

Using Mobile Apps to Enhance Student Engagement in Large Lectures

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ABSTRACT

Much has been written about the desire to increase student interaction and engagement in large lectures. This paper presents a further phase in a study that is being conducted into the use of Prevailing Personal Social Technologies (PPSCTs) to increase student engagement in large lectures. PPSCTs have been defined as being technologies that students personally own and use for social communication. Over the period of the study the PPSCTs at the focus of the study have moved from text message based systems in 2010 through to the use of applications on smart phones, tablets and laptops from 2012 to 2014. This phase of the study presents the results of four cases where lecturers use PPSCTs with the aim of increasing interaction and engagement, and presents these results from the perspective of the lecturers. The findings of this phase of the study suggest that lecturers perceive student interaction and enjoyment to increase as a result of using PPSCTs in lectures and identify a number of different modes for their use. Particular key aspects identified in the success of the approach include anonymity of student responses and the ability of the lecturers to give feedback in real time.

Keywords: Student Engagement, Large lectures, Mobile devices, Student interaction, Smart Phones

1. INTRODUCTION AND METHODOLOGY

The aim of this paper is to present the next phase of an ongoing study into the use of Prevailing Personal Social Communication Technologies (PPSCTs) to enhance student engagement in large lectures, where PPSCTs are used to represent those technologies that the vast majority (95% or more) of the students own personally and use for social communication (Nesbit & Martin, 2011).

The structure of the paper includes a brief literature review surrounding the use of technologies to enhance student interaction and engagement in large lectures, with this including a brief description of the earlier phases of the overall study being conducted.

The four mini cases that are presented in this phase of the study are based on the experience of one of the authors and on interviews of three other lecturers about their experiences of using PPSCTs to enhance student engagement.

In this phase of the study four mini cases are presented with each being about a lecturer who had adopted the use of applications running on mobile web enabled devices as part of their teaching. The experiences of these lecturers are analysed and discussed with a number of conclusions being drawn.

A limitation of this approach is that the experiences are presented from the perception of the lecturers and that these perceptions may be different to that of the students. Later phases of the study will address this with the results of this study informing a survey that is to be conducted of classes where PPSCTs are used.

2. LITERATURE REVIEW

The literature relating the use of technologies to increase

student interaction has most of its origins in the use of clicker technologies. Some of the literature then moved on to the use of texting technologies using smart phones and more recently to the use of apps on smart phones and tablets as they became more widely used and could be seen as being PPSCTs in many large classes.

2.1 Clickers

In a trial that was reported on (Freeman & Blayney, 2005) the same pedagogical approach of small group discussion was used irrespective of whether the feedback mechanism was by show of hands or the handheld keypads (commonly called clickers). This enabled a comparison to be made between the two different feedback mechanisms using the same learning pedagogy. Students involved perceived some advantage when using the handheld keypads when it came to their interaction and understanding. The concept of anonymity was looked at as being one of the driving factors behind this perception, and that this may encourage students who are unsure about their response to engage and interact more than they might with a more public display of a show of hands. It was identified that requiring students to respond to in class questions during class time can assist learning, but that the use of such devices is a costly alternative to asking students to respond to a question by a show of hands, even though this allows for quick feedback in large classes (Freeman & Blayney, 2005).

In a case study of the use of clickers in an introductory management information systems course (Nelson & Hauck, 2008) it was found that use of classroom response systems like clickers significantly improved students' perception of their performance in the course and that the use of the clickers also met with higher rates of class attendance and of student performance. It was also found that the higher the use of the clickers, the higher the students' perceptions was when it comes to active learning, motivation and providing feedback.

In the literature review conducted (Nelson & Hauck, 2008) a number of factors that promote effective learning in the classroom were identified including active learning, providing

This quality assured paper appeared at ITX 2014, incorporating the 5th annual conference of Computing and Information Technology Research and Education New Zealand (CITRENZ2014) and the 27th Annual Conference of the National Advisory Committee on Computing Qualifications, Auckland, New Zealand, October 8-10, 2014. Mike Lopez and Michael Verhaart, (Eds).

feedback, increasing attention span and motivation, with all of these being seen as being particularly challenging in large lectures (Beatty, 2004) and for Net Generation learners (Robinson & Ritzko, 2006). The importance of feedback was also highlighted (Bangert-Downs et al, 1991) with the timing of the feedback being seen as especially important (Azevedo & Bernard, 1995; Kulik & Kulik, 1988).

2.2 Use of Texting on Mobile Phones

The development and trial of a short-message-service (SMS) based classroom interaction system was trailed in a 2007 study (Scornavacca, Huff & Marshall, 2007). The theoretical background for this work included the use of large lecture theatres to produce effective and scalable approaches to teaching large classes, and how this approach can be used at the expense of student interaction which can result in reduced student engagement, motivation and learning as outlined in other studies (Freeman & Blayney, 2005).

