Learning analytics
The current state of play in UK higher and further education

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Executive summary

Introduction

Driven primarily by the need to improve student success, retention and the learning experience, learning analytics is a rapidly growing area of interest in educational institutions worldwide. In the UK Jisc is working closely with its stakeholders to share experiences in areas such as the provision of tools and dashboards for learning analytics, and ethical and legal guidance in how to deploy them. This builds on the work of Cetis which carried out extensive work in exploring issues around learning analytics and provided its useful Analytics Series of reports and case studies in late 2012 – early 2013. Cetis followed this up with a survey of institutional use in May and June of 2013 which received 26 responses. The area is moving forward so rapidly that it was felt that an up to date picture of current developments in the UK further and higher education sectors was required in order to inform the sector and Jisc's future activities.

This report examines the current situation in a range of universities and colleges across the UK. A number of institutions which were known to be carrying out work in learning analytics were approached to see if they would be prepared to be interviewed. The resulting list includes ten universities, two colleges and the University of London Computing Centre, which hosts the virtual learning environment's (VLE) of more than a hundred organisations and is planning to further develop its analytics capabilities. While the list of institutions cannot be considered representative of UK tertiary education it does provide a snapshot of activity in a wide variety of institutions, and includes some of the most high profile developments.

The research was carried out through a series of structured interviews with staff at the universities and colleges selected. These included senior management, academics, and managers from IT departments, libraries and learning technology units. Interviewees were sent summaries of the interviews in order to ensure their views had been correctly represented. The interview questions are included in the appendix, and reports from the interviews form the body of this report.

Variety of institutions and drivers

Various issues are striking when comparing the approaches of the different institutions. Firstly the institutions themselves are extremely varied in their size, structure, nature of their student cohorts and approaches to learning and teaching. At one end of the spectrum Edinburgh has a distributed management structure and a strong research culture, resulting in a variety of learning analytics projects and initiatives across the highly varied schools and departments of the University. At the other end Bridgwater College is taking a centralised approach to student support using systems to track student performance and enable more effective management of teaching staff.

Motivations for carrying out learning analytics also vary considerably, though there is some common ground. Most institutions mention a desire to enhance the student learning experience in various ways such as improving achievement and reducing the number of resits, providing better feedback, and empowering students to

1. Cetis analytics publications http://publications.cetis.ac.uk/c/analytics
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become more reflective learners. Some institutions have significant issues with retention and see learning analytics as a way to identify students at risk of dropout; for others retention is not a significant problem. Providing students themselves with better information on their progress is also mentioned as being an important driver.

An issue several institutions raise is the requirement to provide data on student attendance to UK Visas and Immigration (previously the UK Border Agency). This has required capturing attendance data in various ways, which can be an effective proxy for student engagement and hence lead to early identification of students who are struggling. Another clear external driver mentioned by some institutions is the National Student Survey; obtaining better data on the student experience potentially enables an institution to identify and address issues of concern to learners such as inadequate feedback. Manchester Metropolitan attributes a 9% increase in student satisfaction over two years to its efforts to reorganise its curriculum based on better analysis of student requirements. Derby suggests that it is not only important to ensure students are given adequate feedback on their assignments but also to ascertain whether the students are acting on the feedback.

Learning analytics is seen by some institutions as a way of enhancing teaching, in particular by encouraging more timely marking of student work, and helping to build better relationships between students and staff. For several institutions the focus is on putting the analytics tools in the hands of staff who work directly with learners, and providing them with actionable insights into student performance. At Nottingham Trent it was found that tutors were putting effort into supporting students who requested help but missing those who most needed it. A key aim of learning analytics there is to help identify students at risk before it is too late to intervene.

A number of institutions mention the variety of levels of achievement between different ethnic groups or genders and how they are using analytics to identify and attempt to provide additional support to individuals from underperforming groups. Derby uses analytics to ensure that its decision making on supporting black and minority ethnic (BME) students is evidence-based. It has developed a recipe book for academic staff which appears to have improved the performance of BME students. Nottingham Trent intends to develop more fine-grained understanding of the factors which lead to a particular minority struggling. A group may have more difficulties with one subject than another, and individuals within a group do not necessarily conform to its characteristics, so the aim is to develop a highly personalised approach.

Stage of development

As well as the sheer variety of motivations, a strong impression to emerge from the interviews is just what an early stage the UK is at in its understanding and deployment of learning analytics. Several participants wanted to clarify exactly what the interviewer meant by the term, and the activities discussed ranged from general business intelligence and the monitoring of key performance indicators, to tools which predict students at risk of failure, to systems which help manage the workflow around staff-student interactions. The distinction between learning analytics and academic analytics which researchers such as Long and Siemens have tried to clarify is not easily applied to the current UK context. Indeed many institutions see the data as part of a continuum which can be used by people at every level of the organisation, from individual students and their tutors to educational researchers, to unit heads and to senior management.

There are a few institutions which stand out in their comprehensive approach and significant investment in learning analytics at an institutional level, notably Manchester Metropolitan, Nottingham Trent and the Open University. All the others interviewed have a strong interest in the area and aspirations to further develop their use of learning analytics; some have already gained significant expertise. Whilst there is no doubt a lot of activity taking place in some other UK educational institutions, it is likely that many are only starting to consider how they can best utilise the large datasets they are accumulating to enhance the student experience and other aspects of their operations. Even the participants with the most experience of learning analytics in this study felt that they were just beginning to understand how to develop effective metrics and interventions.

Among the interviewees only a few have programmes which consolidate learning analytics activity across their institutions. In some, effort is fragmented across different departments and projects. Edinburgh’s activities emerge in the context of existing programmes and strategies around the student experience, feedback, assessment and engagement monitoring. Oxford Brookes has strategies to enhance the student experience which encompass a range of projects aiming to build an evidence base for multiple aspects of learning and teaching. Most interviewees mention that their senior managements are taking an increasing interest in the area and some say they are likely to establish institutional programmes to coordinate activity.

While normally under the oversight of a pro vice-chancellor or other senior manager, in many institutions the developments are being coordinated by IT services, with library staff sometimes having a significant input. “Silos” were mentioned by a number of interviewees, with one of the major difficulties of learning analytics projects being to obtain data from owners keen to maintain control. Conversely learning analytics is seen as a way to break down such barriers and bring stakeholders across the institution to work together effectively towards a common goal.
Ethics and legal issues

Major concerns have been expressed around the legal and ethical issues of learning analytics by stakeholders contributing to the prioritisation of Jisc activities. It was thought by many to be vital to clarify this area and to develop a code of practice before significant efforts could be put into learning analytics. However very few issues have cropped up yet among the institutions interviewed. There is a general consensus that students are on the whole reasonably comfortable with information being collected about them for educational purposes and are already used to potentially far more intrusive uses of their personal data by commercial interests. Many institutions report having productive relations with their students unions. They invite student representatives onto key project steering groups which help to allay any fears regarding privacy.

Nottingham Trent has developed an effective four-way partnership between information services, academics, students and their external software consultants. It is felt there that existing policies are adequate to cover the uses of learning analytics, though because the data is being used in different ways there are potentially new ethical implications. The Open University has tackled this by developing a policy on the ethical use of student data for learning analytics with the support of its student association. Edinburgh too expects students to be proactive partners in these matters and is developing an ethics and data security policy.

Concerns are expressed by several institutions about data protection and what staff should be recording about their interactions with students. At Loughborough, personal tutors are provided with training on what to do with sensitive and personal information, and access to different parts of the student record are strictly controlled. Oxford Brookes ensures that data on disabled students for example can only be viewed at an aggregate level unless staff have appropriate permissions. At Derby it has been decided that notes on students taken by staff should be shareable with the student. Given European data protection legislation it seems likely that all institutions will have to adopt similar policies around personal data arising from learning analytics.

It is commonly felt among interviewees that staff are more concerned about ethical issues than the students. Staff may have a greater level of consciousness about potential privacy violations than students but their concerns may also stem from a feeling that learning analytics could be used to monitor their own activities. This may be justified: highlighting lack of timely feedback on assignments is an underlying motivation in some of the institutions interviewed. The role of staff in the analytics process is also mentioned as vital by some participants. Steps have been taken at Bridgwater and Derby, for instance, to allow staff to contextualise automated email interventions before they are sent on to students.

Data sources

Data is being gathered from a wide variety of sources and not surprisingly the approach varies considerably across institutions. Student information systems and virtual learning environments provide the bulk of the data used for learning analytics. Attendance records are also widely collected through various mechanisms such as swipe cards and proximity cards; they are even still taken by hand in some institutions and fed into systems manually. At Bedfordshire students are required to swipe a card when using the library helpdesk, which provides another source of engagement data.

Various library systems are mentioned as sources for learning analytics data, and assignment handling systems such as Turnitin are also being used. Lancaster is considering capturing data on users of PCs in their library such as who is using them, how long they are spending and what apps they are using. The National Student Survey and other student survey data are also used in some of the systems.

Analytics systems

One of the most surprising findings of this study is that there is little common ground among the participating institutions in the analytics systems they are using:

- Activate Learning uses IBM Cognos and WebSphere, and are integrating ProMonitor
- Bedfordshire uses an Oracle data warehouse and business intelligence software, and a student engagement dashboard developed by a third party software house
- Bridgwater uses the Compass suite of tools including ProMonitor, ProSolution and ProAchieve
- Derby is piloting Blackboard Analytics for Learn and uses IBM Cognos as its main business intelligence system
- East London uses QlikView to analyse data held in Microsoft SQL Server and Oracle data warehouses
- Edinburgh uses Google Analytics, Google Charts, Tableau, QlikView, SAP Business Objects and several in-house systems
- Lancaster is using Tableau
- Loughborough has developed its own system: Co-Tutor
- Manchester Metropolitan uses the Microsoft business intelligence stack
- Nottingham Trent uses Hewlett Packard Autonomy, tailored by DTP Solution Path
- The Open University uses SAS business intelligence software and an in-house tool called OUAnalyse. It is currently procuring a new corporate data visualisation tool.
- Oxford Brookes uses QlikView for visualising their data and an in-house developed data warehouse but is moving to SAP Business Objects
- ULCC is currently trialling IBM Cognos

This perhaps confirms the nascent state of the technologies and the lack of consolidation in the marketplace. It is worth contrasting this with the market for virtual learning environments, where Blackboard Learn and Moodle have almost complete market share in the UK. Meanwhile Tribal SITS:Vision dominates the market for university and college student information systems (though there are other products with significant uptake).

Reviews of the main learning analytics tools available are on the Jisc Effective Learning Analytics blog.

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5. UCISA Technology Enhanced Learning Survey ucisa.ac.uk/tel
6. UCISA CIS Survey 2013 ucisa.ac.uk/bestpractice/surveys/cis.aspx
7. JISC Effective Learning Analytics blog http://analytics.jiscinvolve.org/wp/
Dashboards, metrics and interventions

Key to most analytics implementations is a series of dashboards. Some of these provide indicators of engagement to identify at risk students so that tutors can intervene. At Nottingham Trent student ratings are either High, Good, Satisfactory or Low, and a tutor can drill down to a level below this to establish what the cause of a low rating might be. Bedfordshire’s dashboard shows an indicator for student engagement calculated from various data such as book borrowing and library attendance, exam attendance, the handing in of assignments, campus attendance and visits to the VLE. The weightings of the different elements in the engagement metric can be altered depending on the nature of the module and its activities. Derby meanwhile has developed a list of 29 metrics for monitoring student engagement.

Many institutions are building dashboards for monitoring areas such as admissions, enrolment, assessment, graduation and drop-out rates. As noted earlier such functionality may be regarded as business intelligence or academic analytics rather than learning analytics however some interviewees appear to see this as an artificial distinction. There is a hierarchy of dashboards starting with information on a particular student, with the data being successively aggregated for different users at the level of the module, the course, the faculty or school and the institution. At Manchester Metropolitan a key dashboard is the one for programme leaders which includes details of student numbers broken down by factors such as gender, disability, overseas status and BME status; trends in progression between years; marks compared to module averages and previous years; student survey data; and planning of programme leaders’ actions in response to the data. At East London there are dashboards for individual student profiles which show attendance, grades and other data, and separate dashboards which aggregate the data for modules and schools.

