Enhancing learning analytics by understanding the needs of teachers

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The field of learning analytics has great potential to inform and enhance teaching and learning practices in higher education. However, while many studies are being conducted to examine new learning analytics tools or ways that learning analytics can be used to address specific problems such as student retention, few studies have explored the fundamental needs of teaching staff in addressing educational problems or making improvements to their teaching. This paper presents the initial findings from research being conducted with staff associated with teaching and learning at the University of Melbourne to identify the needs and potential uses of learning analytics to improve educational outcomes. The role learning analytics will play in informing teaching practice in higher education is considered, as well as implications for future research in the field.

Keywords: Learning Analytics, Higher Education

Introduction

Research in the field of learning analytics in higher education has developed rapidly over the past few years. The increasing availability of large data sets from university learning systems offers great potential for data interrogation with the goal of informing and enhancing teaching and learning practices and environments. However, without a clear understanding of academic needs, learning analytics tools risk missing the mark or falling short of their potential. At the University of Melbourne, a working group has been established to investigate the issues related to the use of learning analytics in higher education contexts and the potential role for analytics at the University. This paper presents the initial findings from a research project undertaken by this group, a work in progress, investigating staff needs and potential uses of learning analytics. The paper outlines the preliminary themes that have emerged from focus groups held with staff associated with teaching and learning across the University. It considers ways that learning analytics could be used to assist teachers to address the educational problems they commonly face with students, particularly in digital environments. It also considers the implications of the findings on the future direction of research in the field.

Learning analytics provide an opportunity to improve educational outcomes through the analysis of data about learners and their activities. The focus of learning analytics is on the learning process at the personal, course or departmental level (Long & Siemens, 2011). However, a 2012 study of analytics in 336 higher education institutions found that, despite the existence of large amounts of data, the current use of this data is almost exclusively for credentialing and to meet reporting requirements, rather than to inform teaching and learning practice (Bichsel, 2012). Research in learning analytics to date has tended to focus on issues such as student

retention or single tool or problem scenarios (Kennedy et al., 2012). Therefore more research is needed to examine the fundamental issues that can make analytics useful to teaching and learning practices (Lockyer & Dawson, 2012).

While most studies have a particular tool or problem in mind that drives the use of learning analytics, the project reported on in this paper seeks to gain an insight into the various needs of teaching staff in addressing educational problems or making improvements to their teaching. The findings will drive decision-making with respect to the possible implementation of learning analytics at the University. While the research project is of direct importance and relevance to the University of Melbourne, it also contributes to a more fundamental understanding of issues associated with learning analytics, an emerging field which is currently under-researched

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Method

The research is guided by three main questions:

1. What are the key teaching and learning problems/situations that teachers face for which learning analytics could be useful?
2. What data could be used to address these educational problems/situations?
3. What actions can teachers take in relation to the identified educational problems/situations?

A series of focus groups were held with staff associated with teaching and learning across the University. While nine focus groups were held, this paper reports on the data from the first seven groups, which had been completed at the time of writing. The complete sample was chosen to be representative of teaching and learning practice at the University across discipline and degree levels, with six focus groups comprising staff involved in the delivery of each of the six new generation degrees, and three focus groups with staff from the law, engineering and education graduate schools. Participants for the focus groups were nominated by the Associate Dean (Teaching and Learning) and/or program coordinators across the faculties and graduate schools. The seven focus groups reported on in this paper comprised a total of 29 staff.

Participants were initially asked to describe their teaching practices and then they way in which they used technology to support their teaching, in order to identify potential sources of data about learners. The remainder of the focus group was structured around the three main research questions. As participants sometimes had limited familiarity with learning analytics, examples of existing learning analytics reports and dashboards were used as prompts for focus group discussions. This stimulated comments about ways in which existing and new types of analytics could be used to address teaching and learning problems. A thematic analysis of the data was then conducted to identify key themes in participants' responses.

