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The potential of learning analytics in understanding students' engagement with their assessment feedback

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***Abstract*—Assessment feedback, which is an important factor in student learning development, has been a source of dissatisfaction for many years. The technology used in universities such as Gradebook does not allow the tracking of student engagement with their feedback. In general, engagement is mainly reported via observation or students' self-report. This paper presents results from using a prototype application to track students' engagement with their feedback in three studies (*n*=218, *n*=70 and *n*=148) involving summative and formative assessment feedback. Using digital footprinting data, it was possible to gather detailed information on students' access and engagement with their feedback.**

Keywords-learning analytics; digital footprinting; student engagement; assessment feedback;

I. INTRODUCTION

Despite student engagement being an issue widely reported, assessment and feedback technologies used in higher education, such as Turnitin Gradebook, do not allow the measurement of students engagement with their assessment feedback and thus limiting the tutors' first step toward a deeper understanding of their students' engagement with the assessment feedback they provide.

This paper presents the results of tracking students' engagement with their assessment feedback between 2013 and 2015 using a prototype mobile web application, MyFeedBack [1], [2]. It presents the digital footprinting results of three studies on student engagement with their feedback by answering the following questions: 'Do they collect it?' and 'How many times do they access it?'

Findings in this paper are part of a research study that investigated whether using a mobile web application for assessment feedback can increase their motivation, engagement and communication. Current results focus on some of the digital footprinting data. The rest of this paper is structured as follows: Section II gives a brief overview of student engagement. Section III presents a brief review on learning analytics; Section IV describes an overview of the background of the studies; Section V and VI present the results; Section VII presents a brief discussion and conclusion.

II. BACKGROUND

In an educational environment, there are three types of engagement: emotional, behavioural and cognitive. This paper focuses on students' behavioural engagement level with their assessment feedback. Measuring engagement levels is important as these could "be used to determine the teaching practices that most effectively engage students and provide timely feedback to instructors" [3, p.83]. Although various tools are available to measure engagement such as self-report questionnaires, checklists and rating scales and observations, these have some limitations. Self-reports may not be valid due to students' capability to evaluate their own behaviours. Poor reliability and bias toward a positive result are the flaws often found in checklist and rating scales. Finally, the focus of most observation instruments is on the instructor's behaviours instead of looking into the student's behaviours. Furthermore, observation of individual student engagement level is time-consuming [3, pp. 83-84].

References [4, p. 890] argue that students' engagement with feedback is often "invisible". Within this context, learning analytics was used to record and measure student engagement with their assessment feedback. To tell true engagement with feedback, a tool that enabled the tutors to monitor the frequency of feedback access was developed [1], [2]. It made visible students' engagement with assessment feedback.

III. LEARNING ANALYTICS

Learning analytics is defined as "the measurement, collection, analysis and reporting of data about the progress of learners and the contexts in which learning takes place" [5, p. 4]. Data tracked from learners' interaction with their learning platform can be analysed and used to improve learning [6]. A report by the Higher Education Commission [7, p. 13] highlights the increasing evidence that data analytics can benefit all stakeholders in higher education. It has an "enormous potential to improve the student experience at university". For example, the University of Maryland (USA) found that lower achieving students also had a lower access to the VLE, 40% less than students who had C or above. In the UK for example, it has been seen to encourage communication between students and their lecturers. For instance, at the University of Nottingham, student engagement data on the dashboard encouraged tutors to contact their students [5]. However, these are isolated studies. The adoption of Learning Analytics in UK higher education is still relatively very low.

The potential for learning analytics to be used to support learners through their educational journey has been

highlighted [7]. The HEC recommendation 6 states: "Learning analytics should be driven by improvement of learning and teaching processes and student engagement" [7, p.7]. The purpose of this study is the desire to comprehend how students interact with their assessment feedback. With advances in educational technology, learners' behaviours can be completely recorded. The application used in this study included a tool that made it possible to explore student engagement with their feedback such as how many times they accessed it.

IV. METHODS

A. Participants

This research took part in a higher education setting in the UK. The first study (2013-2014) comprised 218 students from the Business school and the School of Health, Nursing and Midwifery (HNM). The second study involved 79 students from the School of Computing (2014). These were second year Computing students working on their group project. No marks were included. A student cohort (n = 148) from the Business School participated in the third and last study (2014-2015). The first and third studies involved summative assessment feedback while the second study was about formative assessment feedback.

B. Data Collection

Data was collected by mean of digital footprinting. Digital Footprinting refers to the 'collective, ongoing record of one's Web activity' [8, p. 802]. On MyFeedBack, each time students accessed their feedback page, a log was recorded and displayed on the tutor's panel (see Figure 1).

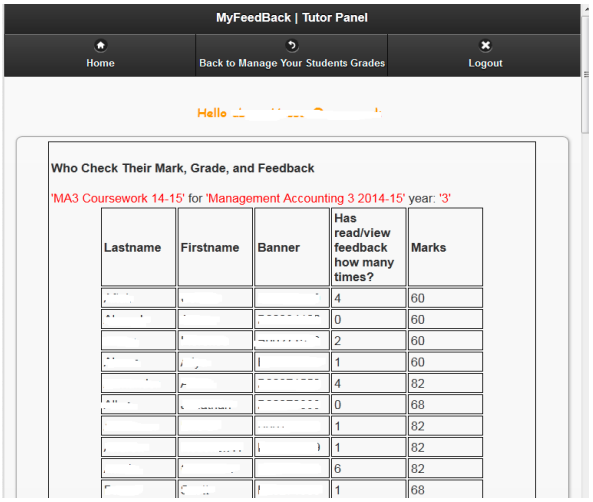

Figure 1. Feedback access monitoring on MyFeedBack – Tutor panel.