Not all the examples of use which emerge from the interviews relate to monitoring engagement or retention rates, or visualising corporate data. One interesting system at Edinburgh was developed initially by students to help them navigate through the many courses they can choose from during their studies. The system shows possible pathways and enables reviews and ratings of courses by students. Unlike some tools in the US it does not yet use the students’ own profiles and performance data to suggest pathways based on their likely success.

The emphasis at Loughborough and Lancaster is around giving tutors better systems to support students and providing all the data they might need when talking to a student, using it as the basis for a conversation. Bridgwater also uses the ProMonitor student portal to prompt discussions between tutors and students. Loughborough has taken this to a sophisticated level with their Co-Tutor system which records tutor-student interactions and provides workflow around them. Meanwhile The Open University has a dashboard for its student support teams showing student activity in the VLE relative to their peers which can prompt them to intervene if activity is low.

In some cases interventions are automated, and emails are sent to students or staff. Often messages to students are run past a tutor and can be rejected or adapted based on the tutor’s knowledge of the learner’s individual circumstances. At Derby, letters are sent to students who are absent; their tone increases in severity as the absence continues. Meanwhile The Open University has found that non-submission of the first assignment on a module is an indicator of risk, so this is used to trigger an intervention if required.
Outcomes

Most interviewees are reluctant to claim any significant outcomes from their learning analytics activities to date – again perhaps demonstrating that it is still early days for the technologies and processes. Several of the participants mention the strong correlation they have found between attendance and achievement. At Manchester Metropolitan it was found that students who submit assignments at the last minute or who have a high proportion of off-campus night time activity are more likely to fail.

Oxford Brookes finds that their dashboards have helped to identify issues with BME achievement on particular courses. Derby has used analytics to dissect attainment across its student population in order to throw a spotlight on areas where it can target interventions. It can evidence impact on BME as well as overall student attainment. Both East London and Bedfordshire report that anecdotally student attendance seems to have increased, perhaps because students know that their presence is being monitored. Encouragingly, at Nottingham Trent the interventions taken by tutors as a result of the analytics are almost always followed by an improvement in engagement. In addition some of the tutors there present the individual student dashboards to the whole tutorial group to prompt discussions about progress – and this is reportedly motivational to the students.

Several interviewees have found that a significant outcome of the analytics work has been improved connections between disparate parts of their organisations. Some, such as Loughborough and Activate Learning, also mention the sense of ownership that staff feel over the tools or the positive reception they have received, and how important this has been in their adoption.

Future plans

Improving the presentation of dashboards is mentioned by some institutions as a priority area for the future. Integrating new data sources is also seen as important. The problems of obtaining data from cloud-based or externally hosted systems such as Google Apps are mentioned by some participants. At East London there are plans to view data from e-book software present on the Samsung tablets being provided to all students. This will show information such as what students are reading, how long they are reading for and the notes they are taking.

There is a strong desire to put tools in the hands of students so they can better monitor their own behaviours and performance. Loughborough considers that student-facing functionality needs to be developed sensitively, though. Is it demotivating to know that you are below average, for example? However for some institutions who have purchased a limited set of licences for a particular product there are financial barriers to rolling it out further to other groups of staff, let alone to all students.

Engagement with the community

All interviewees expressed an interest in working with other institutions to develop their expertise in learning analytics. Many were already doing so; some are involved in networks such as the QlikView user group or the Society for Learning Analytics Research (SoLAR). Lancaster thought that it would be helpful for the community to develop a data schema for learning analytics, particularly for learners who move institutions. Other areas of
interest included sharing expertise in advanced analytics dashboards, metrics, ethics and legal issues, benchmarks and recipes for successful interventions and workflows.

**Acknowledgement**

Jisc is grateful to the institutions and the individuals who were prepared to give up their time to be interviewed and help inform the sector about their many interesting and varied activities in the rapidly developing field of learning analytics. These are some of the pioneers who are laying the foundations for a future which promises increasingly sophisticated analyses of multiple data sources, resulting in potential improvements to many aspects of students’ experience and their chances of academic success.
1: Learning analytics at Activate Learning

An interview with James Clay, 1 October 2014

Activate Learning is an Oxford-based education group which brings together secondary schools, further and higher education, training, consultancy and commercial enterprise. Enhancing the quality of student achievement is the main aim of learning analytics activity at Activate Learning. A second objective is to improve retention and to understand why students fail to succeed so that this information can be provided to Ofsted and so that improvements can be made. A further aim of the analytics work is to ensure that managers are running their programmes and managing their staff effectively.

When IBM talked to Activate Learning about the IBM Student Experience Programme that was the catalyst for the institution to start looking at how it could use analytics to improve the learner experience. They started off by looking at the full picture of organisational activity but cut it down to something more affordable and manageable.

The institution had the data it required but historically it had been difficult to navigate and there was inconsistency across curriculum areas. Once the data had been collected and put in front of people, the next stage was to develop some analytics to prompt interventions.
Where are analytics located in the institution?

The vision came from the Chief Executive and the programme is sponsored by the Deputy Chief Executive. There are four or five business-focussed systems staff working part-time on the reports and two or three technical staff. Support and configuration of the portal system where the analytics are presented have been outsourced; this has proved to be easier and cheaper than doing them in-house.

How is the institution dealing with any legal or ethical issues?

There have been a few minor concerns from staff such as “I already know which of my students are at risk – why do I need a system to tell me?” However they have been reassured that the aim is to provide additional information that might be helpful to them. Analysis of staff activity is likely to be more controversial. A code of practice for ethics and legal issues is not of great interest for Activate Learning which has covered the main issues around data protection and ethics already through its existing policies. Meanwhile the system is secure and only available internally.

What data is being collected?

Data comes solely from the student information system, normally referred to in further education as a Management Information System (MIS). Activate Learning is using Civica Resource Education Management System as their MIS. They will be building in data from ProMonitor which contains the student markbook; longer term they also wish to use data from the Heritage library system and card access data. There is also an intention to integrate the finance and HR systems. The VLE (Moodle) is fairly underutilised at the moment so capturing data from that is not critical. It is being replaced with Google Classroom and Canvas so data capture from these systems will be integrated at a later date.

What analytics systems are being used?

IBM Cognos and Websphere are being used, and ProMonitor, a standard package in further education for managing workflow around learner activity and support, is plugged in.

What tools and dashboards are available?

The default home page for internet users at Activate Learning is the place staff go for news, announcements and their college calendar. It now contains a dashboard with key data that users need to carry out their work. There are reports on attendance by week, and dashboards for retention, achievement, success and English & Maths. Users can set their own preferences to view the data at the level of a whole college down to subject area, course or individual learner. The permissions structure enables everyone to have a personalised portal experience, viewing only the data appropriate to them.
A soft launch was carried out with managers which identified various issues with the interface. The launch was delayed due to various technical issues and they have learned that you should be very clear about technical requirements. The dashboard was set up for Windows 7 and Internet Explorer, but during the two years that the project was undertaken, many users obtained iPads or started using Chrome. It has now been adapted for the Chrome and Mobile Safari browsers.

**What interventions are taken as a result of the analytics?**

No automated interventions are planned but the tools will be used by staff to identify at risk students who require assistance.

**Are there any outcomes to date?**

It is too early to say as this is the first full year of operation but there is an expectation of improvements in retention and achievement. The system has been very positively received by staff, though there is still work to be done on improving data visualisations. The data itself needs to be accurate and having to provide it for analytics has been a driver for cleaning it up.

**What are the future plans?**

With the Further Education Learning Technology Action Group (FELTAG) suggesting that colleges should offer between 10 and 15% of their teaching online, there is a requirement to increase online learning and obtain better data about its use. A student-facing dashboard would be useful too.

There is a plan to integrate data from other systems such as assignment submission data; James feels that the more they know about a student the more likely the institution is to be able to identify problems and intervene early enough to make a difference. Google Apps are used for teaching but getting hold of data from there and other systems in the cloud is difficult. Meanwhile, the colleges may move to a new cloud-based VLE so it would be important to be able to obtain analytics from that too.

Lots of data is being accumulated and presented but there is still a lack of understanding about what to do with it. It is important to get processes automated and to add workflow around the interventions. That needs to be managed carefully e.g. a student hasn’t been attending so needs to be phoned up. How does the institution ensure that the phone call takes place? Where is the information resulting from the call recorded?

**Engagement with the community**

James believes that recipes for successful interventions, workflows and strategies for analytics are key and is keen to engage with the community around those.
The main driver for learning analytics at the University of Bedfordshire is to improve the student experience. A particular challenge for the institution is retention, and student engagement monitoring is helping to identify at risk students. Collecting attendance data for international students is a requirement of UK Visas and Immigration but is also proving useful for domestic students.

The University developed an ICT project for tracking student engagement in their studies five years ago. It enables the identification of student engagement patterns, presenting them to student engagement monitors and academic tutors with a traffic light system. Two Jisc projects further developed the institution’s thinking in the area. The first project around business intelligence contributed to the improvement of the system’s analytical capability. Following on from this, the Strategic ICT for Managing Student Engagement (SIMSE) project applied the Jisc Strategic ICT Toolkit to the solution and helped increase awareness across the institution of the potential for “big data” and learning analytics.

Where are analytics located in the institution?

The development of learning analytics is now being driven centrally by the University’s senior management. The Deputy Vice Chancellor Academic is especially keen to utilise analytics to better understand the student experience. There is a plan to develop a strategy delivering Business Intelligence (BI) across the University that will incorporate various types of analytics. A Student Engagement Management Project is being funded centrally, with IT and Academic Registry playing the major role in its implementation.
How is the institution dealing with any legal or ethical issues?

No particular issues have arisen. In the SIMSE project the research team asked a student focus group whether they had concerns about the data collection on their activities. They accepted the gathering and use of the data as long as it was aimed at enhancing teaching and the student experience. Monitoring staff activity is of course increasingly possible but would be controversial.

What data is being collected?

Data sources include library visits, library use (items borrowed), class attendance and campus presence (through radio-frequency identification (RFID) device in student ID cards), use of the student information helpdesk (SiD), virtual learning environment use (Blackboard), logins to the network (Novell), e-Vision use (student personal information and exam results), assignment submissions, meeting attendance and exam attendance.

What analytics systems are being used?

An Oracle data warehouse and interactive business intelligence software are used. A third party software house developed the student engagement dashboard by working with the University registry and ICT department.

What tools and dashboards are available?

The dashboard shows levels of engagement by students with metrics including Library activities, handing in of assignments, Novell logins, e-Vision logins, class and campus attendance, meeting attendance, and visits to Blackboard Learn. While the algorithm to calculate engagement is fairly sophisticated it has room for further enhancements. For instance there is no differentiation in the campus attendance metric between a student who attends briefly and one who is present all day.

There are default weightings which make up the engagement indicator. These were developed through widespread discussion. It is possible however for an end user to prioritise the importance of different types of engagement by modifying the weightings. Thus a course which uses Blackboard extensively can increase the importance of Blackboard usage in the engagement metric. Similarly attending face-to-face classes at the campus would be relatively less important for nursing students who are expected to be in work placements for much of the time.

Users are also able to pick and mix different engagement data types captured by the system to generate an overall engagement indicator with their defined data types, data decay rates and weightings.

A benchmarking bar chart allows comparisons on engagement between individual students and the course cohort. The dashboard tool can present the students who are deemed to be at risk based on the levels of engagement. System users can modify the threshold level of the minimum engagement for the system to flag up the students at risk automatically. The dashboard is aimed primarily at student engagement monitors who use it to bring students they are concerned about to the attention of tutors.
What interventions are taken as a result of the analytics?

The analytics system is a highly valuable and flexible tool for monitoring the engagement patterns of individual students over a period of time or making group comparisons and benchmarking reports. The system has the functionality to automatically generate alerts to student engagement monitors who can initiate early intervention through the students’ personal tutors. The analytics enable staff to be proactive and offer learners any support they need at the earliest stage of their study, helping them to re-engage, progress throughout the levels and essentially fulfil their academic goals.

Are there any outcomes to date?

It is difficult so far to be sure that retention has increased because of the use of analytics due to the range of factors involved. However, there is some evidence that attendance at the University and in the Library has increased, anecdotally because students know that their presence is being monitored.
What are the future plans?