Results and Discussion

The educational problems/situations and potential ideas for the use of learning analytics that were identified by academic staff in the focus groups were many and varied. They fell into five broad categories: (1) student performance, (2) student engagement, (3) the learning experience, (4) quality of teaching and the curriculum, and (5) administrative functions associated with teaching. Other themes that emerged from the analysis included discipline differences in educational problems and analytics needs, the utility of currently available data representations, and the differences in teachers' perceptions about the usefulness of learning analytics in comparison with the literature in the field. Each of these categories and themes will be considered in greater detail.

Optimising student performance and engagement was the most common potential use of learning analytics identified by staff from across the disciplines. The associated educational problems identified included identifying 'at risk' students, attendance in lectures, student access to learning resources, performance in assessment, and providing feedback to large classes. The majority of participants wanted access to data showing the correlation between student engagement (as measured by attendance in lectures/tutorials), students' access to online resources, students' participation in online communication, and their performance in assessments. It was thought that it would be beneficial to student learning and motivation to be able to provide either individual or cohort feedback on the relationship between student engagement and performance levels.

Important issues that arose in relation to the use of learning analytics to provide students with feedback concerned the way in which the feedback was to be presented and the ability of students to interpret such

feedback. Some indicated a preference for being able to provide general feedback to cohorts of students that outlined the profile of high performing students from previous offerings of the subject. Others suggested that individual feedback should be provided directly to students:

> The self-diagnosis thing I think would be an interesting thing to explore. To actually give the students a bit of power over the sorts of information they have about their own approaches to study. And maybe with time it would build up a bit of a data bank or knowledge about the particular discipline areas or subjects. In general this seems to be the sorts of patterns for those students who've done well and how do you map against those patterns. Something like that would be really really powerful for students. (Business academic)

The idea of being able to profile an 'ideal student', or to allow students to compare their engagement and performance with the rest of the class, was seen as important to making the feedback useful for students. However there are also challenges associated with offering a standard picture of high performance. For example, an academic from Engineering commented that:

> The grades and assessments speak for itself… it's good to have a high grade, it's bad to have a low grade – but when you come to communication and activity it's not so clear anymore. You could be a brilliant student, way ahead of the class, but you have not been accessing the discussion board … is that bad?

This highlights an area of learning analytics that requires further exploration; specifically how feedback from learning analytics can be given to students in a format that is most beneficial to their learning, as well as how students can determine the actions they need to take in response to such feedback.

Several academics saw the potential of using learning analytics to improve understanding and adaption of students' learning experiences. This was seen as an extension to understanding student engagement and performance towards developing a greater understanding of how students develop knowledge, with the potential to distinguish between strategic and deep approaches to learning (Biggs, 1999). An academic in Business suggested that being able to track knowledge development from prior knowledge through to understanding demonstrated at the end of the subject could be one way to determine the value of particular educational approaches. However, participants also acknowledged that there isn't always access to the necessary data to facilitate this kind of analysis. Caution has been recommended when using learning analytics for the measurement of learning quality so that reductionist approaches are avoided (Lodge & Lewis, 2012).

Another category of potential use of learning analytics was the enhancement of quality of teaching and the curriculum. In Law it was suggested that an automated textual analysis of messages sent to online tutors could be used to identify common issues students were facing so that these issues could be addressed with the whole class in face-to-face sessions. Similarly, in Arts it was suggested that analyses of discussion forum posts or the identification of support resources that had a high level of student access may help in detecting areas where students are struggling. Other disciplines saw value in deeper analysis of assessment results, especially formative and summative assessments held early in the semester, to identify aspects of the curriculum that may need further review.

