Analytic4Action Evaluation Framework (4A4E)

1. PERFORMANCE MEASURES AND DRILL DOWNS
   (A) Community of Inquiry Framework for Online Learning: Includes the typology that outlines the types of responsive actions as an evidence hub (B) Implementation testing protocols with evaluative plans
   - Randomised central trials
   - Quasi-experimental
   - A/B testing
   - Pilot study with sub-sample

2. MENU OF RESPONSE ACTIONS
   (C) Evidence prompts further ‘deep dive’ studies or changes to menu of response actions
   (D) Recalibration of key metrics and drill downs as menu of response actions

3. METHODS OF GATHERING EVIDENCE

4. EVALUATION PLANS

5. EVIDENCE HUB

One of the largest challenges for learning analytics research is how to put the power of learning analytics into the hands of teachers. The AA4E is an evidence-based framework for learning analytics with which students, researchers, educators, and policy makers can manage, evaluate, and make decisions about which types of interventions work well, under which conditions, and which do not.

Methodology

A. Settings

We worked with three modules:
- The first module, an introduction to Arts (labelled as Arts) is an interdisciplinary 60 credit module, presented twice a year, which came into being as a ‘new’ module in October 2014
- The second module, an introduction to childhood and psychology (labelled as Psychology) is also a new module that intensively used a range of technologies.
- The third module, an introduction to computer science and digital skills (labelled as Technology) was one of the largest modules at the OU, on which nearly 4000 students were enrolled.

One of the core purposes of the 4A4E approach is to allow module teams to react on real-time data and insight.

B. Instruments

Learning Design

The OU learning design tools were developed using the taxonomy developed by Conole (2012). They are graphical and text-based tools that are used in conjunction with learning design activities, which are mandated at particular stages in the curriculum development process.

VLE behaviour

As found in previous research, VLE user behaviour (e.g., number of clicks, minutes spend per week) is an important proxy for VLE engagement and learning. In this study, we used data collected by the Institute of Educational Technology by means of the Module Activity Planner. We define active engagement in the VLE using a threshold of 60%, which is a (crude) proxy for active engagement by the majority of students in a particular week.

Academic retention and satisfaction

We measured the number of students who passed the module in terms of academic retention. In order to correct for the relative performance differences of a module given the positive/negative characteristics of OU students enrolled into a module, the OU uses a z-score model, where a negative score denotes a relatively weaker performance than expected given the characteristics of the module and the respective students, while a positive score denotes a better performance given the characteristics of the students.

Actions taken on each module

- The Arts module introduced additional assignment preparation tasks – pieces of formative assessment on the VLE - one of which required students to use a wiki in preparation for a graded collaborative writing assignment.
- For the Psychology module, the module team used tutor feedback and student comments from the forum to reach a conclusion that additional support for students was needed around assessment preparation.
- For the Technology module, rapid individualised feedback tools were instigated at the beginning of the module to identify whether students were on the right module or not. It simply asked students ‘Are you really ready for the Technology Module?’ and the students rated their readiness on a five point scale, with automatic support for those who indicated a need.

Results

Table 1: Average scores of the learning design activities of the other 57 mapped level 1 modules.

<table>
<thead>
<tr>
<th>Average Level 1</th>
<th>SB</th>
<th>Arts</th>
<th>Psychology</th>
<th>Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Registered students</td>
<td>666.62</td>
<td>861.77</td>
<td>2234</td>
<td>3181</td>
</tr>
<tr>
<td>% Passed</td>
<td>54.13</td>
<td>5.93</td>
<td>94.10</td>
<td>87.90</td>
</tr>
<tr>
<td>J-score</td>
<td>65.02</td>
<td>12.79</td>
<td>71.30</td>
<td>64.40</td>
</tr>
<tr>
<td>z-score</td>
<td>-0.19</td>
<td>2.87</td>
<td>3.80</td>
<td>-0.70</td>
</tr>
</tbody>
</table>

As illustrated in Table 1: Retention (% Passed) on the Arts module was well above the average of level 1 modules.

- Retention on the Psychology and Technology modules were within the range of the average of level 1.
- The z-score indicated that both Arts and Technology performed better than expected, whereby a score close to 4 indicated a better performance given the characteristics of the students.

Figure 2: Learning design of three case-studies relative to other modules in Level 1. Note that the dark dashed line in Figure 2 illustrates the average scores of the learning design activities of the other 57 mapped level 1 modules.

Three trends can be identified from the Module Activity Chart visualisations in Figure 1:

1. In all three modules the learning design led to a continuous engagement of the vast majority of students, as illustrated by the orange lines.

6. Discussion

- For the Arts module, a common learning activities outcomes measure might lead to informed decisions by managers and teachers alike.
- We will elaborate on the follow-up interventions that were initiated based upon the discussions with the Analytic4Action team in the three modules indicated that small changes in learning design could be traced effectively with current VLE data.
- Based upon the learning analytics, the Arts module introduced additional assignment preparation tasks – pieces of formative assessment on the VLE - one of which required students to use a wiki in preparation for a graded collaborative writing assignment.
- For the Psychology module, introduction of the final assessment e-bootcamp provided guidance for their students about how to prepare for the final assessment, addressing some of their concerns and ran four OU Live sessions dedicated to the different aspects of the final assessment.
- For the Technology module, rapid individualised feedback tools were instigated at the beginning of the module to identify whether students had passed the right module or not.
- By working together in interdisciplinary teams consisting of teachers, learning designers, learning analytics specialists, educational psychologists, data interpreters, IT specialists and multi-media designers, the OU aims to continuously refine the learning experiences of our large cohorts of learners to meet their specific learning needs in an evidence-based manner.

7. References

- D. Cross, S. and Varma, C. (2016). To what extent do existing OU learning analytics metrics and visualisations of student journeys provide an accurate picture of learning design, learning processes and outcomes across the three modules? In: In line with an embedded case study approach to understand how teachers designed three interactive modules and how students engaged with them:
- To what extent do existing OU learning analytics metrics and visualisations help teachers to implement effective interventions?