The dashboard is fairly basic and still not very easy to use; initially it was very slow due to the huge amount of data being processed but it has improved. A more user-friendly interface is still required. The University is trying to standardise reporting tools for projects using Oracle, Excel, SharePoint and Report Builder. The metrics seem to be adequate for the time being. Academic staff and students have expressed an interest in accessing the data too. However, to roll it out to further users would be expensive as there are currently only a relatively small number of licences purchased for the software. Academic staff can access the student engagement data and report via student engagement monitors.

The challenge is how to exploit the “big data” that is being accumulated in the warehouse. Though Yanqing feels a lot could be done with it there are cost implications and insufficient expertise at the institution. It would be useful to integrate student engagement data with other student information systems, such as the student information system (SITS), to develop better predictive modelling. Relating engagement data to historic data sources would enable new students in particular to be supported better in their initial months at the University. While there has been considerable work done on engagement monitoring there is also potential for improving teaching effectiveness using analytics.

There is a clear need for greater senior executive engagement with BI and analytics, and a concerted effort to have an inclusive high level strategy to draw all the existing projects and strands together. The University’s new BI project will aim to achieve these and turn the extensive amounts of data held within its systems into key management information for all managers and staff within the University.

Engagement with the community

Bedfordshire has had significant engagement in the sector through its Jisc projects and is keen to share experiences and work with other institutions in the future. Informative reports of the projects with further detail are available:

Supporting institutional decision making with an intelligent student engagement tracking system
http://repository.jisc.ac.uk/5125/1/Bedford.pdf

Strategic ICT for Managing Student Engagement (SIMSE) project
https://jiscinfonetcasestudies.pbworks.com/w/page/68194223/Transformations%20University%20of%20Bedfordshire
3: Learning analytics at Bridgwater College

An interview with Chris Ashman, 17 September 2014

Bridgwater College, designated an Outstanding College by Ofsted, has a number of centres across Somerset. The College aims to ensure that every learner has the best possible opportunity to be successful and to gain a qualification. The College has a framework called the Bridgwater College Advantage and uses a holistic approach to build personal attributes such as employability, communications and confidence – as well as success in qualifications.

Bridgwater College uses the national dataset at Level 3 called “Level 3 Value Added” which is comprised of data from awarding organisations such as Edexcel and OCR. It tracks the student from the ages of 16 to 18, from their attainment at level 2 to that at level 3 (including A level and most vocational qualifications). This is used to indicate whether the students are achieving better or lower than the national average. Indicators are provided e.g. “If you arrive with C grades at GCSE most people like you achieved …. in this level 3 qualification”.

The level 3 Value Added data is an important measure as the catchment area for a college influences the students’ performance. So for example a college with a high flying intake would expect these students to gain higher grade qualifications. Therefore comparing two or more colleges with different intakes may be inappropriate. Ofsted has realised though that overall success rates can be influenced by how colleges set up their curricula e.g. if lots of short courses are provided, with very high success rates, this can improve the overall success rate for the college. The emphasis now includes “value added” and progression data as well as success rates.

The main driver here is for Bridgwater College to support its students to do better than the national average for similar intakes of students. In addition to the national dataset they have developed their own system (Bridgwater College Value Added). This creates an individual’s profile which is developed looking at their prior attainment, their attendance records, their aspirations and other factors such as whether they are a carer. Some students were not...
great attenders at school or are from economically disadvantaged backgrounds, so the College works out what approaches may work best to support positive behaviours and attitudes to learning in order for them to do well.

Where are analytics located in the institution?

A tutorial programme is the main focus for activity here. 16-18 year olds are in tutor groups and follow a programme which encourages them to think about what they are going to do next in their careers. A lot of time and effort is put into developing the tutors, checking that they are grading the students promptly and that their learners are progressing.

How is the institution dealing with any legal or ethical issues?

There is a staff training programme that raises awareness about data protection, and guidelines around what information to collect during the enrolment process. For Chris it is a priority for staff to take care with what they are noting about students. The Equality Act’s nine protected characteristics are starting to be used to collect anonymised information to compare outcomes through success rates. Most students are happy to give this information.

What data is being collected?

The national data is received in November for the previous academic year’s cohort. That is then used to inform discussions with the current students as well as to inform self-assessment judgements for the College performance.

Within the enrolment process, administrators input data such as GCSE results, socio-economic group and working status, manually for individual students into the ProMonitor system. This then informs the Individual Learning Plan (ILP), to which tutors add comments. In addition to tutors, staff from the support services, estates and security can add notes too to the ILP.

A markbook in ProMonitor allows teachers to post their assignment schedule, log when students have handed in their work and what the grade is. This is then sent to the ILP. The markbook system has begun to be used but is not fully deployed across the College as yet.

What analytics systems are being used?

The ProMonitor is used for generating the ILPs and a suite of software from Compass is used including ProSolution and ProAchieve for the collection and viewing of national comparator data.
What tools and dashboards are available?

ProMonitor has portals for students, parents and employers. Only the student portal is currently used at Bridgwater College and it is mainly deployed when tutors meet with the student. The data is also available to managers so they can view outcomes against national comparators. ProSolution produces in-year performance reports on attendance and retention at the level of individuals, programmes and college.

Metrics include progression rates, success rates, destinations (e.g. university or employment), and where the College sits against national Level 3 value added data. There is also information gathered from student surveys some of which e.g. satisfaction rates, can be benchmarked against external data.

ProMonitor is used for generating the ILPs and a suite of software from Compass is used including ProSolution and ProAchieve for the collection and viewing of national comparator data.

What interventions are taken as a result of the analytics?

An Individual Learning Plan (ILP) with targets is developed using the ILP system. This takes into account circumstance and context which might be thought to put the student at a disadvantage in their learning and attainment. The information is available to the tutor when they are discussing progress against targets and suggested actions with the student. If a serious problem is apparent regarding for example mental health or homelessness the student can be referred to a Senior Tutor.

If attendance is poor or a deadline has been missed, emails or letters can be generated and sent to the student and/or their parent. There is also a practice where parents and students receive a letter or email when the student submits a good assignment. There is no automatic connection between this system and the ILP as yet so data would have to be entered manually in the ILP by the tutor.

Are there any outcomes to date?

The toolkit in place seems to be working but it is early days and staff will be developing it and tweaking it over the coming year. The College is still trying to make the tools produce the output that is required and is not yet totally content with how the system is being used. The addition of Level 1 and 2 national value added data will be helpful.

What are the future plans?

The aim is to provide useful information to staff and students but not to “create a beast that needs feeding” by putting too much emphasis on data collection. The issues now are more around how people are using the tools, professional sensitivities about what they write, and trying to ensure that the processes are not seen as entirely automated. One danger is that a student will hear a message that then determines their final grade. This should be an indicator to inform their ILP – not a prediction; this subtly changes the thinking of both student and tutor.
Engagement with the community

Bridgwater College works within FE and HE regional quality networks to share good practice and in addition engages with European partners through Erasmus+ and a long term link with the HINDS Community College, Mississippi, USA. Bridgwater College would welcome engagement related to practices regarding ethics and legal issues.
The University of Derby has a broad spectrum of backgrounds across its 22,000 students, with less than half coming straight from school, a significant proportion from BME backgrounds, many “first in family” students, and others with caring responsibilities or disabilities. Drivers for learning analytics at the University include developing an excellent student experience by better understanding learners and their diverse needs.

While retention is no longer as much of a concern as it was several years ago, maintaining current retention levels and understanding how to improve them further is important. Derby’s philosophy is that the right outcome should be achieved for each student – not retention at any cost. However, alongside work on the student experience, indicators are being developed around students at risk, developing an understanding of trends at an aggregate level.

In 2010-11 learning analytics was gaining profile, and a timely Jisc project, Student Experience Traffic Lighting (SETL), was started at Derby. This built on an earlier project called Development and Review of Business Interfaces (DERBI) which used service design approaches to enhance service delivery and processes supporting the student transition into higher education. The changes proposed by DERBI led to significant increases in student satisfaction and other metrics.

The aim of SETL was to develop a better understanding of the student perspective, and what was important to learners. There was particular interest in their extra-curricular activities and issues such as whether they were happy with their accommodation. Meanwhile there was an attempt to understand engagement better – what happens for example with those students who sit quietly at the back of the class and who fade away? SETL was a scoping project which developed a holistic vision of what learning analytics could look like at Derby. Some areas proposed such as bringing swipe card data from the Library into an engagement indicator could be relatively easy to achieve.

What is required now however is a more sophisticated understanding of learning, for example ascertaining not only whether students are submitting coursework (via Turnitin) but also if they are receiving adequate feedback on their assignments and, even more crucially, whether they are acting on that feedback. Both projects also laid the
A list of 29 metrics was identified from SETL for monitoring student engagement including attendance and interaction in tutorials and seminars, grade profiles, performance in formative assessments, access to resources in the virtual learning environment, entry qualifications and background, and outside commitments such as childcare, age profile and part-time/full-time status.

There is also a need to be able to answer key business questions for all aspects of the University’s operations. This requires understanding, preparing and warehousing the data from multiple systems. Meanwhile, Jean Mutton, who takes a service design approach to the student experience, was working closely with the statistics team to analyse data on BME student retention and attainment. This resulted in a recipe book for academic staff to help improve inclusivity, with an attempt to get everyone to a level playing field. This appears to be bearing fruit: ‘good honours’ results have increased overall in the institution, those of BME students disproportionately. Analytics have enabled the identification of parts of the University which had particular issues with BME students – and then closer working with those. There were also areas of higher BME achievement where good practice could be identified and disseminated. The overall result was to make decision making on supporting BME students more evidence based.

Where are analytics located in the institution?

Learning analytics can of course cover many areas including engagement, assessment and retention. At present there is no single strategy for learning analytics or senior executive responsible for it; instead it is dispersed across various parts of the institution although they are working toward a more coherent approach. The Deputy Vice Chancellor is one of the main drivers of improved analytics. He holds programme “health checks” every year with schools and has in front of him data on the previous academic year such as attainment figures, cut by disability, BME status and other metrics. The Registrar and University Secretary chairs the board which discusses the business intelligence project, PeopleSoft, data warehouse and enrolment activities. There is also a Student Experience Strategy Group, chaired by a dean, which has representation from around the institution, oversees any activity affecting the student experience, and has a keen interest in analytics.

Others around the institution are carrying out analytics work but not necessarily calling it that. Many academics analyse the data on their students within their areas, for example. Discussions are taking place as to how to bring the analytics projects and activities closer together – analytics combined with a service design approach is helping staff to break through silos and look at experience from a user perspective.

How is the institution dealing with any legal or ethical issues?

No particular student concerns have been raised about learning analytics and there is as yet no overall policy in this area. However, the research ethics committee has looked into what students are signing up to and what the data is being used for referred on a project by project basis. The University’s Data Protection Officer has also informed developments. The aim is to protect students as well as staff. Meanwhile students are involved in much
of the project work, and there is a very good relationship with the students union, who are invited to sit on all project steering groups. One conclusion drawn was that notes on students taken by staff should be shareable with the student – this is helpful in the case of complaints. Another recommendation is that staff should ensure that their notes are written in a way which is appropriate for sharing with others, including the student.

There was some concern expressed by academic staff around attendance monitoring when it was first introduced in 2007. They did not want it to be completely automated so steps were put into the process to allow staff to contextualise the data and adapt any suggested interventions accordingly. They might for example know that a student has a particular problem at home which is preventing them from completing an assignment – so an automated reminder to the student might be inappropriate. Similarly, while predictive analytics is of considerable interest, it could be detrimental to students’ well-being and chances of success if they are presented with data showing that they are more likely to drop out or not achieve their full potential than a student with a different profile of protected characteristics.

What data is being collected?

The student information system (PeopleSoft) is the primary data source for analytics. Blackboard Learn provides the data for the Blackboard Analytics for Learn module. Other potential data sources include Turnitin, Talis and other library systems.

Attendance data has been collected for a number of years at Derby, and swipe cards are being introduced for payment and access to rooms. This should also help with attendance monitoring – at present a bar code reader is handed around by the lecturer and the students swipe their cards with it. New proximity cards will pick up the students’ presence as they walk into the room.