Several groups identified the potential for learning analytics to be used to support administrative functions associated with teaching. Examples of these uses included: assessment of consistency between student placement locations (Education), enrolment and profiling of tutorial groups (Arts), tracking student safety compliance requirements for field trips (Engineering), and guidance for students on future subject selection (Arts). Participants noted that these were areas where existing data sets were available, but there was currently no way to access this data in a useful format. Participants also noted that the time saved by automating the analysis in these administrative areas could instead be devoted to curriculum improvement and student support.

Several participants indicated that they were either using or had attempted to use learning analytics to support their teaching, but had found their needs were not met by the data representations that were currently available. In particular, a number of participants felt that the reports that could be generated from the University's learning management system (LMS) were "not particularly useful". This was attributed to the fact that data wasn't sufficiently summarised in a format that academics could engage with quickly and easily. The ability to customise the format of reports was also requested. Representations of data from subject evaluations such as the centrally administered student experience surveys were said to be "practically useless because we can't have different views of them, like tutorial by tutorial breakdown in terms of responses" (Arts academic). The timing

of the availability of such reports was also said to make the data less useful. It was also suggested that it "would be really good if… information could be presented in a visually accessible way" (Environments academic).

A common request that emerged across the focus groups was the ability to correlate data across systems. For example, combining data from the LMS or lecture capture system with student demographic and/or enrolment data from student information systems to provide greater context and meaning to the trends observed in the student activity data. As an example, a participant in Arts suggested:

> A lot of our students come from other faculties and we get a lot of science students in cinema studies in the first year as well. So it would be really great to be able to identify, at least the percentage of students, who are coming from other faculties who are coming to a very new culture of learning. (Arts academic)

Across the focus groups discipline differences were observed in terms of the educational problems presented and the potential uses for analytics proposed. For example, Engineering academics had a strong focus on the use of learning analytics to provide data to students on their own engagement and performance in the subject, putting the responsibility for the interpretation of the data and required actions on the students. Whereas academics from the Science, Law and Arts disciplines showed a preference for using analytics for subject evaluation and to give students more general feedback on the engagement habits and patterns of high achieving students. Discipline differences were also noted in relation to the availability of student data, with some disciplines making greater use of a wide range of elearning tools, whereas others reported limited use of such technologies. The learning designs and assessment activities used in different discipline contexts also has an impact on the types of data available for analysis.

To date, the literature on learning analytics has forecasted significant uptake of learning analytics in the higher education context (Johnson et al., 2013). However, it was evident across the focus groups that there remains a considerable amount of skepticism and confusion over the utility of learning analytics. The majority of participants in the focus groups admitted to not being fully aware of the definition of learning analytics prior to the start of the session. When examples of existing learning analytics reports and dashboards were used as prompts in the focus groups few participants felt the reports were presented in a format that would be useful in their context. Instead, participants offered suggestions of how similar ideas could be used with different data. This indicates that there is a potential disconnect between the reports and dashboards emerging in the learning analytics field, and the needs of academics associated with learning and teaching in the classroom and online. Participants also raised concerns about the level of skill and time required to adequately engage with learning analytics in a useful way. It has been suggested in the literature that effective adoption of learning analytics in higher education will be dependent on the ability of universities to build a culture of analytics (Norris et al., 2012). A central component in fostering this culture change is the professional development of staff, such that they have the expertise to analyse and interpret learning analytics data to inform educational decision-making (Wagner & Ice, 2012).

Conclusion

The data collected so far as part of this research project has provided important insights into academics' needs and attitudes towards the use of learning analytics in higher education. The potential uses of learning analytics, as identified by participants, go beyond student retention to identify aspects of learning processes and support strategies that can enhance learning engagement and performance. However, it seems as though a gap is evident between the focus of the learning analytics community and the academic voices profiled in this research. There is still work to be done to ensure academics see the benefits and opportunities that learning analytics can offer to improve teaching and learning processes and educational outcomes. Further research is needed to explore the specific ways in which learning analytics can provide useful and flexible outputs to teachers that can be used to both inform curriculum and assessment design, and support students' learning processes, outcomes and experiences.

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