Learning analytics: implementing an institution wide strategy

JISC Networking Event 22nd June 2016

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Learning Analytics @ The Open University

Where are you from?

- PVC Learning & Teaching
- CIO / IT
- Planning Office
- Student Support
- Faculty
Learning Analytics @ The Open University

Where are you from?

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- CIO / IT
- Planning Office
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OU Context

2014/15
174k students
The average age of our new undergraduate students is 29
40% new undergraduates have 1 A-Level or lower on entry
Over 21,000 OU students have disabilities
868k assessments submitted, 395k phone calls and 176k emails received from students
Analytics for student success vision

A clear vision statement was developed to galvanise effort across the institution on the focused use of analytics

**Vision**

*To use and apply information strategically (through specified indicators) to retain students and progress them to complete their study goals*

**Mission**

This needs to be achieved at:

- a *macro level* to aggregate information about the student learning experience at an institutional level to inform strategic priorities that will improve student retention and progression
- a *micro level* to use analytics to drive short, medium and long-term interventions
Vision in action

Recruit | Retain | Progress | Complete
---|---|---|---

Success outcomes and leading indicators

Learning & teaching activities

Student support activities

Measures of our operational performance and interventions

Drivers of student success

Evidence of the drivers of student success guides what we do and what we measure

Evaluation of the outcomes from interventions increases our evidence base of what drives student success

Dashboards / Reports / Tools

- Institutional Dashboard
- PVCs
- Deans
- Programme Directors
- Module Teams
- Student Support Teams

ACTIONS

Intervention
The OU recognises that three equally important strengths are required for the effective deployment of analytics.
Analytics enhancement strategy

- Early alert indicators using predictive analytics
- Policy on the ethical use of student data for learning analytics
- Analytics for action evaluation framework
- Impact of learning design on outcomes
Analytics enhancement strategy

- Early alert indicators using predictive analytics
- Policy on the ethical use of student data for learning analytics
- Analytics for action evaluation framework
- Impact of learning design on outcomes

- Processes that impact student success
  - Direct intervention
  - Information advice and guidance
  - Continual quality enhancement
  - Learning design and delivery methods

- Availability of data
  - Data collection
  - Data storage and access for analysis
  - Technology architecture

- Data exploration and rapid prototyping
- Operational analysis models
- Interpret results

Prototype – design – build pipeline
Development of early alert indicators

Application of a predictive analytics model to trigger interventions with vulnerable students

Calvert (2014)
Development of early alert indicators

Statistical modelling

2015 cohort

‘Training’ dataset

Factors

Logistic regression

Predictions for 2016 cohort

Factors

Output dataset
Development of early alert indicators

The 30 variables identified associated with success vary in their importance at each milestone

Student (Demographic)

Student – previous study/motivation

Student progress in previous OU study

Student – module

Qualification / module of study

Calvert (2014)
Current indicators

Module probabilities

Integrated into the Student Support Intervention Tool

Predicts the probability of a student completing and passing the module
OU Analyse

student engagement with learning activities

Time (weeks)

Pass  Fail  No submit
OU Analyse

Module fingerprint

Assessment 1
Current indicators

OU Analyse

Predicts the submission of next assignment weekly

Deployed through OU Analyse Dashboard
Outcomes of current pilots

Summary of the interim evaluation of piloting as at March 2016

- There is a mixed picture in the quantitative analysis on the impact in the pilot tutor groups on withdrawal rates and assignment submissions (note that tutors are self selected and the expectations to intervene are not consistent across the module piloting)
- It is a useful tool for understanding students and their participation
- Predictions generally agree with tutors' experience and intuitions of which students might potentially be at risk
- A (potential) USP of OU Analyse was the information provided between the assignment submission in relation to students' engagement with learning materials
- Overall, all tutors interviewed were positive about the affordances of OUA, and are keen to use it again (for a range of reasons) in their next module
Case studies and vignettes

“I love it it’s brilliant. It brings together things I already do [...] it’s an easy way to find information without researching around such as in the forums and look for students to see what they do when I have no contact with them [...] if they do not answer emails or phones there is not much I can do. OUA tells me whether they are engaged and gives me an early indicator rather than waiting for the day they submit”
Analytics enhancement strategy

Early alert indicators using predictive analytics

Policy on the ethical use of student data for learning analytics

Analytics for action evaluation framework

Impact of learning design on outcomes
Adoption of learning analytics with the OU requires broad acceptance of the values and benefits (organisational culture) and the development of appropriate skills across the culture.

01 Learning analytics is an ethical practice that should align with core principles, such as open entry to undergraduate level study.