The business intelligence project has spent time agreeing data definitions and tidying up the data in general – it is not so concerned with producing “shiny” dashboards at this stage. A new project is also developing a better understanding of the end to end flow of data around the student record journey. The student information system, PeopleSoft, included a lot of customisation. Business requirements changed – it was originally built around the needs of full-time students for example - and there was a need to go back to basics with it. Because the market is changing constantly the approach now is to base developments around the needs of users rather than simply deploy what the software provides.

What analytics systems are being used?

Blackboard Analytics for Learn is being piloted at the moment for distance students by Derby Online. Cognos is used as the main business intelligence system. The University looked at QlikView but felt that building a data warehouse-based system would give them more options in the future. A warehouse is therefore being developed and the student record data, held primarily in PeopleSoft, is being stored there.

What tools and dashboards are available?

One bespoke dashboard that has been developed presents attendance data from the student information system to academic staff, displaying where the students have recorded themselves as absent, where they have a
support plan in place and where they have requested extensions. The data is displayed in the dashboard directly from PeopleSoft and does not use Cognos or go through the data warehouse. PeopleSoft's usability was not found to be ideal so the dashboard has improved access to the data.

Business intelligence dashboards are also being scoped for areas such as admissions, enrolment, assessment, graduation and drop-out rates. The results can be broken down in various ways such as by module, class and programme. The institutional and sector National Student Survey data is also viewable and there is an intention to add other datasets, including possibly the Higher Education Information Dataset for Institutions.

The Career Hub system takes data from the student information system and can accept notes from careers advisors. The intention is to put this back into the student information system in the future.

It is not yet clear whether the tools Derby has are adequate. There is a need for a common front end on all the data. One issue is that Cognos licences are only purchased for a relatively small number of staff – providing them for all who potentially need analytics could be costly.

What interventions are taken as a result of the analytics?

There are triggers in the attendance monitoring system – letters are sent to students who are absent. The tone of the letters increases in severity as absence continues.

A better understanding and ability to interrogate key data metrics has enhanced the direction and impact of several pieces of ongoing work such as the Transition and First Year Experience project and the Student Attainment project.

Are there any outcomes to date?

With seven years of data there is now evidence of a correlation between attendance notifications, retention and attainment. Meanwhile the changes made as a result of analytics have resulted in an increase in BME and overall student attainment.

One of the most significant outcomes of the DERBI and SETL projects has been a change in the mind-set of those involved across the University, moving beyond silos and thinking more from the user’s perspective.

What are the future plans?

There is a desire to carry out more work on student tracking; a more sophisticated business intelligence system should be able to facilitate this. The University would like to know how many students dropped out in year one, how many continued and how many got particular grades – drilling down through bio-demographic data to information on assessment and retention in order to better correlate aspects of engagement with achievement. There is also interest in a student-facing dashboard so that students can gain an understanding of their own level of progress.
Engagement with the community

Derby is very interested in collaborating with Jisc and other institutions around learning analytics, and has already worked closely with various universities who are developing their own expertise.
The University of East London (UEL), like many other institutions, has an issue with retention and sees the potential of learning analytics to increase the number of students who complete their qualifications as well as improve attainment. Many students are from widening participation backgrounds and many do not have English as a first language. The University is using analytics to develop a better understanding of how UEL students learn and how they juggle different activities such as work, study and childcare.

Three years ago UEL began a pilot around attendance monitoring on the basis that participation is a key factor in retention. There is some evidence too that students not attending can be disruptive to those who want to learn.

The Higher Education Funding Council for England (HEFCE) requires institutions to monitor student attendance. Meanwhile UK Visas and Immigration expects universities to be able to show concrete evidence that international students are present, and not able to carry out paid work for more than twenty hours per week.

In order to meet the requirements of the external agencies to monitor attendance and to build up a better picture of participation the University has put in place an automated attendance system - students are required to swipe a card on entry to every lecture, seminar, workshop and practical session.
Where are analytics located in the institution?

The new PVC for Learning, Teaching and Student Engagement has a major interest in learning analytics. Responsibility for driving forward activity has tended to be split and fragmented across the university; to date most of the development work has been driven from Corporate Information Systems within IT. Gary Tindell, whose previous role was Retention Manager, sits in this unit. Having analytics driven by people with a business perspective, sitting within IT, means that innovation can take place quickly and effectively with a minimum of bureaucracy.

How is the institution dealing with any legal or ethical issues?

Students have not objected to the swipe cards and understand why they are required. There were objections to the policy of removing students from their courses when their attendance falls below the threshold but not to the data collection itself.

Monitoring of e-book usage may be more of an issue, and analysing staff metrics would also certainly be controversial. However the analytics work is primarily aimed at improving the student experience. Previous attainment or previous educational institution can be influential of course in retention and student success. There are also significant differences between ethnic groups. There are twice yearly reports to the Equality & Diversity committee on degree classes broken down by ethnicity and this has highlighted the significant differences in attainment across different groups. Although policies are in place to close this attainment gap, these differences are relatively stubborn and may be the result of other correlational factors such as subject choice. The use of such data to identify at risk students is controversial and it is not currently being taken into account, though equality and diversity policies may change this.

What data is being collected?

Attendance records from the swipe cards are fed into a data warehouse together with data from several other systems:

- The student information system (SITS:Vision) - module performance data and student characteristics such as age and gender
- Activity data from the virtual learning environment (Moodle)
- Library activity (Athens)
- Physical library loans report
- Coursework receipt activity
- Free books downloading activity
What analytics systems are being used?

Swipe card data is held in an SQL Server data warehouse. Other student information is transferred to an Oracle data warehouse. UEL deploys a business intelligence tool, QlikView, to analyse the data in these systems. This tool requires customisation for the institution's requirements however pre-configured dashboards for education are available from BME Solutions. UEL has found QlikView straightforward and cost-effective.

What tools and dashboards are available?

The University's management information capability has been developing consistently over the last fifteen or so years, with performance on a range of indicators able to be monitored at institutional, programme, course and other levels.

Information available from QlikView includes:

- A student profile page, showing percentage attendance, grades and other characteristics
- A report showing Moodle activity per student over a week
- Ability to view data by schools and modules as well as individuals, with graphs showing a clear correlation between attendance and module mark

What interventions are taken as a result of the analytics?

There is a policy of a minimum of 75% attendance. Automated emails are sent to students every month showing their attendance. Attendance rates are also placed in the student portal (UEL+) so the students can view them there. Students are given warnings and are ultimately withdrawn from their studies if their attendance does not improve.

The student profile page was used by “learning achievement assistants” who were graduates from the previous year appointed to advise current students. They looked at students’ attendance on everything and contacted them if they were below the threshold. This was done from a report which listed attendance rates and grades for each student.

The work of the learning achievement assistants is now being done by a student retention team of four of five people who are increasingly examining measures of engagement rather than simply attendance.

Are there any outcomes to date?

There is a very high correlation between attendance and module performance – if students are above the threshold they do well. After running for only three semesters however there is not enough data yet to be able to say categorically that retention has increased as a result of the analytics work and the resulting interventions. Anecdotally attendance has gone up and there has been some progress in student performance. Probably another year’s worth of data would be required before definite conclusions can be drawn.
There is some evidence that as physical attendance drops off Moodle usage can go up. Typically, this trade-off occurs at the end of the semester when students are preparing to submit coursework and revising using coursework materials stored on Moodle. This shows how module design is a critical factor to be taken into account when carrying out learning analytics – physical attendance may not be so critical to retention if students are highly engaged online.

One interesting outcome from UEL’s analytics activities has been a debate on how to improve timetabling; the data has supported anecdotal evidence from staff that timetabling could be enhanced.

What are the future plans?

QlikView itself is evolving rapidly and the UEL dashboards will continue to be developed. The next phase is to build helpdesk software which records meetings and interactions between students and tutors. That will be done using the Moodle gradebook, held in the Moodle MySQL database and viewed from QlikView.

One aim is to develop a decision-making application using flags to simplify the identification of students at risk of dropping out. For each student there is a range of variables such as attendance, Moodle participation and coursework grades – the value of this data needs to be fully understood and utilised in supporting students. A more sophisticated understanding of the relative importance of different engagement events needs to be developed.

All UEL students are now receiving a Samsung tablet from the University. John Smith’s provides the e-book software which will provide the institution with data about what they are looking at, the notes they have taken and other usage data. Students will be made aware of this during the enrolment process.

Engagement with the community

UEL has already done 34 presentations to external audiences, visited various sites and liaised extensively with the many other institutions using QlikView in the UK.
6: Learning analytics at the University of Edinburgh

Interviews with Wilma Alexander, Anne-Marie Scott & Mark Wetton, Learning Services and Barry Neilson, Information Systems, 1 September 2014

As a large and complex University, Edinburgh’s approach to learning analytics is diverse but maturing. The institution has been influenced by what it has seen in the US with initiatives such as Purdue’s Course Signals, however, there is not a big problem with retention at Edinburgh. Instead the primary aim is to provide better feedback for all students, and to present it in a visually helpful way. There is also an intention to develop better understanding of problems with learning content and to help inform course design.

Meanwhile because Edinburgh is such a distributed institution it can be difficult for students to find information or to access it in a consistent way so learning analytics helps to highlight where improvements can be made. In addition, given the high level of non-EU students, there is interest in supporting attendance monitoring required by UK Visas and Immigration. The relevance to Learning Analytics is the belief that this data could prove to be a useful proxy for engagement for all students.

Another priority for Edinburgh which analytics may be able to help with is empowering students to become reflective learners.
Where are analytics located in the institution?

There is currently no University-wide programme for learning analytics however it is emerging in the context of existing programmes around the student experience, feedback and assessment, improvements to NSS scores, and engagement monitoring and compliance. The Learning and Teaching Committee provides some oversight of the VLE project which is looking at learning analytics. There is an intention to set up a VLE analytics steering group.

Meanwhile the institution has invested in seven new chairs in Science and Engineering who are looking at technology-enhanced learning and are taking an interest in analytics. Also a new Chair in Learning Analytics has been established with the intention of developing Edinburgh’s research expertise in the field. The University is particularly well-placed in the area of Massive Online Open Courses (MOOCs) too, which is becoming a focal point for learning analytics.

Some small internal grants allow teaching staff to apply for pump-priming funding. Three projects funded under this scheme relate to learning analytics. Because of the high degree of online learning in Medicine, a colleague is seconded from there to Learning Services to do research on the effectiveness of analytics driven interventions. There is also work to provide students with information on their activity in discussion forums relative to their peers. The intention from these projects is to pull in any interesting research outputs to influence the development of analytics across the institution where appropriate.

In Learning Services it is relatively easy to develop learning analytics due to the data they already have. They are also having conversations with the Library which sits on huge amounts of data.

Having looked extensively at commercial products it has become clear that a blanket approach to analytics would not work in such a diverse institution so Edinburgh is probably looking at a more granular type of analytics, as far as supporting student learning is concerned. For example, on a course where the discussion board is not used the students should not be presented with data about it. The intention is to develop tools that academic staff can deploy as they see fit. Meanwhile there are discussions taking place about to what extent the experience for students across the institution should be consistent; several different virtual learning environments are in use, for example. The questions of how useful learning analytics are going to be for Edinburgh, and whether funding should be spent on developing them rather than other areas, are still being discussed and researched.

How is the institution dealing with any governance issues?

Over-all responsibility for governance and data management within the University rests with the Student and Academic Services Group and the University Court. Information Services work closely with the Student Systems team and are taking steps to ensure there is a standard approach to defining data objects and reporting.

Students are considered key partners and are involved with all the learning analytics developments. There is a good relationship with the Students Association. The Vice President for Academic Affairs has been very active and will be a member of the VLE analytics steering group.

While transparency is a big theme for the institution, learners have not always been aware of the data that is held about them. Students would like to be able to see what staff can view about them.
Staff in general are coming up with concerns here rather than the students, who appear to take a level of monitoring for granted and are perhaps comfortable with benign data gathering. However, if interventions are carried out on the back of that data, particularly when it is aggregated from various systems, they may be more concerned. The intention with the VLE project is to ensure students know they can request intervention and are expected to be pro-active partners in any discussion on progress.

