Improving the Student Experience through Learning Analytics

Project leader: Howard Errey
DSC Digital Learning Team
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Strategic objectives addressed:

Connected Values: Students’ aspirations, experience and needs are central to evaluating our performance and shaping improvement.

Creative Values: RMIT creates opportunities for students and staff to explore, test and fulfil their potential

Student Experience Goals: Understand the experience and aspirations of our students, and use this knowledge to shape improvement in education and services

Improving the student or cohort experience, student retention or actions arising from student feedback.

Internal order number: 360482

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Funding scheme (please type an ‘X’ in the correct box)

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1 Executive summary

This project encompassed four areas of activity with the aim of both impacting students through the feedback of learning data; and impacting teaching staff through methods for designing student feedback which in turn feeds back into learning design. Knowledge in design methods for developing a feedback experience for students was gathered, as well as technical expertise in xAPI standard for the storage and sharing of data was developed. Students with expertise in statistics, experience design and programming were employed to assist in project outcomes.

1.1 Semester One

In semester one various attempts were made to extract data from the Blackboard learning management system in a research methods course. Some data had to be individually extracted from Blackboard and not all information needed was available. Because the only data that could be extracted was number of hits and time spent, impact was not overly meaningful for students especially as it wasn’t linked to any learning behaviour.

Due to the difficulty of extracting data and the paucity of data, there were few resources available for designing a student feedback experience, beside sending rudimentary feedback text in emails. The data gathered was not useful in the student context. We had to work so hard just extracting data that we couldn’t determine if the feedback was useful.

1.2 Semester Two

With the experience gained from semester one, in semester two, we tried a different approach with Project Management Lecturer Ehsan Gharaie. Ehsan had been collecting class performance data from Blackboard over previous years. Ehsan also used responseware in lectures to provide quizzes and collect data on student learning activity. Data was put on to the board during lectures, while individual data from the responseware was collected for later use. Ehsan’s data was more meaningful than the data obtained in semester one as it included information about interaction in lectures, student performance against the cohort as well as behaviour in Blackboard. This enabled us to start feeding back data to students about their engagement and performance.

1.3 Applying Design Principles

Feedback to students started with sending students emails, with graphical reports that were designed using R Software in a mobile responsive way. Over time we were able to rapidly evolve feedback into easily scrollable representations. We entered a design process where through weekly design iterations we were able to continually improve and update the relevance of the feedback. By having a design process it enabled us to ask questions. Staff not directly involved in the project, could come along and contribute ideas, that could be incorporated into the design cycle. Setting up an agile design wall meant that all ideas could be considered for adoption.
The design took on a layering process with weekly interactions and iterations to enable ongoing redesigning and tweaking of the feedback; and its visual presentation. Data was provided in a mobile compatible form with graphs representing students' performance alongside other students, as well as data about their engagement. At the same time we were liaising with students through presentations during lectures, supporting them to learn what it means to receive feedback. Students were encouraged to reflect and choose to change. We monitored the opening of emails and found significant viewing of the feedback.

1.4 Feedback
Obtaining feedback about the design and usefulness of the reports was an important part of the project. Students were invited to provide feedback any time through a survey or by contacting the project officer. Perception of self-efficacy was also obtained using pre and post course measures. A nominated student representative was also part of the project and was involved in all parts of the design process. The student representative provided feedback about the appearance of the reports, the information included and how the reports should be disseminated. The role of the student was critical to the success of the project as he provided valuable insight about the student perspective.

1.5 xAPI
By establishing an interactive design process we were able to open the methods to new frameworks such as xAPI. A part of the challenge of capturing and representing data is finding a format that will represent data consistently. xAPI is a standard that provides a method for describing and capturing online behaviours as they occur. Our aim was to convert the data we were using into xAPI format with a view to being able to provide students ownership of their data in future projects. A practical pilot xAPI workshop was held amongst DSC Digital Learning Team staff with a view to expanding this in 2017.

1.6 Summary
Feedback from students in focus groups at the end of semester 2 was overwhelmingly positive. There was a minor statistical improvement in self-efficacy between pre and post test. We learned that feeding back learning analytics to students is as much about designing a student experience. We also learned the importance of reiteration in the design. Feeding back data to students is not a static activity but an ongoing cycle of feedback, both to students; and for educators in designing a learning and feedback experience.

