, it was discovered that there were a number of items that were not applicable to the Australian market – and this continued to become more and more evident as the project progressed. Some examples:

- All of the terminology in the out of the box reports was based on the American system and nearly all headers and titles had to be modified. Examples included the date format was Month-Day-Year as compared to the standard Australian Day-Month-Year and student program years were defined as Freshman, Sophomore, etc.
- The system was designed with little flexibility and any changes to the standard American methodology were considered a customisation. For example, the relationships in the data were designed assuming that Blackboard Learn courses align to 'Sections' of a class, resulting in small student numbers in each Blackboard course. Because the Australian system doesn't use sections in Blackboard, customisations had to be made throughout the database and across the reports. The more customisations that were required, the more difficulties were encountered with the upgrade.
- The main A4L report was difficult to run due to its design for small class sizes – it was not capable of handling classes with 250+ student enrolments typical of Australian universities. Blackboard recommended the removal of many of the calculations that allowed the report to provide graphs and visual information, but this substantially diluted the value to the end user.

Other issues also revealed the tool not ready for wide use and support within either the University of Newcastle or other Australian institutions. For example, application troubleshooting required full knowledge of the Blackboard Database, the Student Information System data and integration and technical expertise to manage between multiple applications. This was partially due to the infrastructure inadequacies, the need for complex internal service arrangements and the considerable complexities of the self-hosted environment. This scenario required that a technical person within IT Services supported Blackboard, with full business knowledge of Blackboard and access to multiple databases.

Blackboard assisted by building the development environment incorporating this data and made a site visit to train our IT and eTeaching Support Group in the functionalities and technical aspects of A4L.

By early April, 2014, Blackboard had worked out many of the incompatibilities of its Analytics for Learn product vis a vis its implementation in the Australian market. At this point, final data uploads were proceeding as we were preparing to 'go live' to meet the new start date for the pilot that had now moved to the second semester of 2014. The project was on track (for the reallocated dates) and moving ahead.

In early- and mid-2014, a separate project that was evaluating whether UoN's Blackboard Learn should remain hosted internally or be moved to Blackboard's external hosting environment. This resulted in a major decision to move all Blackboard services to Blackboard's external hosting environment (but A4L was to remain an internally hosted product). Intense negotiations included a number of Blackboard services, such as Disaster Recovery and a data channel between the Blackboard data and UoN's Management Information System (the developing data warehouse). These negotiations left a brief window for preparation to port all learning management system data and software to the externally hosted environment.

While implementation of A4L was still in the planning stages, a larger data warehouse (NINA – Newcastle Information and Analytics) was being developed by the Strategy, Planning and Performance unit (formerly Planning, Quality and Performance) within the Vice Chancellor's division at UoN. The original intent was to pilot A4L prior to this larger data warehouse's development, but the issues described here resulted in the data warehouse project moving forward at a quicker pace and being launched first. At this point, the decision was made to delay the installation of Analytics for Learn until such time as the functionality of the NINA analytics system within the data warehouse, as well as the new Blackboard Learn 9 retention centre could be explored.

The purpose of this MIS NINA system is to aggregate data from a number of systems, including Blackboard, the student information system, research systems, the HR system and the admissions system as a data warehouse. It is designed to provide rich information regarding trends and analysis relating to research performance, student demographics, cohort success, as well as recruiting, admissions and student support strategies. It is still unclear how this information will inform individual course coordinators' teaching strategies as current intentions are to answer business questions posed primarily by senior university administrators and increasingly those by teaching academics. Student functionality within this system is also uncertain at this time.

Specifically, the capability of NINA to support analytics of student data for teaching staff needs to be explored. As there are obvious overlaps between what is being offered within the NINA system and that of A4L, these capabilities need to be further defined prior to a decision to continue with the installation of the A4L product. Additionally, there are clearly gaps in the NINA system's ability to provide data to students on their own performance. Some of this information may be available to students in a functional format through Blackboard Learn's © Retention Centre, and this will be further explored along with reconceptualising how Analytics For Learn could fit most effectively into the University of Newcastle's overall analysis of data focusing on student retention and success

The intention of UoN is to fully embrace and leverage the data from the Strategic Planning and Performance unit's big data warehouse (NINA), for large and campus-wide initiatives, while at the same time utilising Blackboard Learn 9©'s Retention Centre to give simple, course-based analytic information to individual course coordinators and students. Further exploration of how A4L may enhance the value of information from the data warehouse (NINA) will be ongoing as use of this

data matures – especially relating to immediate student data relating to personalised course activities and success.

Key Lessons

This case demonstrates the importance of a functional analytics software product, and a sound and reliable infrastructure as an essential underpinning to a learning analytics maturity model for any university. Attempting to install A4L with an immature product not ready for the Australian market, as well as while the platform on which Blackboard Learn sits was in transition resulted in delays and an unclear pathway for installation. Administrative and planning hurdles, existing in any large institution must be cleared prior to the introduction of any learning analytics software or strategic implementation. This places physical, virtual and administrative infrastructure issues firmly at the core of any analytics maturity model.

Also, a detailed plan for how analytics data will be used to benefit students and teaching staff should be developed and disseminated to gain broad institutional support, and a definitive appetite to leverage the benefits of the technology. A clear business question (or number of questions) must be salient and central to the strategic direction of the university, with senior executive support. Otherwise, competing priorities and initiatives will supersede analytics projects, and the project may stall. A definitive plan must be in place relating to how all systems (data warehouse and targeted learning management analytics) will work together to provide rich and powerful data. While the data warehouse can provide answers to a large number of over-riding questions relating to research, admissions, enrolment, and program performance, the A4L platform may eventually found be a better fit for those questions asked by students and individual course coordinators about specific course cohorts. Considering the divergent business questions and stakeholders asking them, there will most likely be space for both systems to work in concert, and this is currently under exploration.