An ethics and data security policy within the context of the virtual learning environment is currently being developed and will be taken to the Learning and Teaching Committee.

While there are various interesting initiatives taking place there is a healthy degree of scepticism and critical analysis taking place around learning analytics at Edinburgh. Some of the larger vendor tools would not be an easy sell to the students, let alone the staff. Some staff do not like the idea of traffic light systems showing at-risk students, for example. There is also some nervousness around assessment results being available in the systems before they have been through exam boards. A whole communication strand around the benefits in order to build trust would be essential.

What data is being collected?

There are multiple data sources which can be used for analytics at Edinburgh. Blackboard Learn and Moodle are the main VLEs being used, and Tribal SITS:Vision is the student information system.

Some courses in Geosciences are piloting a product called Cogbooks to develop their understanding of adaptive learning. There is also a joint project with some Australian universities to pilot a tool for student feedback – UQMarkup - which gathers a lot of data as the student interacts with it. Meanwhile Information Systems is working closely with Humanities and Social Science to gather data about their students into one location in preparation potentially for better analytics. There will probably be a need for a data warehouse later once data such as library records are brought in.

As primarily a face-to-face university, data from the virtual learning environment is not always that useful for analytics. Some of the most important data for analytics however is around assessment, and this is currently held in multiple systems. Work is currently going on to consolidate this in the student record system and to enable real-time access to the data.

The approach in Information Systems is to attempt to think about what personal tutors need to do their jobs better and what does a student need – rather than to be driven by the analytics available.

What analytics systems are being used?

The team in Medicine has carried out bespoke development work for Moodle, putting some tracking code into the system to produce a few reports and a heat map of activity. They are also using Moodle Engagement Analytics and another Moodle plug-in which does social network analysis of forum participation. They have found that these are not adequately student-facing. They would like to be carrying out more graphing and visualisation but haven’t found anything for Moodle that they can pick up easily.
Meanwhile Blackboard users have found the Retention Centre and other tools in Learn limited and ugly, with most not available to students at all. It is hampered by being course-based only, and there are concerns about whether real-time data refresh is possible.

What tools and dashboards are available?

MOOC data is being analysed using Google Analytics, Google Charts, various open visualisation tools and Tableau. QlikView is being used for mining NSS scores and for wider business intelligence purposes, as is SAP business objects. None of the tools are perfect.

A scripted system developed in Physics extracts gradebook information from Blackboard Learn and puts it into a dashboard for personal tutors, colour-coding the marks in the process. A student view of this has been released and usage is being monitored.

Meanwhile some software called PATH, initially developed by two students in their final year in Maths, has now been adopted by Information Services as a corporate system to help students navigate through the sometimes hundreds of courses they can choose from, by listing pre-requisites in a comprehensible way. Ratings such as “72% of 18 students recommended this course” are now incorporated, and reviews can be posted by students after moderation by student representatives. They are also looking at how the reviews and internal course survey data could be presented together – and whether they could open up the system to enquirers.

What interventions are taken as a result of the analytics?

An Individual Learning Plan (ILP) with targets is developed using the ILP system. This takes into account circumstance and context which might be thought to put the student at a disadvantage in their learning and attainment. The information is available to the tutor when they are discussing progress against targets and suggested actions with the student. If a serious problem is apparent regarding for example mental health or homelessness the student can be referred to a Senior Tutor.

If attendance is poor or a deadline has been missed, emails or letter can be generated and sent to the student and/or their parent. There is also a practice where parents and students receive a letter or email when the student submits a good assignment. There is no automatic connection between this system and the ILP as yet so data would have to be entered manually in the ILP by the tutor.

Are there any research outcomes to date?

In Medicine they are looking at possible interventions based on participation in the virtual learning environment; they have found a strong correlation between struggling students and low participation, including date of first login. Again, though, a blanket approach across the University would not be appropriate as other areas use the virtual learning environment much less systematically.
What are the future plans?

Projects in 2014-15 will provide limited student-facing data from the VLEs Blackboard Learn and Moodle, and promote their use as a form of feedback to assist students in reviewing their progress and form a basis of discussion with personal tutors. If this is successful (i.e. welcomed by students and staff as a useful support) Information Services will continue to work with the Student and Academic Services Group to seek ways of “joining up” the data more effectively.

Personal tutoring was introduced two years ago and there is a fairly immature system that supports it. Pebblepad is used a tool to help scaffold the dialogue – analytics could help to inform that.

Engagement with the community

Edinburgh is highly engaged with the sector around learning analytics, participating in SoLAR and the worldwide research community, and sharing with users of QlikView for example.
7: Learning analytics at Lancaster University

An interview with Andrew Meikle and Masud Khokhar, 10 September 2014

Lancaster University’s institutional aspirations include being in the top ten UK universities and the top 100 worldwide. Meanwhile college principals and advisors would like to have better data to help with retention, and alongside this is an aim to enhance teaching quality.

While there is currently no explicit drive from senior levels to develop learning analytics, there is a sense among many staff that analytics could make a difference. One particular innovation in the area is the interactive transcript that shows students their progress. The Provost for Student Experience, Colleges and the Library is very keen to ensure that academic tutors can see the transcripts for whom they are responsible. For the first time staff will have something in front of them inviting a call for action, allowing early intervention with students. It is intended that better awareness by students of their progression will allow them to modify or amplify aspects of their behaviour.

Another potential driver for learning analytics is ensuring that student work is marked in a timely manner – and getting feedback to learners before their next assignment is due. Research is already showing that when students submit their assignments close to the deadline, they are potentially at risk; without feedback on their previous submission the risk of failure is likely to be heightened.

The Library and ISS have been working on a new strategy called Digital Lancaster. The Library want to expose library data more publicly, and have been involved in UK initiatives such as the Library Analytics and Metrics Project (LAMP). Initially the intention was to be able to benchmark library services against the sector. They are now looking at
combining data on student attainment and library usage such as downloads of e-resources and borrowing records. The main development in the Library currently is developing a full API to expose their data to the rest of the University.

There is likely to be an initiative at Lancaster to combine the different analytics activities more holistically soon.

Where are analytics located in the institution?

Analytics activities are located primarily in Information Systems Services (ISS) and the Library. To date the focus on business intelligence has been more around areas such as admissions and places in clearing than about learning or pastoral care.

The innovations unit with ISS works closely with students, and most big projects such as the student portal project have steering groups which include student representatives.

How is the institution dealing with any legal or ethical issues?

The main issues have been around policy rather than ethics or legalities, though Lancaster would be interested in participating in developing a national code of practice for learning analytics. One example of an issue that has arisen is that the interactive transcript only contains “published” marks but a tutor has the potential to see marks that have not yet been confirmed. If that member of staff can take an intervention on the basis of this information it needs to be appropriately flagged.

What data is being collected?

Data is available from Lancaster’s in-house student information system: Lancaster University Student Information (LUSI), including attendance and submission records. The VLE (Moodle) is another source of data but it is not currently feeding into analytics. Library systems include ALMA, Primo, EzProxy, Shibboleth and Aleph Archives. The Library website shows how many PCs are free but they are not currently capturing and recording who was on the PC and for how long so this is a further potential data source (similar data is also presented through the mobile app, iLancaster, for other public PCs across campus). There is also attendance monitoring (which meets UK Visas and Immigration requirements but was not originally implemented for that purpose) using LUSI. Implementation varies between departments. The Management School requires students to use swipe cards when attending lectures and tutorials. Another department passes around a portable reader so that students can swipe their University ID cards.

A further potential source of data for future analytics is records of the apps that students are opening in the labs. Much of the data required for analytics already exists; it is a matter of drawing it together and relating it from different sources to the same student.
What analytics systems are being used?
The main business intelligence tool being used is Tableau. A hand-crafted Microsoft SQL server database is being used as a data warehouse for data transforms on the LUSI data. It has not yet been decided whether to extend this database for learning analytics.

What tools and dashboards are available?
The interactive transcript is available to college tutors and students. An improved visualisation is required for tutors so they can better understand and act on the information presented to them.

Tableau is used for visualising content in the data warehouse, which is currently focussed on admissions data. The intention is to begin to use Tableau more for visualising operational data. Lancaster has found the tool easy to use, easier for example than Excel pivot tables and charts.

The Library is developing a dashboard for Library staff, formed from different Tableau reports. It will show student book borrowing and downloads of e-books, chapters and e-journals, together with reporting of physical attendance.

What interventions are taken as a result of the analytics?
Tutors are able to give better advice to students based on the analytics available in the interactive transcript. No automated interventions are currently implemented.

What are the future plans?
Longer term the consistent capture of marking criteria and marks against individual components of the assessments in the analytics would allow a longitudinal study of student progression and more sophisticated analysis.

The Library intends that “evidence-based librarianship” will influence collection management and ensure that business decisions are more data driven. Meanwhile they are looking at occupancy monitoring so that a student can check how busy the Library is before visiting it.

Engagement with the community
Andrew and Masud felt that a shared learning analytics service for UK institutions would be extremely difficult to achieve given the variety of systems and data structures in use. However, they felt that a data schema for analytics data might be of use, particularly as the ability for students to switch institutions and take their data with them is becoming more important. Lancaster would also be keen to be involved in a community of practice around analytics facilitated by Jisc.
At Loughborough University, the development of analytics to support learning and teaching has been instigated by academics, who need a better and more holistic picture of student engagement; they are short of time and find it difficult to interpret what meaningful engagement means from the wealth of systems and the large amount of data available to them. The main aim of these developments is to provide staff with actionable insights into the student learning experience. However, the students are also becoming a significant driver. They want to have access to more of their own educational data in a meaningful way, preferably in one system.

While the projects around learning analytics fit into the institution’s strategic objectives there is no explicit top down driver at the moment. Senior management’s focus to date has been on business intelligence and the institutional management of learners, as opposed to a focus on analytics around individual students and their learning.

The main focus for developments in learning analytics is a system called Co-Tutor™. Over a period of 15 years this has evolved from an Excel spreadsheet to an enterprise system. During the last year the system has been through a process of commercialisation and Jisc has provided some funding for Loughborough to pilot it with other institutions.

Melanie sees the market for retention and success software comprising two types of products: systems that are designed to deal with large numbers of students and big datasets to predict levels of success (and therefore algorithmically identify struggling students), and “softer” ones which collate and visualise data, tailored for particular staff groups, in order for them to act upon the information provided. Co-Tutor falls into the latter category. Rather than tackling predictive modelling at this stage it is about using technology to nurture and build quality relationships between staff and students. It uses the data as a window into each student’s learning experience, and automated messaging and notifications to escalate issues where appropriate. The software creates dashboards and alerts specifically for different tutoring roles (personal tutors; lecturers; project, placement and research supervisors) and provides an audit trail of their interactions with students. The National Student Survey has an influence here too; learners are increasingly demanding timely feedback on assignments, for example.

A student portal for Co-Tutor is currently under development as well. Recent research by a student intern, looked at...
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what educational data and visualisations are important to students to help inform the roadmap for developments. They also recognised the need for a much more mobile-friendly interface to access their educational data from University systems. There is pressure too from the Students Union to make a mobile app for students available as soon as possible.

Where are analytics located in the institution?
Melanie is Head of the Centre for Engineering and Design Education (CEDE) at Loughborough, where Co-Tutor has been developed. The Academic Lead for CEDE is the Pro-Vice Chancellor for Enterprise, though the PVC Teaching also takes an interest in the area. There is a core team of three people involved in Co-Tutor and expertise is bought in when required from the University’s IT Services.

CEDE works at school level and is not a central unit but it is driving change across the institution; it is in a good place to push for a data governance policy and an analytics strategy, for example. It is also outwards-facing and attempts to build on what is happening elsewhere in the sector.

How is the institution dealing with any legal or ethical issues?
Data protection is a concern and personal tutors are provided with a series of training opportunities by the University’s Centre for Academic Practice. This training explores what information tutors should and should not record, and what they should do with very sensitive and personal information such as a student saying they are struggling to cope after a family bereavement. Staff tag comments when they add them to Co-Tutor in categories such as Pastoral, Feedback, Placement and Research. These are linked to a sophisticated system of staff permissions; if a personal tutor tags a comment as Pastoral for example no other staff can view it except for the Monitor (Senior Tutor) and the department’s Co-Tutor Administrator.