2 Outcomes
The main outcomes of the project can be divided into the following key areas:

(1) Semester one project. There were 113 students from School of Global, Urban and Social Studies who took part in the project in the first semester.
(2) Semester two project. There were 78 students from School of Property, Construction and
Project Management who took part in the project in the second semester. Student feedback was obtained through surveys and focus groups. The results of these findings are discussed in Project Outcomes and Impacts and Evaluation.

(3) Workshop. A workshop was held at the end of the year to communicate how different universities are using learning analytics around the globe.

(4) Conference. A poster about the project was presented at the Australian Learning Analytics Summer Institute conference.

(5) Blog. The LTIF project shared ideas throughout the year on the Digital Learning Team blog.

3 Project outcomes and impacts

3.1 Semester One

In the first semester learning analytics reports from the LMS were developed and emailed to students. The participants were 113 students from HUSO2079 - Research Strategies. The issues experienced are already detailed in the Executive Summary and this blog post http://dldsc.team/2016/05/13/learning-analytics-ltif-update/.

3.2 Semester Two

The second part of the project involved providing students from BUSM3308 - Techniques for Projects with their own learner data. There were a total of 78 students who agreed to take part in the study. Students were provided with the following information: their behaviour in Blackboard (this included how many times students had been accessing areas in Blackboard, how long they spent in Blackboard and the times of day they were accessing Blackboard), their level of interaction in lectures and their performance on assessments compared to their own set goals and class average.

Data was collated from Blackboard and Turning Point, processed using R Software and then distributed via student email. Learner reports were provided weekly from week 3 to week 12 of semester 2. An example of some of the information provided to students can be seen below.
A number of methods were used to examine the impact of the learner reports on the students. Students completed the Generalised Self Efficacy Scale (Schwarzer & Jerusalem, 1995) and Self-Reflection and Insight Scale (Grant et al, 2002) at the beginning and end of the semester. Students
were also asked to provide feedback during the semester via Google Forms. At the end of the semester students were also asked to complete a survey evaluating the learner reports and they were invited to attend focus groups.

### 3.3 Student Survey

Overall, the results of the survey showed that students valued the learner reports they received and they had a positive impact on their learning.

The findings from the study showed:

- On average, 78% of students opened the email containing their learner data reports. This finding suggests that students were interested in the data reports.
- The majority of students (65%) reported that they were opening their reports on a weekly basis.
- 44.4% of students rated the learner data reports that they received as ‘very helpful’, 33.34% of students rated the data reports as ‘somewhat helpful’, 11.1% of students rated the helpfulness of the reports as ‘neutral’ and 11.1% of students rated them as ‘somewhat unhelpful.’ These findings suggest that, overall students found the reports helpful.
- Most of the students (80%) reported that they would like to see similar learner data reports in their other classes.
- The majority of students (77.8%) reported that the learner reports ‘very much’ or ‘somewhat’ helped them reflect on their own learning.
- The average scores on the self-efficacy pre test were 31 and the average score on the post-test were 33. There were no significant differences between these scores.
- The average score on the self-reflection pre-test was 63 and the average score on the post-test was 64. There were no significant differences between these scores.

### 3.4 Focus Group

A focus group was held at the end of semester 2 to obtain student feedback about the reports that students received. Students were asked a number of questions regarding the usefulness, distribution and look of reports.

The main themes from the focus group are summarised below:

*Value of reports.* Students reported that they valued receiving their reports and, in particular, liked seeing how they tracked across the semester compared to other students. They enjoyed seeing the reports and reported that they had not received anything like them in previous classes.

*Comparison with other students.* Students reported that they liked being able to see how they compared to other students as it gave as better sense of their performance and they could track when other students found certain assessments difficult.

*Email distribution.* Students reported that they found email as very convenient as a form of distribution.
A data report for all subjects. Students reported that they would like to see a learner report that incorporates data from all of their courses and provides them with link to facilities and sites that can help them improve.

Incorporating reports in class. Students reported that they felt that self-reflection would have increased if the reports had been discussed in class. Students felt that discussion in class would have provided a deeper understanding of the reports and a greater chance to interpret what they meant.

Blackboard hits. Of the information they received, students reported that Blackboard hits were the least useful because they were not as informative as the other pieces of data.