02 The OU has a responsibility to all stakeholders to use and extract meaning from student data for the benefit of students where feasible.

03 Students should not be wholly defined by their visible data or our interpretation of it.

04 The purpose and boundaries regarding the use of learning analytics should be well defined and visible.

05 Students should be engaged as active agents in the implementation of learning analytics (e.g., personalised learning paths, interventions, etc.).

06 The University is transparent regarding data collection, and will provide students with the opportunity to update their own data at regular intervals.

07 Modelling and interventions based on analysis of data should be sound and free from bias.

08 PRINCIPLES for the ethical use of student data for learning analytics.

Information for students

Ethical use of Student Analytics Policy

Also listed as:

Ethical use of Student Data for Learning
Policy on Ethical use of Student Data
Ethical use of Student Data for Learning
Using information to support students

For more information, see How the OU uses data.

Charter Principle:

We treat each other with dignity and respect.

How the OU uses data

Learning analytics and you

How we use learning analytics

Student data is used in three main ways:

Monitoring: We try to identify students who meet certain criteria, such as submission of assignments or your engagement with their studies.

Early warning indicators: This approach is based on statistical analysis of past students and an indication of the expected performance of something happening, which is not an absolute predictor but has an indication of how likely the result is. Based on the information we know that a student will be successful in a particular course, our model predicts outcomes with absolute certainty, and there will always be things that affect student progress that are beyond the University's control, such as personal circumstances.

How the predictive models used contain the effects of multiple factors, and we use it to predict success based on the probability of the student's success. We consider students who are not studying to withdraw, understand expectations of workload, and encourage them to plan ahead. We also use information to help you identify and personalize your students who may benefit from a support that can offer additional support or encouragement. It should be noted that the ethical use of the predictive data is being monitored and can be revised in the future if it does not meet the university's ethical and data protection policies.

Endnote:

Endnotes are not used in this new way.
Analytics enhancement strategy

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  - Information advice and guidance
  - Continual quality enhancement
  - Learning design and delivery methods

- Availability of data
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  - Technology architecture

- Data exploration and rapid prototyping
  - Operational analysis models

- Interpret results

Prototype – design – build pipeline
Scaffolding action

Analytics for Action Evaluation Framework and Toolkit

Supporting Module Teams

- Identify Priority Curriculum Areas
  - Dashboards and drill-downs
  - Menu of response actions
  - Prioritising responses

Hub of Expertise

- Deep dive analysis and strategic insight
- Evidence Hub

Methods of gathering data

Assistance with Evaluation

Evaluation of responses

Institutional activity
Support activity
Faculty-based activity
Real-time progression reports

Definitions workshops
Agreed global student terms

Identifying the right data sources

Expanded Data Warehouse

SAS Visual Analytics
Interactive, Drill down, Real Time Reporting

STUDENT PROGRESSION REPORTS
Real Time Dashboards showing student progression within qualifications, across OU study, in module

Workshops With:
Student Services
IET
Strategy and Information Office
Awards Ceremonies and Qualification
University Secretary’s Office

Faculty Workshops
Gathering Retention Reporting Requirements

Student Data Sets from Strategy and Information Office
New Qual Data Mart
Establishing Qual/Mod relationships

Student Progression Reporting Framework
Real-time progression reports

Student Focussed Views

Institutional View
User: VCE
- Progression Against Targets
- Qual Retention Top/Bottom
- Module Retention Top/Bottom
- Current Student Body Profile

Real Time Data Views

Faculty Dashboard
User: Deans
- Which quals have retention issues? RAG status of retention measures
- Which modules have retention issues? RAG status of retention measures

Global Data Definitions

Qualification Dashboard
User: PDs & QMs
- Retention Rates by Qual
- Which modules are my students studying?
- How are my qual students performing in module?
- Are students progressing through my qual?

Drill down output

Module Dashboard
User: Mod Teams
- Real Time Module Retention
- Are my students in qual, standalone, concurrent study?
- How are students performing on my mod (by qual)
- Are my students still engaged?

Key indicators

Reports to Understand Progression and Performance Relationship between Qual and Module
Who is on A105 - Voices, texts and material culture and what are they studying?

M1.2 Which new framework qualifications are my students studying?
- Q01 - BA(Honours) History
- Q03 - BA(Honours) Humanities
- Q39 - BA(Honours) English Language and Literature
- Q86 - BA(Honours) English Literature and C
- Q66 - BA(Honours) English Literature
- QD - BABBSc (Honours) Open degree
- Q85 - BA(Honours) Classical Studies
- T07 - Certificate of Higher Education in Hum...
- R14 - BA(Honours) Arts and Humanities
- W05 - Diploma of Higher Education in Hum...
- T09 - Certificate of Higher Education Open
- Q43 - BA(Honours) Philosophy and Psychol...