V. RESULTS

A. Do They Collect it?

In total, based on unique student accounts, 130 students (60%) accessed their feedback on MyFeedBack in Study 1. In Study 2, of the 79 registered on MyFeedBack, 70 students (89%) sent their drafts to their lecturer in order to get formative feedback, and 60 (86%) of them accessed their feedback in the first week. In Study 3, out of 148 MA students (2014-2015 cohort), 121 students (82%) accessed their feedback.

B. How many times do they access it?

In Study 1, 70 (56%) students accessed their feedback twice or more. In Study 2 involving formative feedback, 47 (68%) accessed their feedback just once (see Figure 2). Out of the 121 students who accessed their feedback in Study 3, 78 (64%) accessed it twice or more.

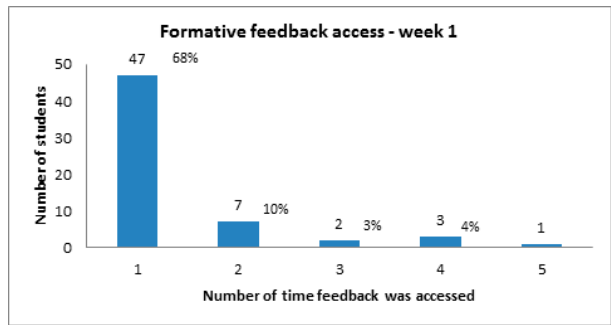

Figure 2. Student Formative feedback access – week 1.

VI. STUDENTS' ENGAGEMENT WITH FEEDBACK: STATISTICS RESULTS

To identify what influenced students' engagement with their feedback as found using Digital Footprinting data, statistical analyses of that data were performed. The number of time students accessed (or engaged with) their assessment feedback was re-coded from 0 to 3+.

A. Do marks influence students' access to their feedback?

This question was relevant to Study 1 and Study 3 which involved summative assessment feedback and included students' marks. There were in total 366 students, 251 (69%) accessed their feedback and 115 (31%) did not. Their assessment marks ranged from 0 to 83 over 100 marks.

A Mann-Whitney U test was performed. Results outlined that Z value is -.253 with a significance level (p) of p =.801. The probability value (p) is not less than or equal to .05, so the result was not significant. There was no statistically significant difference in marks of students who accessed their feedback and those who did not access it. Individual results from Study 1 (z = -.027, p = .978) and Study 2 (z = -.535, p = .593) corroborated these findings. In conclusion, students' decision to access their feedback was not influenced by their marks.

B. *Is there any relationship between gender and feedback access?*

Study 1 had 81 males and 137 females; Study 2 had 62 males, and 8 females and Study 3 had 68 males and 80 females. The number of females in study 2 was too small and was not considered when using the Mann-Whitney *U* Test for individual tests.

Based on Mann-Whitney *U* tests performed on Study 1 (z = -.271, p = .786), Study 3 (z = -.610, p = .542), then using the merged data from pilot studies 1 and 3 (z = -. 221, p = .825) and the merged data from all three studies (z = -.018, p = .986), students' engagement with assessment feedback was not influenced by their gender.

C. *Does the type of assessment feedback influence students' engagement with it?*

Mann-Whitney *U* test results from Study 1 vs Study 2 (z = -1.223, p = .221, r = .07) and Study 2 vs Study 3 (z = -3.320, p = .001, r = .22) presented different outcomes. While the comparison between Summative Assessment Study 1 and Formative Assessment Study 2 produced no significant difference, the comparison between Study 2 and Summative Assessment Study 3 showed a significant difference, with a small effect size, implying that the type of assessment feedback influenced students' engagement with their feedback.

VII. Discussion and Conclusions

Digital footprinting results indicated that more than half of students in each of the three studies accessed their feedback. Students involved in formative assessment feedback (Study 2) presented a lower engagement with their feedback. This behaviour is not surprising. Reference [9] argues that the absence of marks may explain why students do not look at their formative feedback.

Statistic results from digital footprinting data indicated that gender and marks do not affect students' decision to access and engage with their feedback. While there was no significant difference in student engagement with feedback between the types of assessment feedback in Study 1 (summative) and Study 2 (formative), there was a significant difference between Study 2 (formative) and Study 3 (summative). Results showed that engagement with feedback was higher in Study 3. This could be explained by the fact that the lecturer involved in Study 3 (Business school) was better prepared, having experienced the positive benefits of using MyFeedBack with another group of students in the previous academic year.

This paper presented an approach to tracking students' engagement with their assessment feedback. Learning analytics based on the analysis of the student online interaction with their assessment feedback provided an insight of student behavioural engagement with their assessment feedback. Although the application used in this study is basic and does not include a visualisation tool other than presenting a log containing students' usage of their assessment feedback, MyFeedBack can help educators to make decisions regarding potential pedagogical strategies that may be used to support student engagement with their feedback. The ability to access digital footprinting data on students' interaction with their feedback and identify students who might not be reading their feedback and therefore be at risk of failing a module is very important to the educators. However, to support educators, tools that enable visualising that information needs to be developed and integrated into their current VLE. Currently, the technologies used by many higher education institutions are limited or costly.

MyFeedBack was not designed to track the length of time students spent on their feedback each time they accessed it. Future research should, therefore, consider including such a feature in order to get a more accurate and deeper understanding of students' level of engagement with assessment feedback. Tracking data related to student engagement with feedback is a valuable source of information that enables lecturers to improve their feedback delivery methods and can enable dialogic feedback channels.

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