4 Dissemination strategies and outputs

Presentation at RMIT University Learning and Teaching Conference (2016): Streamlining Data: xAPI and the LRS. In this presentation we discussed our LTIF project and how xAPI could potentially be used to extract information from multiple data sources, such as Blackboard, Google Forms and Turning Point.

https://drive.google.com/open?id=0B4tFJUm3bJxeWjNId25Qand4dlU

Workshop. We presented a round-table breakfast for the project team and DSC staff about current trends in learning analytics. The workshop was presented by Professor Dragan Gasevic, a leader in learning analytics and is Chair in Learning Analytics in the Schools of Education and Informatics, at the University of Edinburgh. In his workshop Professor Gasevic explored how universities around the globe are using learning analytics and gave the staff the opportunity to explore ideas about analytics and xAPI. There were 12 staff who attended the workshop.

Poster presentation titled Improving the Student Experience with Learning Analytics at the Australian Learning Analytics Summer Institute, Adelaide, 27th November 2016.

https://drive.google.com/a/rmit.edu.au/file/d/0B4tFJUm3bJxeM3NRLXhSb0IkCg0clhMR0RmNUdOVpZWG44/view?usp=sharing

Blog Posts

http://dldsc.team/2016/03/24/improving-the-student-experience-through-learning-analytics/

http://dldsc.team/2016/05/11/student-analytics-first-steps/

http://dldsc.team/2016/05/13/learning-analytics-ltif-update/

xAPI http://wp.me/p7mCwL-23F In press

Videos. 2 videos were produced one as a summary of project outcomes, the other as a guide for teaching staff interested in learner analytics.

How to video http://wp.me/p7mCwL-23g In Press

About the project http://wp.me/p7mCwL-23B In Press
Evaluation of project outcomes

Value Impact for Students

The project has impacted students in the following ways:

1. *Enabled the students to become more involved in their own learning*. The project helped students to become more aware of the different areas involved in learning and has helped them get an insight into personal success factors that affect engagement and grades.

2. *Enhanced the student experience*. The learner reports provided were found to be beneficial for the students. They opened the reports, liked receiving them and found that useful for their learning. The reports can be seen as a novel and successful way to engage students, provide them with feedback and enhance their experience at RMIT University.

3. *Implemented and embedded learning analytics from a student point of view*. Learning analytics has been acknowledged as a useful way to obtain information about student behaviour but very few projects have actively tried to involve students with their own learner data. This project has taken an important step in showing student their own learner data and obtaining feedback about some of the strengths and weaknesses of using learning analytics in the classroom from a student perspective.

4. *Involvement of students in projects*. One of our aims with this project was to incorporate the student voice and to have students actively working on the team. We had three students involved in the project team, including a psychology, IT and statistics student. The involvement of students in the project provided the student perspective and gave students further work experience.

Value Impact for Staff

The project has impacted staff in the following ways:

1. *Watching videos/attending lectures*. We collected data about student learning behaviours (watching videos and attending lectures) and performance. We were able to to compare students who (1) only attended lectures (2) attended lectures and watched lecture recordings online (3) watched lecture recordings online only (4) attended some lectures and watched some lecture recordings online and (5) did not attend lectures or watch lecture recording online. This data is currently being analysed further and will help inform staff about when to make recording of lectures available.

2. *Assisted staff to make effective use of data*. Project Management lecturer Ehsan Gharaie has been collecting data about students for a number of years but had not found a useful way to use the data. The reports generated allowed Ehsan to present data to a students in a meaningful way.

3. *Potential to incorporate learner reports in other subjects*. From our project we now have the framework to create and generate reports in other subjects. This will enable staff to potentially implement aspects of our project into their subjects.

4. *Development of an xAPI knowledge base for student ownership and sharing of data*. We have investigated different ways to extract and share data. xAPI has been found to be a very effective way to obtain and distribute data from different sources. xAPI could
potentially be used by the university as a streamlined approach to presenting information in the future.

6. Communication staff across colleges. The staff involved in the project were from different colleges. Staff from a range of different areas have also assisted in different parts of the project. The project has helped increase communication and expand connections across the different colleges which will hopefully lead to further project development in the future.

7. Connections across institutions. Through the reporting of our findings and attendance of conferences we have been able to make connections with individuals from other universities. For example, we have connected with Kirsty Kitto at QUT for sharing of xAPI knowledge and activity.