What data is being collected?
Data is brought into Co-Tutor from multiple systems including: the VLE (Moodle); the student information system (a bespoke system); the timetabling system; the security system that holds user photos (Symmetry); attendance monitoring system (Attendant) and an assignment handling system (CASPA). There is no data included as yet from the Library but it is hoped that the reading list system (LORS) and library borrowing records can be connected. An attendance monitoring system has its data fed in manually from printed registers which are sent around the class for students to sign. An early attempt to automate the process using ID cards was unsuccessful as it could take up to 15 minutes to swipe the cards of 150 students at a lecture. Other options are now being investigated. There are also different cultural views of attendance monitoring between departments.

Various projects at the University are building up further data about learners which will be useful in the future. These include linking systems that record the physical and virtual submission of coursework, the automated
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capture of attendance data and feedback, and e-portfolios. Where possible new systems are being set up to log activity using the data structure used by the Experience API (Tin Can xAPI).

Co-Tutor itself also collects a lot of data about staff interactions with students.

What analytics systems are being used?

Co-Tutor is the main system being used. No data warehouse has been deployed as yet.

What tools and dashboards are available?

Co-Tutor is built around an interface for associated tutors (e.g. personal tutors) to view information about their individual tutees, showing basic information about the learner and details of their interactions with the tutors and others. It will also show a visualisation for the percentage of lectures they have attended and grades. There is an activity timeline, similar to the one in Facebook. It might have an entry about a meeting the student had with their module lecturer regarding their coursework, and another stating that they did not turn up for a lecture. Due to staff demand there is now a feature where staff can cc the system when emailing a student so that the message appears in the Co-Tutor timeline. Tutors can also record if they have sent a meeting request to a student and whether a student has missed the meeting, providing evidence if required that they did not show up.
Co-Tutor also provides a dashboard for staff showing who they have not met with or not commented on recently. There is also a history of attendance showing weekly summaries for the students. Assignment information and grades are included and timetable information will soon be presented too. Files can be uploaded to the system if required. There is also a record of any placement or work experience activity with an associated checklist for staff, for example if health and safety forms have been completed and uploaded on time.

No particular metrics are calculated at the moment – this is more a presentation of the raw data. There is an interest in including a metric around online engagement but it has proved hard so far to develop something meaningful from the click data in Moodle.

A dashboard to collate information about a module is being developed further in Co-Tutor, as well as one for programme-level monitoring of cohorts. Dashboard reports include data about staff interactions, showing, for example, when personal tutors have logged in or are meeting with their tutees. It can also be used for the monitoring and management of placement cohorts. The National Student Survey again is driving the requirement to ensure that such interactions take place. Meanwhile both external requirements such as from UK Visas and Immigration, and internal codes of practice such as the minimum number of formal contacts between full-time research students and research degree Supervisor(s) normally being 12 per annum, are driving the use of Co-Tutor which can be used to check that this is happening. The system facilitates the workflow around tutoring and has aspects in common with the customer relationship management systems in use in industry.

What interventions are taken as a result of the analytics?

Designed primarily as a tool to provide better data on students for personal tutors, interventions are initiated and managed in a case-based way, for example prompting tutors to follow up on students who are not attending, with the ability to notify monitors and escalate cases to other senior staff. Workflow management around placement students also allows for interventions by staff where elements of the checklist are missing, for example when a company induction has not taken place within the required time. Data fed from other systems within Co-Tutor also allows interventions to take place, addressing the need to provide timely feedback on assignments.

Are there any outcomes to date?

There has been no research to gain evidence of improvements to student success as yet. However while there has never been a mandate to use Co-Tutor it is used by almost all teaching and administrative staff, including personal tutors. Staff feel a sense of ownership over it, their suggestions are integrated into new versions of the software, and there is no sense that it has been imposed by the institution.

It is anticipated that giving students access to the data will initiate changes and encourage staff to review their own practice e.g. once staff and students regularly use the same “Feedback” area within Co-Tutor, to communicate and record a dialogue around academic feedback, both staff and students will be able to see that their feedback is being acted upon, or not! There is then scope for the personal tutor to see the dialogue and encourage the student to act upon it too. When students then come to complete the National Student Survey they may be more likely to recall the feedback and support they have received.
What are the future plans?

More work will be done on creating actionable insights involving visualisations. It may be useful to provide historic trend data, with comparisons against previous cohorts, as well as comparing students to their own cohort. Student-facing functionality has to be developed sensitively. For example, it may be demotivating to know that you are below average as compared to your module cohort and showing this data may be counterproductive. So the underpinning work needs to be done before this kind of functionality is built in.

Meanwhile, there is an interest in sentiment analysis and discovering whether negative or positive comments in forums could be an indicator of something going wrong (or right) for an individual or across a cohort.

Loughborough is open to co-designing Co-Tutor with the other universities involved and to building in features that the community thinks would be useful. There is a roadmap for future developments but Melanie is not sure that the sector is yet ready for all the possible innovations in learning analytics, including sentiment analysis. Key to successful implementation is embedding the tool within a holistic personal tutoring system, which a piece of software alone cannot achieve. This is driven by evidence of success, and staff feeling that it will make a genuine difference to how they can support students. It needs to be seen in the context of the whole infrastructure for teaching, learning and personal tutoring with associated institutional policies and recommended practices.

Engagement with the community

Loughborough is helping other institutions try out Co-Tutor as part of the Jisc pilot. It is interested in sharing evidence of the learning analytics and interventions happening in the sector and to co-develop an evidence base.
Three main factors drove MMU to invest in their analytics capability. First the University wanted to improve its NSS scores, which were not reflecting initiatives undertaken to improve learning and teaching. The Deputy Vice-Chancellor for the Student Experience was asked to bring about a step-change in student satisfaction. Meanwhile a review of the learning technology platforms was under way and was suggesting areas for improvement. Finally, a Jisc project, Supporting Responsive Curricula was considering how the curriculum could be enhanced to embed employability. Significant areas of the University’s business needed to be changed simultaneously, and a holistic solution reinforced by data-driven continuous improvement was considered to be the best way forward.

Retention and other measures of student success were important but the initial drive was to make a step-change improvement in the student experience, which would be reflected in student satisfaction measures in the NSS.

Various strands of work were put into place under the umbrella of a change programme to Enhance Quality and Assessment for Learning (EQAL). Detailed statistical analysis was carried out on the NSS results, which was triangulated with findings from student focus groups. It was found that course organisation was problematic and timetabling was a concern for many students. MMU identified that step-change improvement would require a refresh of the entire undergraduate curriculum. The first strand of work was concerned with what a better undergraduate curriculum would look like. This required 800 modules to be rewritten in the first year alone.

It was recognised that a curriculum re-write on this scale would need to be supported by smart, technology-enabled processes. The technology strand within EQAL was charged with not only supporting the curriculum refresh but also delivering seamless integration of different student services (timetabling, assessment, library) and providing the data and process support for continuous improvement. This is where learning analytics came in, though it was not called...
that in 2010 when the work started.

Delivering seamless, personalised information to students was the major focus for the first wave of EQAL from 2010 to 2013. The curriculum refresh enabled the creation of new course codes and other course-related tags which could then be used consistently across student records, the VLE and timetabling. This was done to achieve better personalisation for the student, for instance to produce personalised timetables and assessment schedules in Moodle and the student smartphone app, but would also then prove invaluable for analytics. The second wave of the EQAL programme, chaired by the Deputy Vice-Chancellor for Student Success, has a series of projects, three of them relating to analytics.

The first aimed to establish the infrastructure and capability for carrying out analytics. External consultants were engaged to transfer into MMU key skills and expertise around data warehouse design and operation and query and report writing using the Microsoft business intelligence stack.

The second project is a Continuous Monitoring and Improvement (CMI) system. As part of MMU’s day-to-day quality enhancement procedures, programme and module leaders are responsible for creating and tracking “improvement plans”, which have traditionally been paper-based. The CMI project provides Programme and Module Leaders with dashboards and tools to capture and track follow-up actions to support them in developing targeted improvement plans. Having this information available will also be helpful in a forthcoming QAA review.

The third project is around Student Engagement Monitoring (SEM). Students’ assessment submissions and Moodle usage have been gathered since EQAL started but a central source of attendance data was not available. A system of self-registration is being established using a simple form and mobile devices. This is particularly helpful for monitoring the attendance of overseas students for the UK Visas and Immigration. The University is partnering with the smartphone software provider CampusM to develop the idea of self-registration to include in-class voting. After signing in students can then participate in the interactive content of the class to provide an incentive to register.

Where are analytics located in the institution?

The DVC Student Success has overall responsibility. Design of learning analytics dashboards reports has been a partnership between the institution’s Strategic Planning, Quality and Learning and Research Technology departments, informed by focus groups with Programme and Module Leaders. Creation of the data warehouse, dashboard and reports has been the responsibility of Mark Stubbs’ Learning and Research Technologies department, which leads developments across student records, learning systems and innovation. There are four or five technical staff in Mark’s team who put more than half of their time into analytics, mainly dealing with the warehouse and associated reports. Another two people in the Quality department put more than half of their time into embedding analytics in continuous improvement processes and practice. There is a similar number in the Learning and Teaching unit who have, among other tasks, been developing help and advice for each tab in the system. The IT department provides day-to-day administration of the Microsoft analytics server infrastructure.
How is the institution dealing with any legal or ethical issues?

The students’ union is on the advisory board for areas such as student engagement monitoring. As very little of the data is currently exposed to students no major concerns have been voiced. The University plans to spend a year understanding the data itself before presenting anything to students and will be discussing its approach with student representatives.

There was close liaison with the Legal unit in the development of the student satisfaction survey so both staff and students knew what could be done with their comments. There is an intention to review the wording of the resulting agreement.

There was a general feeling among staff that EQAL might be about staff reduction. However this was not the intention – its purpose was to improve NSS scores and the fears have been allayed.

What data is being collected?

Data sources include the Moodle log files, the student information system (Unit4 Agresso Students), coursework receipting (a separate, in-house system), and the internal student satisfaction survey (also a separate, in-house system). Attendance monitoring (initially using self-registration software from Scientia Timetabling, and later the CampusM smartphone app) and financial information will eventually be brought in.

Because of the curriculum refresh, tags are used to assemble resources around the learner. It is a major achievement to have rewrittten every single undergraduate module and have the data perfectly lined up in student records, the VLE and timetabling, all with consistent identifiers.

The process of integrating the data across systems has helped to clean up the dataset – with staff required to add the correct subject code, for example.

What analytics systems are being used?

Data is brought into the (SQL Server Data Services) data warehouse using SQL Server Integration Services (SSIS). Datasets are joined in OLAP cubes (SSAS) and surfaced using SQL Server Reports (SSRS). The team acquired expertise in the various technologies with the help of consultants. Custom SQL Server reports have been written to produce the dashboards, which are presented in SharePoint and embedded in workflows for capturing follow-up actions.

The tools are sufficient for MMU’s requirements at the moment. They are about to start running ad-hoc query pattern recognition software. They are not yet in a position to know whether the Microsoft business intelligence stack can do everything they need. They are going to try to evaluate EQAL using the data they’ve got and ask it questions such as “Did the programme improve student success or was it down to other factors?”
What tools and dashboards are available?

The programme leader dashboard includes various tabs; a module leader’s version with similar metrics is scheduled for release by the end of the year.

**Tabs in the programme leader dashboard at MMU**

- **Students** - running totals for numbers enrolled, withdrawn etc. and visualisation of changes in the cohort in the current year (and compared with faculty average) from last year showing disability, overseas students, gender, whether they live at home, mature students, BME etc. They are refining those based on what staff find useful. All of this is driven from the student information system.

- **Progression** – trends in progression between years and completion overall. A programme at MMU is a group of course titles that make sense to be managed together. The page provides drill-down to the course titles within a programme. A module level equivalent is being developed. A student engagement dashboard currently being worked on that will allow drilling down to individuals.

- **Marks** – these are split by level and include the range of marks (whether markers are using the full range of the marking scheme) and comparisons with the previous year. You can see module averages against meaningful comparators and the previous year, and can click on them and drill down.

- **Satisfaction** – statistical analysis of the NSS-derived key questions that seem to get to the heart of the MMU experience. It was decided to ask those every year in an internal version of the NSS. A single survey was created asking NSS-style closed questions combined with open questions such as “What is the best thing about your course?” Typically 10,000 students respond, posting over 40,000 comments. All are tagged with the module code and sent anonymously to module leaders - available from the satisfaction and comments tabs.

- **Planning** – collate programme leaders’ actions in response to the data. Actions can be specified on any page and are added automatically to the continuous improvement action plan.

What interventions are taken as a result of the analytics?

There will be automated alerts as part of student attendance monitoring using the Scientia monitoring system. E.g. “I see you haven’t attended” – quite a lot of work is going on with students to get the wording right before the first pilot.

Interventions are recorded in the CMI action plan, e.g. changing the timing of an assessment or organising a different format for programme liaison committees so students have more of a say.

At institutional level, data about the performance of programmes informs a Targeted Programme Improvement initiative, which assembles a cross-departmental team to work with programmes that appear to need extra help.
Are there any outcomes to date?

A PhD student looked at usage patterns in old WebCT logs together with demographics and grades. She identified that the balance of activity between general navigation, downloading content, engaging with assessment and forums could produce signatures for different styles of VLE engagement. She also examined access patterns whether on-site, off-site, day or night and found for example that young males tend to leave their work till the last minute and over-estimate their ability to catch up. Students with a high proportion of off-campus, at night activity were also far more likely to fail. These findings have informed data feeds for the engagement monitoring system.

MMU has seen considerable benefits to date from the reorganisation of the curriculum and associated activities – statistics have shown that improvements in organisation have correlated with improvements in overall satisfaction, which increased by 6% in the 2012 NSS and a further 3% in 2013.

What are the future plans?

The University has asked the University of London Computer Centre, which is hosting Moodle for them, to provide usage data including:

- The Moodle tools and content each student has engaged with
- Hits relating to navigation, resources, assessment and discussions
- Access (e.g. on campus, at night)

The University will then pull this into the warehouse - it will be much more useful to them in their own warehouse as it can be tied up with so many other bits of data. They are also trying to obtain click data from various external systems to be brought in the warehouse such as Talis Aspire reading lists. MMU expects to add other data sources to the warehouse over time, e.g. HR and financial data.

Engagement with the community

MMU is keen to share metrics and expertise with the sector, particularly if there are opportunities for benchmarking HESA data with other institutions. MMU has used all the HESA fields and keys in their data warehouse.
Nottingham Trent University has more than 28,000 students, about 45% of whom are from widening participation backgrounds. There is currently a 93% completion rate and 93% employability of those who complete.

One of the key strategic drivers for the institution has been around enhancing the student academic experience. The staff do not have time to engage in extensive interpretation of data around students’ learning and participation; learning analytics aims to present this information to tutors so that they can be as effective as possible.

NTU already has very good strategic information for senior managers with a mature Cognos implementation and a lot of data built up. Improving attainment through earlier intervention is the primary objective. This should reduce the amount of resits, an expensive process for the institution and enhance retention, though graduation rates at NTU are already good.

Another strategic driver has been work on the HERE project with Bournemouth and Bradford Universities which discovered that those who had the greatest propensity to leave were also the most significant doubters about their confidence at being at university – and the least likely to ask for additional help. Tutors were putting effort into assisting those who requested support but often missing those who most needed it. Because of the significant correlation between engagement and success it is possible to alert the tutor when behaviour starts to deviate from what is expected; this is the main concept behind the current learning analytics work at NTU.

In 2013 the project rolled out a tutor dashboard to forty tutors across forty modules involving 5-600 students. The dashboard was piloted against a background of resistance from some quarters but considerable enthusiasm from those using it. Due to the success of the initiative it is now being introduced on all programmes over the whole institution. This has involved dissemination roadshows for staff but does not require training as it is straightforward to use. Importantly for adoption the impact on academic time required to make use of it is minimal.
Where are analytics located in the institution?

The PVC Academic is sponsoring a formal 18-month long project run from Information Services (IS). A steering group comprises representatives from IS, academics, students and DTP Solutions, who are tailoring the software (HP Autonomy). It has proved an incredibly collaborative and effective four-way partnership. This project is the main focus for learning analytics and is aimed at building capacity. There are other areas of analytics such as sentiment analysis which are of interest and may be included later.

Two IT staff and two business staff are involved in the project. The current rollout has required an extra project manager and a business analyst. The technical work has been carried out mainly by DTP Solution Path; the University’s input has largely been to coordinate that work.

How is the institution dealing with any legal or ethical issues?

Neither staff nor students have expressed serious concerns about ethics or legal issues, and existing policies are thought to be sufficient. This may be due to the considerable involvement of students and academics in the project. The Information Services (IS) Student Committee has 14 student representatives. Whenever a new initiative is planned the Committee is consulted and feeds back to IS. The plan is then modified accordingly and returned to the students for their sign-off.

On the legal side NTU is not using any more data than it was previously. Students have already been asked to agree to the relevant computing policies. However, as it is now being processed in a different way, there are new ethical implications, and it is important to get the conversation right about these issues. The aim of the analytics work is to attempt to support the students in the best way possible. The data is being used in a much less invasive manner than with systems students use every day such as Facebook; academics tend to worry more about such issues than students.

What data is being collected?

Data is collected in a data warehouse with feeds from the VLE, the student information system, the library system, smart cards and assessment systems. There is also an end of year review which looks at how people engaged in student life; the data captured is contributing to intelligence about activities which may lead to success. Conversely studies may suffer as a result of too much extra-curricular activity – and this may also be ascertained from the data. The analytics solution (Autonomy) takes its data from the data warehouse and directly from other systems, though the intention is to bring all relevant data into the warehouse ultimately.

What analytics systems are being used?

NTU was approached by at least seven vendors of analytics products. The selection process involved asking each vendor to crunch five years of anonymised data from seven data sources to see what insight could be obtained. Hewlett Packard Autonomy was able to sort out and gain insight over some very complex data so was selected.
DTP Solution Path has brought the expertise to fine-tune this system while NTU's responsibility is the business focus.

**What tools and dashboards are available?**

A dashboard has been developed for tutors to discuss students’ performance with them. The system takes data from seven sources and determines what success looks like for the average student on each individual course. A visualisation chart shows a progress line indicating participation which aggregates the seven data sources. Thus in a humanities course, access to library resources will be emphasised more by the software than in a science course.

The engagement rating is calculated using data on tutorial attendance, resource usage, assessment submissions, library loans, card swipes and academic history.
What interventions are taken as a result of the analytics?

An engagement rating is the primary metric and is High, Good, Satisfactory or Low. The tutor can drill down to the level below the rating and say to the student e.g. “I see you haven’t been to the library yet.”

Automated email alerts are sent to tutors when students fail an assignment or have had no engagement for a fortnight.

Are there any outcomes to date?

Most tutors in the pilot used the dashboard once per week with a minimal impact on their workload. A third of tutors contacted students as a result of viewing their engagement rating. A subsequent conversation with the tutor is almost always followed by an improvement in engagement. All the pilot tutors wanted to keep the tool and reported good feedback from students. Typical tutor comments were:

“It saves so much time by having the information to hand in one place for a student.”

“Useful to get a sense of the student’s history. Useful to be prompted to send out an email to a disengaged student and useful to have a template for guidance on this.”

“Tutors can immediately have a conversation and build on it.”

While the aim is make every student as effective as they can be, learning analytics and interventions seem to benefit in particular those in the middle ground of ability and performance. However, there is evidence that many of those who are doing very well are simply coasting along so there is a desire to put more effort into them too so that they can excel.

NTU is not yet looking at prior attainment or other pre-existing data such as ethnicity. There is some evidence emerging from other work that a particular ethnic minority might struggle with aspects of a course, and have appropriate interventions put in place. However there are often individuals in that group who do not fit the pattern and might be better not to receive the intervention. The intention then is to identify finer-grained sub-factors that lead a minority struggling – and to develop more personalised interventions.

Another outcome is that some tutors show (with the students’ permission) the individual dashboards to the whole tutorial group as a way to discuss progress; this is reported to be motivational to the group.
What are the future plans?

While Mike considers the tools available to be more than adequate in their capabilities for the time being, there is a desire to present the tutor dashboard in a way that is more motivational for both staff and students. It is also intended to put more data into students’ hands in the future so that they can self-manage their behaviours, and to develop a mobile interface for them.

Meanwhile automated alerts and reports to tutors which emphasise positive outcomes are being considered e.g. “There are no reported problems with any of your students over the past month.” The pilot project also suggested that alerts to tutors may be appropriate in the case of non-attendance at induction or a change of engagement group e.g. High to Good. It would be necessary though to avoid “spamming” tutors with too many alerts.

A more sophisticated approach to non-attendance would also be helpful too, enabling the recording for example of authorised absence.

Engagement with the community

NTU has been heavily engaged with the community and being somewhat ahead of the game, their expertise is in popular demand at conferences and in other institutions. They are keen to engage in the planned Jisc learning analytics developments.
The primary aim of learning analytics activities at the Open University (OU) is to increase student success as measured through retention, progression and the achievement of qualifications. In the past, students would sign up for individual modules and build them up into a qualification, often over a number of years. Now, the new funding regime in England requires learners to sign up to a qualification in order to obtain a student loan. This has meant reorganising many aspects of the OU’s activities around the qualification rather than the module, and closer scrutiny over measures of student success to ensure they complete modules, progress to the next one and ultimately achieve their qualification.

Learning Analytics is one of the key projects in a large strategic priority programme at the University aimed at enhancing the student experience. One of the primary strands of the project is to improve the management information available on students’ status and progression through their qualification. A new view is required from the student perspective, showing what they are doing within a module and how they are progressing through the qualification. Thus if a student starts in October and is struggling, perhaps due to personal circumstances, this can be more easily identified. The student can then be advised to defer and restart the module the following February, with a greater chance of completion. The previous approach would have been to consider that deferral was a negative outcome rather than one which maximised the student’s chances of success.

While the institution has over a decade of experience in analysing data relating to the student experience, the current institution-wide project has been running for a year and has another two years to go.
Where are analytics located in the institution?

The Learning Analytics project is led by the Pro Vice-Chancellor for Learning and Teaching, and is managed by Kevin Mayles from the Learning and Teaching Centre with a core team of around ten people including four project managers, a project officer, two analysts and some support staff. A management group contains representation from key stakeholders across the University.

The data is managed by IT in collaboration with the Information Office which has a planning and forecasting function. The Institute for Educational Technology carries out most of the analysis and generation of insight around the student experience, and identifies the factors affecting student progression and withdrawals. Some of the deliverables required of analytics, while overseen by the project, are being carried out within units as "business as usual" activity. The extended team includes around twenty people altogether, and there are perhaps fifty across the institution contributing to the project in some way.

The OU Students Association has been involved and is being consulted in particular around the student-facing tools.

How is the institution dealing with any legal or ethical issues?

In July 2014 the University's Learning, Teaching and Student Support Committee approved a policy for the ethical use of student data for learning analytics, built around eight key principles. The aim was to ensure openness and transparency around the data being collected and what is being done with it. It is not just about doing the minimum to comply with legislation. Learning analytics is seen as an ethical process with the student at the heart of it. Learners are not wholly defined by the data the University has about them which can never reflect the totality of the individual’s experience. The policy will result in communications to students and guidance to staff.

What data is being collected?

The Data is drawn from various systems including the in-house student information system and the virtual learning environment. There is a strand of work to improve some of the data feeds available, and a particular emphasis on collecting better information from students who withdraw, to help the University identify and address factors leading to withdrawal. There is also a feeling that the knowledge of the Associate Lecturers (tutors) needs to be gathered in a more systematic way. Meanwhile work is being done to enrich the data held about the learning design of the modules and connect this to the behavioural data that is gathered. This should help to ascertain whether some models for learning content, activity and assessment are more effective than others.

There is also work going on in Library Services to ensure that library data is included in the institutional picture. One question being asked is to what extent library activity for OU students is correlated with student success. The data required is not easily accessible to those carrying out learning analytics and it needs to be incorporated into appropriate systems. Some early pilot work does seem to show similar correlations between library use and
student success as found at Huddersfield by the Library Impact Data Project\(^8\). However unlike other HE libraries where there will be data on library loans, at the OU the library data relates mainly to online access to library resources. One current focus is to make this data available to the OUAnalyse analytics tool (see below). As in many libraries, search has essentially been outsourced to a cloud-based system – currently EBSCO Discovery, but migrating shortly to Primo Discovery – and it hasn’t yet been possible to obtain data from that system on student search behaviour, data that may be of some value in understanding student engagement.

What analytics systems, tools and dashboards are available?

There is a custom-built student support tool which takes data from the data warehouse and uses SAS business intelligence software to manage it. Meanwhile other dashboards are currently being developed and prototyped. A student facing one will help learners track their progress through a qualification and make better study choices.

There are a lot of student satisfaction metrics available ranging from NSS scores to the results of internal end of module surveys. In the past this was done on a sampling basis but now every student is surveyed at the end of every module. This generates more granular data relating to areas such as workload, assessment and value for money. Metrics for pass rates and completion rates are also created. Within a module there are views on assignment submissions, and a tool for student support teams which provides information on activity within the VLE such as students’ access to their module website and activity in forums relative to their peers.

After a pilot project working with Microsoft on predictive analytics, the Knowledge Media Institute has been developing a tool called OUAnalyse and investigating how the behavioural patterns of previous cohorts of learners and their demographic data can be used to predict the likelihood of success for current cohorts. A prototype dashboard now plays those indicators back to staff.

Another developing area of predictive modelling at the University uses a statistical model to look back at the results achieved each year and compare the pass rates to expected pass rates based on the profile of the students. A similar model looks forward and predicts the likelihood of pass rates and progression rates for the current cohort. An indicator of likely completion can then be derived for individuals.

What interventions are taken as a result of the analytics?

A major goal of the initiative is to understand impact of the interventions being made aimed at improving student success. Interventions include adapting the learning design of a module or changing the curriculum by replacing or re-versioning a module, as well as direct communications with students. An intention is to develop a common way to evaluate the interventions and common datasets which feed into the annual cycle of quality enhancement.

A structured programme of interventions has been put in place with the student support teams. An example is non-submission of the first assignment which triggers an intervention. OUAnalyse gives the potential to change the trigger to target interventions earlier and more precisely.

\(^8\) https://library3.hud.ac.uk/blogs/lidp/
One interesting decision taken by the OU is that they are deliberately not looking to correlate interventions with student success. If for example students have not submitted an assignment, their expected behaviour after an intervention might be that they then submit the work or phone up their tutor. However, it is their behaviours which will be monitored rather than whether they are then successful; it is recognised that there are many more factors at play here than just the interventions.

**Are there any outcomes to date?**

It is still too early to say whether the interventions in the new pilot projects and those recently implemented by student support team are proving effective. The University has developed a clear view of the key factors that are influence student success, and this is now driving prioritisation through the strategic planning process. Through the current initiative it is hoped to refine individual interventions to better target those students most in need in a timely way.

**What are the future plans?**

The OU is currently going through the procurement process for a new corporate visualisation tool (e.g. QlikView, Tableau etc.) There is already a mature data warehouse but there remains a need to provide a better system to explore the data visually and help develop a self-service approach. The capacity of the institution cannot simply be enhanced by employing more data analysts, and professional development activities are being put into place to help staff make more evidence-based decisions with the help of the analytics. Meanwhile a community of practice is being created for staff to share their experiences in using the data and carrying out interventions.

Alongside the analytics project, work is going on separately to improve management information for the new student support teams which have been put in place, corralling all the data they need into a single dashboard. This will enable them to build queries to identify groups of students who require an intervention, and record those interventions in order to assess their effectiveness.

**Engagement with the community**

Staff from the Knowledge Media Institute and the Institute for Educational Technology in particular are heavily involved in the research community around learning analytics through the Society for Learning Analytics Research and participation in the annual Learning Analytics and Knowledge conference.
At Oxford Brookes University there is an expectation of continuous innovation in teaching and learning. The Strategy for Enhancing the Student Experience puts an emphasis on establishing an evidence base to improve the student experience. This has been the focus to date on learning analytics – though that term has not been used extensively at the University.

A business intelligence initiative, developing an “academic performance tracking tool”, has been one of the key projects to gather data and present new visualisations to staff. Course teams use this tool for module, programme and faculty reviews, and the data influences the overall operational plan for the University. This replaces reports from the in-house student record system which would previously produce reams of paper with analysis and quality reviews carried out manually in a very inconsistent way. Using the tracking tool, one of Oxford Brookes’ key business processes has rapidly moved from one with many variants to a system which allows consistent viewing of data to evaluate progress and identify the priorities.
Where are analytics located in the institution?

The tracking tool project became part of a cross-institutional programme of twelve projects headed up by John Raftery, Pro Vice-Chancellor (Student Experience) which together support the overall student experience strategy. His successor, Julie McLeod, remains the strategic lead in this area.

How is the institution dealing with any legal or ethical issues?

No significant ethical or legal issues have yet arisen in the use of analytics. Care is taken not to expose specific student identifiers. For example information on disabled students can only be viewed at an aggregate level. Meanwhile permissions to drill down to small data sets in the tracking tool are restricted in some situations to avoid the identification of individual students.

What data is being collected?

Data comes from the student information system, National Student Survey, benchmarking and module evaluations. There is no attendance monitoring data.

What analytics systems are being used?

There is currently an in-house developed data warehouse however the institution is progressively switching to a commercial solution based on the SAP Business Objects Suite.

What tools and dashboards are available?

There are dashboards for module, programme and faculty reviews as well as ones for less formal, more exploratory purposes such as examining retention by applying different filters e.g. BME, age and gender. There are also dashboards for applications and enrolments. At a strategic level there are the institutional KPIs and also a portfolio review around viability, quality and reputation, enabling potentially problematic programmes to be identified.

QlikView is the main system used to visualise the data. Staff in the Strategic and Business Planning Office (SBPO) have found it easy to develop dashboards using it, and users like the interface. The dashboards are aimed at many types of staff and the user base is now more than a thousand people, though not students as yet. There is however a question about whether the institution has the right tools or strategy for integrating further data sources. SBPO has achieved a lot with relatively little funding and a small team but is looking at developing a new data strategy for further developing its use of analytics.
What interventions are taken as a result of the analytics?

Academic Advisors use a module in Moodle to track and communicate with students. Data from this is fed into the Academic Advisor’s dashboard. Advisors are required to meet with students at least twice a year and interventions can be tracked this way.

Are there any outcomes to date?

The academic performance and tracking tools have been used to analyse the performance of BME students and look at the significance of entry qualification scores. Problems were also identified with BME achievement on particular courses.

The tools have been well received with staff feeling a sense of ownership over the data. The programme review dashboards enable the creation of a bespoke document for the programme, and individual teachers appreciate being able to drill down into the data. The dashboards are also used in the Portfolio Review of Undergraduate Programmes.

What are the future plans?

At a high level the dashboards have been used to identify the top performing programmes – these will be recognised in the future by a Programme of the Year award.

Oxford Brookes is keen to develop individual and personalised learning. There is an intention to process data in a more student rather than cohort-focussed way, viewing data for an individual learner and seeing how they engage with different parts of the University. Two ideas are currently being developed:

- Better understanding learning gain – how an individual student can improve beyond what might have been predicted, and how their performance can be tracked more closely
Developing a student support communications tool which makes it easier for different support services around the institution to communicate, and tracking the effectiveness of interventions

Engagement with the community

Oxford Brookes is keen to engage with the Jisc community and to investigate the development of more advanced dashboards.
In 1968 the University of London Computer Centre (ULCC) was formed to provide services to all of the University’s colleges. It has to pay its way and aims to deliver an annual surplus to the University of London. Around eight years ago an FE college approached the Centre asking for help in hosting Moodle, their institutional virtual learning environment. There are now around 100 institutions for whom ULCC hosts Moodle as a managed service, roughly forty are from higher education and sixty are further education institutions. There are about 2 million active users of the Moodle hosted services in total. ULCC deals mainly with business users in the institutions, often those from a learning technology rather than IT background.

Two years ago ULCC began to explore offering reporting services on top of Moodle, which did not itself have particularly sophisticated reporting functionality. These are now offered as an additional service. Meanwhile for further education the Centre built an individual learning plan module for Moodle which has been contributed to the open source Moodle community.

Another driver for ULCC in the area of analytics has been around the Nexus initiative, funded originally by HEFCE to develop an enterprise service bus for the sector. The aim was for a service to sit in the cloud and join institutions to services. So for example there are 40 institutions in London and 30 local authorities; pulling data out of student information systems about which students were living where and feeding it into the “bus” in an intelligent and data-protected way would make the process of council tax collection more efficient.
Exploring the possibilities of learning analytics

It occurred to ULCC that Nexus provided possibilities for developing learning analytics across institutions. They could build dashboard capability to sit on top of the enterprise service bus with institutions deciding what data they wanted to plug in. The value of the dataset for learning analytics would clearly be enhanced if the Centre was to look at data other than that held in Moodle. The aim then is to begin to connect student information systems; once a connector has been built for one system e.g. SITS it should be relatively easy to connect in another institution which is using SITS. The next stage would be to aggregate data from multiple institutions to be able to achieve a better level of analytics. Thus the profile of psychology students across institutions might be more similar than the profile of psychology and engineering students in the same institution.

Another business unit in the University of London which works closely with ULCC is "The Careers Group" which offers careers services to the students of about fifteen institutions. The Group also runs the Destination of Leavers of HE (DLHE) annual return on behalf of institutions, with the analysis of the data being a key part of the service. There is therefore the potential for some useful analytics here – not just what employment rates are for a particular institution or subject area but also how the activity of students affects their subsequent employment.

Meanwhile the University of London International Academy has around 54,000 distance learners, 85% of them international, and is talking to ULCC about the possibilities of analytics. They already use the IBM product Cognos for some of their business intelligence needs. Subsequent conversations with IBM resulted in the Centre providing some anonymised data from an FE customer to IBM so that the company could crunch it and see what insights it could come up with.

Next steps

The IBM work concentrated on attrition. They found the way that some approaches from retail were applied was particularly interesting: the tools analysing the cost-effectiveness of interventions as a result of analytics, rather than simply recommending interventions. The software also inferred how effective an intervention might be with a particular profile of student.

Richard feels that most learning analytics products represent information that already exists rather than creating truly new insight. ULCC will shortly decide whether to proceed with the IBM toolset to develop a learning analytics service which can add greater value by inputting from multiple institutions.
Appendix: Semi-structured interview questions

**Drivers**
What are your institutional drivers for developing learning analytics?

**Logistics**
What have you done so far?
How is analytics being rolled out? Is there a programme to coordinate activities?
What are the timescales?
Where are the analytics activities located in the institution?
Is it sponsored by a senior manager?
How many people are involved in the programme and what are their roles?
Have you involved students / students union etc.?

**Tools**
What dashboards and other tools have you deployed so far or are under development?
Who are the tools aimed at?
How easy were these to use and how useful are they?
Did they require bespoke development?
Do you think the tools you’ve got are adequate? If not what else would you require?
What kind of metrics are being used to analyse the data? Do the tools provide adequate metrics?
Is there a technical contact that Jisc could follow up with?

**Data**
What data sources and fields are being used for the analytics?
Do you use pre-existing data e.g. prior performance data or just data generated during the course?
What tools are you using to extract the data – do you have a data warehouse for example?
Outcomes to date

What kind of interventions are you carrying out? Is there any evidence that these are proving effective?
Do you have any other outcomes to report so far (e.g. increased retention)?
What outcomes do you anticipate from analytics in the future?

Ethical and legal issues

Have you come up against any ethical or legal issues in the use of analytics?
Have staff or students expressed concerns about analytics?
How have you dealt with the concerns? Have you got an institutional policy or code of practice?
Would you find one useful?

Plans for further development

Have you got any plans to develop your use of analytics further?
Are there any tools or systems you'd like to see developed which would make a significant difference to how you could deploy analytics?
JISC is interested in developing sector-wide tools and metrics. Would you potentially be willing to share your tools or metrics with other institutions?