M1.3 Which old framework qualifications are my students studying?
- B03 - BA(Honours) Humanities
- B01 - BA(Honours) History
- B0 - BABBSc Open degree
- B39 - BA(Honours) English Language and Literature
- B66 - BA(Honours) English Literature
- C98 - Certificate of Higher Education in Hum...
- E64 - Diploma of Higher Education in Hum...
- K05 - Certificate of Higher Education Open

M1.1 How many of my module students are standalone or on a qual?
- 1,405
- 66
- 27
These are the new framework qualifications that your module students have linked this module to.
Are A105 - Voci in texts and material culture students studying multiple modules?

M2.1a How many modules are my students studying? (Click bar to filter visuals M2.1b and c)

- Concurrent: 171
- Overlapping: 2
- Total: 173

M2.1b How many credits are my students studying?

M2.1c Which presentations are students in multiple modules studying?

M2.2 How many students are studying concurrently?

Concurrence | N students
---|---
Concurrent | 171
Overlapping | 2
Total | 173

M2.3 Modules currently being studied with A105 - 20...

Choose concurrent/overlapping: [Select]

<table>
<thead>
<tr>
<th>Module</th>
<th>N students</th>
<th>Concurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>AA100 - 2015J</td>
<td>112</td>
<td>Concurrent</td>
</tr>
<tr>
<td>A215 - 2015J</td>
<td>13</td>
<td>Concurrent</td>
</tr>
<tr>
<td>A200 - 2015J</td>
<td>12</td>
<td>Concurrent</td>
</tr>
<tr>
<td>A230 - 2015J</td>
<td>12</td>
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</tr>
<tr>
<td>U214 - 2016J</td>
<td>5</td>
<td>Concurrent</td>
</tr>
<tr>
<td>A217 - 2016J</td>
<td>3</td>
<td>Concurrent</td>
</tr>
<tr>
<td>A224 - 2016J</td>
<td>3</td>
<td>Concurrent</td>
</tr>
<tr>
<td>A2281 - 2015J</td>
<td>2</td>
<td>Concurrent</td>
</tr>
<tr>
<td>A105 - 2016B</td>
<td>1</td>
<td>Overlapping</td>
</tr>
<tr>
<td>A219 - 2015J</td>
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<tr>
<td>A325 - 2015J</td>
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<tr>
<td>A327 - 2015J</td>
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<tr>
<td>A330 - 2015J</td>
<td>1</td>
<td>Concurrent</td>
</tr>
<tr>
<td>A340 - 2015J</td>
<td>1</td>
<td>Concurrent</td>
</tr>
</tbody>
</table>
Supporting Module Teams

- Working with 46 modules, meeting each team at least 3 times in the year
- Briefed over 80 staff
- Support available to module teams
- Mailbox for ad-hoc support
- 1:1 Support Meetings
- A4A Toolkit
- Data Source Briefing Workshops
Supporting module teams

- Technology Enhanced Learning Team enabled actions
- Module Team enabled actions
- Student Support Team enabled actions
- Associate Lecturer enabled actions
- Library Services enabled actions
Evaluating the use of the A4A Framework

Technology Acceptance Model (TAM1)

- Explains why a user accepts or rejects a technology.
- **Perceived usefulness** and **perceived ease of use** influence **intentions to use** and **actual behaviour**.
- Identify what factors explain future intentions to use the innovation and actual usage behaviour
Feedback from Data Source Briefing Workshops

Based on Technology Acceptance Model (TAM1)

Perceived usefulness (PU)
- Using the data tools will improve the delivery of the module.
- Using the data tools will increase my productivity.
- Using the data tools will enhance the effectiveness of the teaching on the module.

Perceived ease-of-use (PEOU)
- Learning to operate data tools is easy for me.
- I find it easy to get the data tools to do what I want them to do.
- I find the data tools easy to use.

Perceived training requirement
- I expect most staff will need formal training on the data tools

Satisfaction with Workshop
- The instructors were enthusiastic in the data briefing.
- The instructors provided clear instructions on what to do.
- Overall, I am satisfied with the workshop.
Feedback from Data Support Meetings

Based on Technology Acceptance Model (TAM1)

**Perceived usefulness (PU)**
- Using the data tools from the support meeting will enhance the effectiveness of the teaching on the module.
- Using the data tools from the support meeting will improve the delivery of my module.
- Using the data tools from the support meeting will increase my productivity.