The system developed was based around the assumption that a large proportion of students have SMS enabled mobile phones with them during lectures, and that these could be used to enable the lecturer to receive messages from students during a lecture. The system developed involved the use of a SMS management tool (SMS Studio) and was used in two different ways during lectures. Firstly it was used to allow students to send messages to the lecturer during the lecture that could be responded to during the lecture or afterwards (open channel mode). Secondly it was used to present students with a discussion topic to be discussed in small groups, and then respond to a multi-choice question based on the topic (m-quiz mode). Approximately one quarter of the students participating in open channel mode, and over half of the students responding in m-quiz mode (Scornavacca et al, 2007).

It was concluded that the additional channel of communication was of benefit to both students and lecturers compared with when there was no equivalent channel. There was a perceived increase in the quantity and quality of feedback from the students. It was also identified that an area for further research was related to any change in student learning and performance when using such a system, and whether this would be different across a range of contexts and subject area (Scornavacca et al, 2007). This development and trial provided the initial impetus for one of the prior phases of this study in which texting based application was developed and used to enable students to have small group discussions in large lectures and provide open ended answers to questions from the lecturer (Nesbit & Martin, 2010).

In a further phase of this study (Nesbit, 2012) the use of a texting based application to increase student engagement from the perspective of the students with this showing that there was significantly more willingness on the part of students to interact when the system was used.

2.3 Use of Apps on Smart Phones and Tablets

The next and most recent prior phase of this study reported on a survey conducted in late 2012 that showed the ownership of devices such as smart phones, tablets and laptops (mobile web enabled devices) had reached the point where they could be considered to be PPSCTs (Nesbit, O'Steen & Bell, 2013).

This most recent prior phase (Nesbit, O'Steen & Bell, 2013) analysed the use of apps on mobile web enabled devices in a large class and indicated a positive response from the students involved with a particular emphasis on the anonymity of responses and the timing of feedback.

An initiative analysed involved students being able to use applications on smart phones to participate in lectures (Calma et al, 2014). In each lecture students were asked to answer five multiple choice questions using either a smart phone app or using pen and paper. Results indicated that students found the approach useful irrespective of whether they used the app or pen and paper. One of the most useful factors was the immediate feedback that was only really possible when students used the app. The implications highlighted in this study are that there is a significant potential to increase student engagement following this approach.

2.4 Summary of Literature Review

Irrespective of whether the devices used are clickers, mobile phones that can text or apps on mobile web enabled devices, the perceptions of students have generally appeared to be positive, with providing interaction that might not normally be possible, providing anonymity and providing faster feedback.

3. RESULTS

This section presents the results of this phase of the study. The lecturers are identified as Lecturer A, B, C and D respectively to preserve their anonymity and the apps used are identified as being App X, Y and Z respectively as this study is application neutral.

3.1 Case 1

Lecturer A adopted the use of an application (App X) that had been developed by a group of computer science students at the university where they are employed to teach a first year business related subject. App X was developed as a web application that was able to run on smart phones as well as tablets and laptops.

App X allows for interaction between the lecturer and students in a number of ways during a lecture. These include:

- Students answering questions of a multiple choice nature using the application and having a histogram of the results displayed to all the students
- Students answering open ended questions with their answers being displayed to all the students
- Students asking questions or making observations and the lecturer answering the questions with the questions potentially being displayed to all the students

Lecturer A has used this application and the learning management system (LMS) that has been adopted by the university across several semesters to increase student engagement in large lectures, partly through the use of the "Flipped Classroom" concept (Tucker, 2012).

There are typically more than 200 students at each lecture in the course with many of the students having studied content previously. The students are asked to read some content prior to coming to the lectures and the lectures typically commence with students answering multi-choice questions using their mobile web enabled devices. This allows the lecturer to determine which particular content needs to be addressed in more detail as the lecture commences. The students can discuss their answers with other students before responding which allows students to participate whether they have a mobile web enabled device with them or not.

Students are also encouraged to ask questions or make comments using App X during the lecture. Some of the comments made are of a humorous nature from the perspective of the lecturer can create a good atmosphere for learning. Some of the questions have been "are we supposed to know this already?" or similar and have resulted in lecturer needing to re-

explain the nature of the “Flipped Classroom” approach that has been adopted. Other questions about content have helped the lecturer become aware of concepts that may need more explaining.

One of the key aspects identified by the lecturer in how well the approach has worked is that of anonymity as the responses made using the application are anonymous which can result in students asking questions that they would not normally ask.

There is no requirement for students to participate in the use of the application and there are no marks associated with participating which addresses the issue of some students not owning a device that the application can run on. To partly address this, the students are encouraged to discuss questions with the people sitting next to them.

Of particular interest to the lecturer are the discussions that take place between the students when answering the questions and whether that is aiding the students learning. A visually impaired student has commented to the lecturer that they gain a lot from listening to the discussions of the other students about the content that is being talked about.

The response from the students in these classes to the lecturer has been very positive about the approach that has been taken and that they feel it is student led and student focussed.

3.2 Case 2

Lecturer B adopted the use of an application (App Y) that is freely available for all to use. The lecturer uses App Y at the university where they are employed to teach a first year business related subject. App Y is undergoing development as a web application that runs on smart phones as well as tablets and laptops.

App Y is similar in concept to App X (used in Case 1) in that it allows for interaction between students and the lecturer in the many of the same ways that were described above in Case 1. Lecturer B uses App Y to increase student engagement in large lectures and had also previously used clicker technology (Martyn, 2007) for the same purpose. In the first year course that is the focus of this case there are typically in excess of 200 students at each lecture.

The lecturer uses the application to get students to answer multiple choice questions about content as it is covered with the aim of keeping the students involved and also to check their understanding about concepts as they are being covered.

The students are encouraged to discuss the questions with the people they are sitting next to, and the lecturer believes that there is some benefit to the students in doing this. There is no requirement and no marks associated with students participating with the use of the application which addresses the potential concern of students who do not own a device that the application can run on.

The students appear to enjoy the use of the application in this way and the lecturer believes that this may also help their learning, but does not have any hard evidence to prove that this is the case. The lecturer believes that one of the keys to the success of this approach is the idea of anonymity.

As indicated earlier, the lecturer had previously used clicker technology for the same purpose. The main difference between using clickers and using App Y is that the vast majority of the students have a device that the application runs on, whereas previously the clicker devices had to be given out at the start of the class and collected in at the end of the class.

3.3 Case 3

Lecturer C adopted the use of App Y (the same application as for Case 2) for use at the university where they are employed to

teach a second year business and information systems related subject. The lecturer uses App Y with the aim of increasing student interaction and engagement in large lectures. In the second year course that is the focus of this case there are typically 100-120 students at each lecture.

The lecturer uses the application in a number of ways in the lectures including:

- Students discussing (in small groups) questions that need open ended answers and having one person in each group submitting the answer for that group so that the lecturer can display the responses to all the class and give feedback on them.
- Students being asked at the end of the lecture to discuss (in small groups) either (a) what the most important concept covered in the lecture was or (b) what is the one thing from the lecture they would like to have explained again. In both cases one person in each group submits the response for the group so that the lecturer can display the responses to all of the class and give feedback on the responses.

The main driver for this lecturer in adopting this technology was to enable small group discussion to take place about the content, and to get feedback about what the students understand about the content that has been covered.

The lecturer sees anonymity as being one of the keys to the success of this approach as well as students being able to see a range of different responses to the questions.

3.4 Case 4

Lecturer D adopted the use of App Z for use at the institute of technology where they are employed to teach on a pre-degree level computing, communications and business course. The main motivation for the lecturer in this case was to improve the student interaction during classes, with the classes generally having between 20 and 25 students in attendance.

The application was used by the students to submit answers to open ended questions. If the students were required to respond verbally, the lecturer would normally have 2-3 responses, whereas when the application is used over half of the students would typically respond.

The lecturer believes that feedback on the responses is vital, particularly accentuating the good parts of answers that may not be completely correct, and that there is also some real benefit in the students seeing what each other are thinking.

The benefits to the lecturer are that the approach encourages students to think about the questions more and that it makes it easier to “see where the class is at”.

The application has also been used for students to answer questions like “are there any more questions?” and “do you want to go over this again?” and it has been observed that the students are more responsive than if they had been asked to do these things verbally.

The feedback from the students has been positive, including comments like “it is cool”. Keys to the success of the approach are seen by the lecturer in this case as being the anonymity of responses and that the devices have almost become “prosthetics” for many of the students.

4. ANALYSIS, DISCUSSION & CONCLUSIONS

A number of themes emerge from an analysis of the four cases that have been described with these being shown in table 1.

Table 1 – Themes Emerging from the Cases

Students appear to interact a lot more with the lecturer than if required to verbally.
The concept of anonymity is one of the biggest drivers behind the success of what has been done with this concept being consistent with some of the literature (Flies & Marshall, 2006).
The desire of lecturers to understand what the students are thinking or understanding about the content being a motivating factor.
Some students appear to benefit from discussing their responses with the student sitting next to them with this perhaps having relevance to auditory learners as per the VARK model of learning styles (Fleming, 2006).
Students (from the lecturers' perspectives) appear to enjoy using applications on their own personal devices.
Lecturers being able to give feedback based on student responses in almost real time is seen as being a benefit by the lecturers.
There are a number of modes in which applications on mobile web enabled devices can be used to increase student engagement including students answering multiple choice questions; answering open ended questions; asking for some content to be re-explained; describing the most important content being covered, and asking general questions.

These themes that have been identified from the four cases demonstrate that the use of applications running on mobile web enabled devices do have the potential to enhance student engagement in large lectures from the perspective of the lecturers.

These themes will form the basis for future research into lecturers using applications similar to the applications used in the cases in this paper.

The themes will also form the basis for the creation of a survey that can be completed by students in classes where these applications are being used to gain an understanding of how important these themes are from the perspective of students and their perception of the different ways in which the applications can used.

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