Enriching student engagement: Cloud-based polling software adapted to modern learning environments

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ABSTRACT

In recent years educators have looked for ways to improve the quality of student engagement and feedback, particularly in large classes, through the use of interactive classroom response systems. More sophisticated cloud-based systems and the uptake of smart mobile devices have allowed for increased student participation opportunities. A potentially richer feedback environment for classroom interactions has also been made possible with the latest available mobile technologies. The purpose of this paper is to report the findings of the first iteration of a design science project, using polling software to enhance student engagement. Of particular interest was whether any benefits reported in previous studies, involving larger student groups, were scalable down to smaller learning spaces and relevant for blended delivery modes.

Keywords

Student Engagement, Student Learning, Classroom Response Systems, Polling Software, Cloud-based Technologies, Mobile Technologies

INTRODUCTION

This study sought to replicate in a local institutional context the findings of Nesbit and Martin (2010) who explored the level of student engagement and possible pedagogical value of small group discussions/individual responses being shared with the wider class audience through the use of short message service (SMS) and a database display (SMS Studio software).

From the literature they identified eight key threads that were relevant for their study of large first year accounting classes:

I. Cost and simplicity of devices
II. Pedagogy defining the use of any technology
III. Anonymity of student feedback
IV. The implications for learning and not just engagement for students (but much harder to measure)
V. Timely provision of feedback to students
VI. Effective question construction
VII. Necessary economies of scale for technology to be cost effective
VIII. Provision of an additional communication channel
Nesbitt and Martin (2010) concluded that their experiments demonstrated that at least a few of these aspects could be met, namely: the relatively low cost of participation for students; anecdotal increased engagement by a large class; timely feedback possible to student responses and a positive reaction of the system by students. In short these findings encouraged further experimentation.

A major question for research of this pilot study was to see how many of these perceived benefits could be observed in smaller class sizes when using similar technology in blended as well as in traditional transmission-based teaching and learning situations.

The initial intention of this study was to trial SMS Studio at Manukau Institute of Technology (MIT) to see if similar positive effects on student engagement could be observed. Newer web-based software (in this case Poll Everywhere™) was instead chosen, primarily because of offering a lower student access cost through a WIFI option as well as SMS. Its design also permitted richer feedback possibilities e.g. multi-sentence responses to open-ended questions. The software would serve as a useful addition to existing blended delivery methods available.

LITERATURE REVIEW

Scornavacca, Huff., & Marshall, (2009) advocated that the unrelenting rate of mobile phone uptake should be embraced by educators as a teaching and learning tool geared for classroom interactions. Their survey data based on a large class of 250 students, unsurprisingly, indicated that a cumulative 84% of students would prefer to text an answer as opposed to raising a hand in class. Less than five years on, the ever growing use of laptops and in particular tablets (a fourfold increase in the 12 months to May 2013), along with the fact that smartphones now comprise about 62% of mobile phones sold in New Zealand (Marketing Week, 2013) gives teachers added opportunities to engage students effectively and to begin to make observations about how engagement impacts on student learning.

The potential risks of using mobile devices to transmit feedback were spelt out by Ferrier (2010) and Dyson (2011) among others. Having the mobile device as the loci of interest might cause distractions and in fact militate against student engagement. However, if accompanied by appropriate teaching techniques (e.g. student-centred learning), the rewards can potentially outweigh the pitfalls.

Hattie (2008) showed, in a large landmark study, that the single most significant effect agent for learning was feedback to students along with quality teaching and the students’ cognitive abilities. As these are key components of student engagement, the potential for better classroom outcomes exists if the technology/learning activity mix is appropriate.

As part of their Digital Initiative series Duke University science lecturers used the cloud-based Poll Everywhere™ software as chosen by this study. (Duke University, 2010) They were able to facilitate the following types of engagement activities:

- Encouraging class discussion using multiple choice question prompts or opinion polls and displaying aggregate results
- Assessing student understanding using in-class quizzing to gauge student understanding
- Promoting active participation by engaging students and avoiding passive classroom environments
- Surveying students anonymously to enable students to weigh in on controversial subjects

The above study was noted only after the data for this paper was gathered. So it was interesting to see the same basic range of activities and objectives undertaken by both sets of research. Of further note was that they both involved smaller class sizes (15-70 students). The Duke University study was limited to yielding a set of general impressions gathered by four faculty members about student participation and perceived engagement with class activities. While no hard data was published the summarised consensus among those surveyed was that using the software had a positive effect in these areas. Since they were using mainly the texting functionality of Poll Everywhere™ there was concern about intermittent cellular reception in some teaching venues.

BACKGROUND

This paper’s research was gathered over a series of classes of a 15 credit, Personal Environment course, and part of a Level 4 Certificate in Computing, Communication and Business (Cert CCB). This qualification was, until 2014, a foundation pathway to further degree/diploma study in MIT’s Faculty of Business and Information Technology.
The Personal Environment course complements specialty subjects within the Cert CCB and covers subjects such as self-awareness, assertive behaviour, dealing with stereotypes, effective organisational communication and group work theory.

All certificate courses have a strong blended delivery mode that allows for interaction between the lecturer and individual and small groups of students.

Giving and receiving feedback is a feature of learning in the class and it has traditionally been forthcoming as the students have been together engaged in classroom activities as a cohort for at least five weeks prior to the Personal Environment course.

The class size of 25 allowed this study to see if the methods to increase student engagement in larger classes could be scaled down to relatively smaller student groups. The lower student to teacher ratio also presented possibilities to trial techniques that could further enrich student engagement. This, in theory, would be possible with the recent availability of web-based technologies.

A local impetus for experimenting with new technologies was the impending move of the Faculty to a purpose-built campus in Manukau City (Semester 2 2014) which would feature modern open and closed learning spaces and a BYOD (Bring Your Own Device) learning environment.

Notwithstanding the aforementioned principles for a successful student engagement platform, the main drivers to experiment with an interactive engagement platform were:

- Immediacy of feedback (for both lecturer and students)
- Accessibility, convenience and cost not major barriers
- Potential to enhance learning through measurable increased engagement

A standard method of engagement in a lecture/classroom setting is to ask for voluntary answers from individual or small groups of students who have been set a task. Salient points would be summarised on a whiteboard by the lecturer and/or discussed with the wider class. Alternatively the task or question at hand may require a student response via a blog comment on the class’s LMS page. Follow up comments/posts were generally forthcoming from students, but some needed to be prompted to contribute to the discussion at hand. Predictably it was noticed that some enjoyed making oral contributions to each class more than others, unless topics of strong general interest arose. As expected, none of these engagement methods guarantee 100% participation all of the time.

**METHOD**

A series of classroom activities was facilitated via Poll Everywhere™ over a number of Personal Environment classes in Semester 1 2013.

These class sessions were chosen because of the potential value the software would offer in the learning delivery of selected course material. The format offered by the software would need to be relevant to the topic being explored and thus more likely to contribute to actual learning rather than employing technology for its own sake.

To capture data the lecturer discreetly monitored the number of individual student contributions over a series of classes prior to using the polling software. This was also done before and after each time Poll Everywhere™ was used in selected classes. The class roll formed the basis for ascertaining student attendance for each class.

**Access and Equity**

According to enrolment records all but one student out of twenty five possessed a cell phone and just about half regularly brought another type of mobile device to class such as a laptop or tablet with WIFI capability. Nevertheless it was stressed that participation in the activity was not compulsory. In the event many responses were specified to be given by students working in pairs/small groups to allow greater access and spread the small cost of texting. The availability to respond through the Poll Everywhere™ web browser allowed for practically costless responses.

**Anonymity and Moderation**

To assure student comfort and safety it was emphasised that all responses would remain anonymous for display and discussion purposes. It was pointed out that students would never receive spam texts as a result of using the system. The software does not keep or allow the display of any cell phone numbers or ask for personally identifiable information to use the system.
This study used the basic Poll Everywhere™ system which was free to groups under 40 people. But there was no facility to filter any inappropriate comment in this version. This was considered a low risk in view of the relatively small group who were familiar with each other and with the lecturer. In the event only one relatively mild and humorous comment was received that was not appropriate to the task.

**Subject/Question Selection**
This study was keen to establish any possible comparisons between the general level of student engagement before and after using the system. Moreover in the literature, August (2012) cautions against overusing the software. To that end only eight sessions were used for overall comparison purposes and of those only four classroom sessions out of approximately sixteen featured student polls. Some prior thought was therefore necessary to feature content and activities that would be conveyed effectively by using Poll Everywhere™ software.

**Discussion/Findings**

**Student Engagement Outputs**

![Poll Everywhere screenshot](image)

**Figure 1**

In Figure 1 we see a straight-forward poll based on a case study resource made available to students, around selecting appropriate anti-stereotyping strategies. Displayed responses would lead to a useful and immediate follow-up class discussion to reinforce learning.

Figure 2 gives an indication that a richer degree of feedback can be had in Poll Everywhere™ than in some other Audience/Classroom response systems (especially if inputted through the web browser). Multi-sentence responses are possible, allowing more in-depth answers to posed questions which could indicate that the software can engage students on a cognitive level, not just on an emotional or behavioural one. Nesbit and Martin (2012) surmise that this is frequently an issue regarding the effectiveness of, for example, using social media and indeed many interactive technologies in a learning context.
In Figure 2 we see a selection of responses where students have been asked to respond to a given stereotyping situation using more than one suggested strategy simultaneously. As expected some student responses contained more strategies than others (for a full list of responses see Figure 3 overleaf).

Poll Everywhere™ also keeps a useful record of poll responses. In Figure 3, on the following page, the full bank of captured responses can be seen. It was interesting to see that most students favoured using the web browser as opposed to texting, very likely because of the relative ease of inputting via this method (or a smart phone) and the perceived cost factor of texting.

Student Engagement Comparisons
Would the level of student engagement noticeably increase as a result of displaying selected questions on a data show and allowing responses to be made by texting or through a web browser?

The software allowed the lecturer to invite and capture student generated data which in turn could be discussed and fed back, almost in real time. Aspects of student learning could therefore be immediately reinforced. It seems logical that the prospect of timely feedback would enhance the desire of the student to give it in the first place.

The medium presented an anonymous and therefore non-threatening channel to contribute to class activities which empowered some students who were otherwise hesitant to contribute.

Because of the relatively low student numbers and the anecdotal nature of measuring student engagement, this pilot study can only suggest a basic but encouraging correlation between the use of this technology and the level of such engagement. Table 1 captures some in-class, real-time observations in the eight classes (Four of these classes using Poll Everywhere™; the other four without using the programme) with an approximate tabulation of noted engagement events.
Results for Give an answer to stereotyping that contains more than one strategy

Summary

<table>
<thead>
<tr>
<th>How people responded</th>
<th>Sent to</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Web or smartphone</td>
<td>(our site)</td>
<td>10</td>
</tr>
<tr>
<td>Text (AU)</td>
<td></td>
<td>3</td>
</tr>
</tbody>
</table>

Individual Responses

<table>
<thead>
<tr>
<th>Response</th>
<th>Via</th>
<th>Received at</th>
</tr>
</thead>
<tbody>
<tr>
<td>do we just agree some values around the way we treat each other and relate each other, and then give effect to the idea that in a world of market segments of one everyone’s contribution has value and deserves respect? Well I don’t know!!</td>
<td>Web</td>
<td>July 5, 2013, 10:52 AM</td>
</tr>
<tr>
<td>Hey Mike, hold on a minute. Are you even listening to the words coming out of your mouth? You are stereotyping people just because they are immigrants or they can’t speak English properly. They are not stupid, just need a little bit more training. Stop being bias and let’s work on how to solve this problem.</td>
<td>Web</td>
<td>July 5, 2013, 10:40 AM</td>
</tr>
<tr>
<td>Hi mum</td>
<td>Web</td>
<td>April 17, 2013, 01:57 PM</td>
</tr>
<tr>
<td>I don’t think it is your job to supervise the workers instead of blaming them? I think I advice you to keep a mentor for the workers who can direct them to the job. Also you can draw a mind map which explains all the tasks in a simple way. You can also re-question the workers if they understand the task provided.</td>
<td>Web</td>
<td>April 17, 2013, 01:56 PM</td>
</tr>
<tr>
<td>Mike I know you mean well but could you please elaborate? I am an immigrant, do you think I am slow? Everyone is bit slow at first.</td>
<td>Text (AU)</td>
<td>April 17, 2013, 01:54 PM</td>
</tr>
<tr>
<td>Hey mike do you think that’s a fair statement? Maybe in future we should clarify instructions. I think anybody on a new job is going to have teets</td>
<td>Text (AU)</td>
<td>April 17, 2013, 01:53 PM</td>
</tr>
<tr>
<td>Ouch Mike, wouldn’t you struggle if you had a language barrier? We may have lost this order today, but we still have one tomorrow, and the following day. People need to make mistakes to learn. Not everyone is the same. The workers were trying their hardest to complete the job to the standard you want, our company only works to the highest standards, so they strive to complete their work with such standard. Mike, some had to sign off the workers, and the work they’ve done.</td>
<td>Web</td>
<td>April 17, 2013, 01:52 PM</td>
</tr>
<tr>
<td>I know you mean well Mike, but that was offensive. Are you speaking of someone in particular? and how can we solve this problem?</td>
<td>Web</td>
<td>April 17, 2013, 01:52 PM</td>
</tr>
<tr>
<td>‘are you referring to one person in particular?’</td>
<td>Web</td>
<td>April 17, 2013, 01:52 PM</td>
</tr>
<tr>
<td>I know you are frustrated of the job being not done but I think its not fair to blame the workers only. Anyone can make mistake.</td>
<td>Web</td>
<td>April 17, 2013, 01:51 PM</td>
</tr>
<tr>
<td>Assume good intent “i know you don’t mean that in a negative light, so could you please explain...” Ask a question “Do you mean all of them are the same?” Interrupt and redirect “Excuse me, Mike. But don’t you think we should actually be talking about how the coffee machine is always out of coffee? PRIORITIES! Broden to universal behaviour “I hope you don’t think that all immigrants are the same!”</td>
<td>Web</td>
<td>April 17, 2013, 01:50 PM</td>
</tr>
</tbody>
</table>

Figure 3
Table I

<table>
<thead>
<tr>
<th></th>
<th>Classes Without Poll Everywhere™</th>
<th>Classes With Poll Everywhere™</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Average attendance over 8 classes (4 with and 4 without Poll Everywhere™)</strong></td>
<td>22</td>
<td>22</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Average No. Responses - Prompted Questions/Activities from Individual Students</strong></td>
<td>12</td>
<td>19</td>
<td>+58%</td>
</tr>
<tr>
<td><strong>Average No. Responses - Unprompted Questions/Contributions from Individual Students</strong></td>
<td>5</td>
<td>13</td>
<td>+260%</td>
</tr>
</tbody>
</table>

Noticeable increases in the level of student engagement were observed as a result of using the software, as opposed to other in-class activities designed to encourage participation (as shown by the average number of prompted questions in Row 3 of Table 1). The organisational communication content area seemed an ideal subject for students to apply their cognitive skills and polling software presentation in many instances lent itself well to this. But as the literature demonstrates these systems can be successfully, if judiciously, used across a broad spectrum of learning disciplines. (Duke University, 2010).

Table 1 suggests, too, that the polling software could have had an “icebreaking effect” on the overall level of task related contributions by class members. The general level of student engagement (as measured particularly by the average number of unprompted questions/contributions) during a session when the software was used did rise significantly once a poll was facilitated in class. A nearly three-fold increase in the number of student class responses (mainly in oral class participation) was noted on average. Did activities involving Poll Everywhere™ contribute to a sense of confidence in, and ownership of, the classroom environment by students? This would point towards (but obviously not yet prove) a possible level of engagement that could go beyond the behavioural norms of a student cohort or even an emotional engagement that resulted from the novelty factor of using new technology.

The richer feedback possible with Poll Everywhere™ and other recent systems is an area for further research. More studies are needed across a range of classes and disciplines areas to see if similar results with a variety of sample sizes are replicable. The software lends itself well to smaller class sizes where student responses can to be analysed by the class teacher and adequately acknowledged. The availability to capture more in-depth student responses tantalisingly invites comment and analysis about the quality and measurability of learning to which these systems may be able to contribute.

**CONCLUSION**

Many of the initial principles mentioned in the introduction of this paper by Nesbit and Martin (2010) along with other probable contributors to student engagement were incorporated into this pilot study and had a bearing on the results. These factors are indeed scalable as this initial study questioned. It is hard to claim to what extent any one factor such as platform cost, ease of use, immediacy of feedback, participation anonymity and the like contribute to measure levels of student engagement without a more rigorously framed research project. One could survey student impressions, for example, and derive possibly significant quantitative and qualitative data. Being able to analyse the role played by the various types of engagement students experience would also be useful. In turn, exploring how we can meaningfully gauge the relationship between student engagement and actual student learning would be a logical step for further collaborative tertiary education research.

The exponential take-up of smart mobile devices gives unprecedented access and opportunity for students to engage in different types of learning environments. As much as there are potential pitfalls associated with such technology, educators should be open to use and adapt accessible technologies that will produce credible and enriched student engagement. A worthy goal to which this small pilot study has also pointed.
REFERENCES