**Perceived ease-of-use (PEOU)**
- I find it easy to get the data tools used in the support meetings to do what I want them to do.
- I find the tools used in the support meeting easy to use.
- Learning to operate the data tools used in the support meeting is easy for me.

**Perceived training requirement**
- Based upon my experience with the data tools used in the support meeting, I expect that most staff will need formal training to use these tools.

**Satisfaction with Workshop**
- The facilitators helped me identify an issue, or an action, that could be taken on my module.
- The facilitators provided a clear interpretation of my module's data.
- The facilitators were enthusiastic in the support meeting.
- Overall, I am satisfied with the support meeting.
Workshop

Satisfaction with Workshop

- **Overall, I am satisfied with the workshop.**
  - Totally Agree: 42.42%
  - Agree: 46.97%
  - Neutral: 9.09%
  - Disagree: 1.52%

- **The instructors provided clear instructions on what to do.**
  - Totally Agree: 48.48%
  - Agree: 37.88%
  - Neutral: 12.12%
  - Disagree: 1.52%

- **The instructors were enthusiastic in the data briefing.**
  - Totally Agree: 62.12%
  - Agree: 36.36%
  - Neutral: 12.50%
  - Disagree: 0.00%
Support meetings

Satisfaction with Support Meetings

- Overall, I am satisfied with the support meeting. 68.2% Strongly Agree, 31.8% Agree, 0% Neutral, 0% Disagree, 0% Strongly Disagree
- The facilitators were enthusiastic in the support meeting. 81.8% Strongly Agree, 18.2% Agree, 0% Neutral, 0% Disagree, 0% Strongly Disagree
- The facilitators provided a clear interpretation of my module’s data. 68.2% Strongly Agree, 31.8% Agree, 0% Neutral, 0% Disagree, 0% Strongly Disagree
- The facilitators helped me identify an issue, or an action, that could be taken on my module. 45.5% Strongly Agree, 50.0% Agree, 4.5% Neutral, 0% Disagree, 0% Strongly Disagree
Using the data tools will enhance the effectiveness of the teaching on the module.

Using the data tools will increase my productivity.

Using the data tools will improve the delivery of the module.
Support meetings

Using the data tools from the support meeting will increase my productivity.

Using the data tools from the support meeting will improve the delivery of my module.

Using the data tools from the support meeting will enhance the effectiveness of the teaching on the module.
Workshop

Perceived Ease of use

I find the data tools easy to use.

- Totally Agree: 3.03%
- Agree: 34.85%
- Neutral: 37.88%
- Disagree: 21.21%
- Totally Disagree: 1.62%

I find it easy to get the data tools to do what I want them to do.

- Totally Agree: 4.55%
- Agree: 34.85%
- Neutral: 39.39%
- Disagree: 21.21%
- Totally Disagree: 0.00%

Learning to operate data tools is easy for me.

- Totally Agree: 12.12%
- Agree: 37.88%
- Neutral: 34.85%
- Disagree: 12.12%
- Totally Disagree: 1.92%
Support meetings

Learning to operate the data tools used in the support meeting is easy for me.

I find the tools used in the support meeting easy to use.

I find it easy to get the data tools used in the support meetings to do what I want them to do.
I expect most staff will need formal training on the data tools

Perceived training requirement

- **38.46%** Totally Agree
- **46.15%** Agree
- **10.77%** Neutral
- **4.62%** Disagree
- **0.00%** Totally Disagree
Support meetings

Based upon my experience with the data tools used in the support meeting, I expect that most staff will need formal training to use these tools.
Analytics enhancement strategy

- Early alert indicators using predictive analytics
- Policy on the ethical use of student data for learning analytics
- Analytics for action evaluation framework
- Impact of learning design on outcomes
Learning design link to success
Learning design link to success
Constructivist Learning Design

Assessment Learning Design

Balanced-variety Learning Design

Socio-construct. Learning Design

Learning Design 150+ modules

Rienties, B. and Toetenel, L. (2016)
Constructivist Learning Design

Assessment Learning Design

Balanced-variety Learning Design

Socio-construct. Learning Design

VLE Engagement

Week 1  Week 2  Week 30+

Student Satisfaction

Student retention

Communication

Learning Design 150+ modules

Rienties, B. and Toetenel, L. (2016)
Analytics enhancement strategy

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- Analytics for action evaluation framework
- Impact of learning design on outcomes
“A successful analytics implementation is a cultural challenge, not a technological one.”

Mike Sharkey, VP of Analytics, presenting at the AIR Forum
Are there any questions?

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References: