

# Use of Smart Phone Applications and Purple Shirts to Enhance Student Engagement in Large Lectures?

*Trevor Nesbit*  
University of Canterbury  
*trevesbit@gmail.com*

*Billy O'Steen*  
University of Canterbury  
*Billy.osteen@canterbury.ac.nz*

*Tim Bell*  
University of Canterbury  
*Tim.bell@canterbury.ac.nz*

## ABSTRACT

The need to increase student engagement in large lectures has been addressed in a number of studies with this paper being one phase in an ongoing study into the use of applications on mobile devices to address this need.

The purpose of this paper is to present the results of a focus group conducted with a group of students from two courses where an application running on smart phones and similar devices was used to facilitate feedback from small group discussions during lectures. The motivation for this paper came from the need to triangulate some of the findings from earlier phases of the study relating to the importance of anonymity, issues surrounding requiring students to own devices like smart phones, the coverage of course content, not overusing the technology and the importance of lecturer feedback.

The paper confirms findings of earlier phases of the study that surround the importance of feedback from lecturers and the significance of issues surrounding requiring students to own devices like smart phones. Light is also shed on the high importance of anonymity for some students. Issues surrounding the impact on time to cover course content and overusing similar technologies require further exploration. That the use of applications can serve to increase the enjoyment of learning also emerged and was related to an ongoing thread of interactions using an application across two semester that related to a purple shirt that was sometimes worn by one of the lecturers in the course.

**Keywords:** student engagement, large lectures, smart phones

## 1 INTRODUCTION

This paper is part of an ongoing study into the use of applications on mobile devices (for example smart phones) to enhance student engagement in large lectures. This phase presents an initial analysis of the results of a focus group that was conducted with a group of students about their perspectives. In the two classes the application Socrative was used to allow students to submit open ended responses to questions that they had discussed in small groups so that the lecturer could give feedback to the entire class on their responses.

Earlier phases in the study have included the development and trial of an SMS-texting based application (Nesbit & Martin, 2010; Nesbit, 2012), identifying that the ownership of smart phones had reached a level where the study could move to applications on mobile devices (Nesbit, O'Steen & Bell, 2013), an initial analysis of the experiences of lecturers who have used applications and the resulting benefits (Nesbit, O'Steen & Bell, 2014), an initial analysis of the experiences of learning advisers who have supported lecturers using applications (Nesbit, O'Steen & Bell, 2015a), and an analysis of student responses to a survey regarding the use of applications across two accounting information systems courses (Nesbit, O'Steen & Bell, 2015b),

One of the motivations for conducting the focus group was to triangulate some of the findings of the earlier phases of the study with a model that had been developed from the literature with the aim of further validating some of the findings, particularly as they relate to the importance of anonymity, issues surrounding the ownership of devices like smart phones, the time needed to cover course content and the

importance of feedback from the lecturer.

## 2 LITERATURE REVIEW

The study completed by Kay & Le Sage (2009) identified six threads in the literature relating to the use of audience response systems with these being classroom environment benefits, learning benefits, assessment benefits, technology based challenges, teacher (or lecturer) based challenges and student based challenges. Two additional threads were identified with these being pedagogical issues (Flies & Marshall, 2006; Beatty, Gerace, Leonard & Dufresne, 2006; Blood & Gluchak, 2013; Brady, Seli & Rosenthal, 2013; Wolter, Lundeberg, Kang & Herreid, 2011; Camacho-Minano & del Campo, 2014; Stewart & Stewart, 2013; Latham & Hill, 2014) and the cost and simplicity of devices (Freeman & Blayney, 2005; Scornavacca, Huff & Marshall, 2007; Chen & Lan, 2013; Blood & Gulchak, 2013).

A summary of the eight threads is shown in Table 2, with the aspects under each thread that have been added to or renamed from the study completed by Kay & Le Sage (2009) being marked with an asterisk.

## 3 RESEARCH METHOD

Seven students responded to an email invitation to participate in the focus group. The students were from two classes that had been taught by one of the authors in the previous semester, with the invitation not being sent to students that were being taught by any of the authors in the semester the study was completed in.

In the first part of the focus group the students were given a list of 15 statements (see Table 1) and were asked to rank the statements into order based on how strongly they agreed with them. A more general discussion surrounding the use of Socrative followed this.

The statements and the results of the rankings are shown in Table 1 and are sorted by the average ranking of how strongly

---

This quality assured paper appeared at the 6<sup>th</sup> annual conference of Computing and Information Technology Research and Education New Zealand (CITRENZ2015) and the 28<sup>th</sup> Annual Conference of the National Advisory Committee on Computing Qualifications, Queenstown, New Zealand, October 6-9, 2015. Michael Verhaart, Amit Sarkar, Rosemarie Tomlinson and Emre Erturk (Eds).

they were agreed with. The standard deviation of the ranking for each statement is also shown.

A summary of the comments made by participants in the focus group (grouped into categories relating to the threads emerging from the literature review) are recorded in Table 1.

## **4 RESULTS, ANALYSIS AND DISCUSSION**

This section presents an analysis of the results of the ranking exercise that was conducted in the focus group and on the discussions that took place during the focus group, with this being broken down by the threads emerging from the literature review as shown in Table 2.

### **4.1 Classroom Environment Benefits**

The importance of anonymity of student responses was highlighted as being very important in the literature as well as in the interviews of lecturers (Nesbit, O'Steen & Bell, 2014), interviews of learning advisers (Nesbit, O'Steen & Bell, 2015a) yet in the surveys of students was not seen as having quite the same level of importance (Nesbit, O'Steen & Bell, 2015b). The data in Table 1 shows the statement relating to anonymity (statement 1) has a mean ranking of 9.4 which puts it more than half way down the list which appears consistent with the results of the surveys (Nesbit et al, 2015b). However this particular statement has the highest standard deviation of the rankings across the students (5.7) indicating a wide variation in the rankings for these students (rankings of 1,2,11,11,13,14,14) which suggests that there is a very high level of importance for some of the students.

Discussion relating to anonymity highlighted that the use of applications for the person would be "good for less extraverted people or those that are shy", and that students feel better about asking a lecturer to slow down if they are anonymous. This was further highlighted by the general feeling that they (the students) would not want to interrupt with a lecturer with a question, but would feel OK with asking questions using an application.

When it comes to engagement there were comments relating that there was clearly more engagement, particularly from students who wouldn't normally engage. There were also comments that the use of the applications "makes me think more" which is a sign of increase cognitive engagement (Fredricks et al, 2004).

There was some comment about how some students not bothering to participate, but there was a general feeling that this was balanced by more students participating than normal. It was also commented that the use of applications in this way encouraged attention.

When it comes to making learning more enjoyable it was agreed that the comic relief that the use of applications could create was good for the classroom environment. This related to the lecturer for one of the courses wearing a purple shirt to their first lecture of the year in a different course and that comments relating to the purple shirt (whether it was being worn or not) continued through that course and into one of the courses that is the subject of the this part of the study. The general feeling from the focus group was that this added to the enjoyment and atmosphere of learning.

### **4.2 Learning Benefits**

When it comes to the learning benefits thread, there were comments from the students in the focus group that included it "makes things clearer", and the "seeing different words that others used was helpful". There was also a general feeling amongst the students that the activity surrounding the use of

the application created a break that was good for their learning.

It was also commented on that if the application was being used for students to ask questions that it is good to be able to see what the student had asked as it is not always possible to hear what the student asked. This was particularly useful when the lecturer had a long answer to the question as it enabled other students to recall what the question was asking.

There was agreement from some of the students that being tested to check their learning during class could result in less studying as students know what it is they know. This was consistent with the findings of Chui et al (2013) who reported that students using response systems in classes reported being more confident in their abilities and spent less time preparing for the course outside of class, without there being any difference in course performance than students who did not use response systems.

### **4.3 Assessment Benefits**

Statement 7 regarding feedback from the lecturer helping learning has the second highest level mean ranking is consistent with the importance of feedback identified in the summary of the literature conducted by Kay & Le Sage (2009) and in the earlier phases of the study conducted in Nesbit et al (2014), Nesbit et al (2015a) and Nesbit et al (2015b).

This was also discussed during the focus group and there was a general agreement with the concept that it was good to get feedback and correct and incorrect answers to questions.

### **4.4 Technology Based Challenges**

The survey of students in Nesbit et al (2015b) did not question students about issues relating the ownership of devices, however, it is paid a lot of attention in the literature and was paid some attention in the interview of lecturers (Nesbit et al, 2014) and in the interviews of learning advisers (Nesbit et al, 2015a). The statement that received the second lowest level of average agreement was statement 13 (requiring all students to have a device) indicating that there is a strong level of feeling about the issue of students being required to obtain devices that they currently do not have. It is interesting that statement 3 (requiring all the students to use an application like Socrative) is half way up the list as this separates out the ownership of the device from the use of the application.

The concept of making participation using the application a course requirement with the members of the focus group not being sure if that was a good idea overall, but there was a general feeling that if participation was a requirement for a course, then perhaps the course should provide the technology.

There was also a general sense of agreement that students not having a device could be a problem, however it was also agreed that this could be solve by getting students to work in small groups.

### **4.5 Lecturer Based Challenges**

The issue of having time to cover course content was identified in the literature and in the some qualitative responses from students that have yet to be reported on elsewhere. It is interesting that amongst the students in focus group that the time taken to use an application can result in losing time for lecture content (statement 14) had the lowest mean level of agreement. While this may point to this not being a big issue from the student perspective, some caution is needed due to the students having volunteered for the focus

group. The importance of not overusing the technology (statement 2) can also be seen in a similar light.

The issue of having time to cover lecture content was also raised during discussion time in the focus group, with some students suggesting that multiple choice questions might be better than questions with open ended answers as a way of not losing as much time for covering content.

#### 4.6 Student Based Challenges

The students were asked for their views on whether applications could or should be used for checking attendance and on whether marks should be allocated for participation. On the subject of checking for attendance it was not generally seen as being a good idea.

When it came to the concept of allocating marks for participation there we mixed views. There was a view that there would be some implementation issues, particularly where not all students might have a device. As a consequence of this part of the discussion it was generally felt that it would be better if marks were not allocated for participation so that the use of the applications would remain optional.

#### 4.7 Pedagogical Issues

The concepts of contingent teaching and question driven instruction were discussed with the students in the focus group with the general agreement that both approaches were of value and that they would also work with multiple choice questions.

When it came to the use of applications in classes of a range of sizes it was agreed that there was more added value in large classes as there tends to be less interaction as classes get larger.

As indicated in the student based challenges, it was generally agreed in the focus groups that it would be better if the use of the applications was optional.

The wider range of question types that were possible with using applications as opposed to being restricted to multiple choice questions was seen as being an advantage of the use of clickers.

#### 4.8 Cost and Simplicity of Devices

The statement relating to the application being easy to use had the third highest mean ranking of the statements which is a good indication that the particular application is easy to use.

In the discussion in the focus group the issue of not all students having a device was raised, and how that, in part, could relate to the cost of devices.

The use of applications on devices was generally seen as being an improvement over clickers because of familiarity.

#### 4.9 Other Concepts Raised

Other concepts to emerge from the focus group included:

- The risk of overusing the applications (although the statement relating to this was ranked 12th out of the 15 statements) as this could potentially reduce the engagement and interest of students.
- The idea of using the applications to profile a room of students for their views on an issue, particularly if it was a controversial issue.
- The concept of using the application where lectures are being live streamed to enable students not physically present to participate as this would help to increase their engagement

- The enjoyment of learning that can increase due to ongoing humorous interactions that in this case related to a purple shirt that was often worn by one of the lecturers.

### 5 CONCLUSIONS

The findings confirm the importance of feedback from the lecturers and the significance of the issue surrounding the ownership of devices. Some light is also shed on the high level of importance of anonymity for some students. The issue of coverage of course content and not over using the technology requires further exploration.

### 6 REFERENCES

- Beatty, I. D., Gerace, W. J., Leonard, W. J., & Dufresne, R. J. (2006). Designing Effective Questions for Classroom Response System Teaching. *American Journal of Physics*, 74, 31-39.
- Blood, E. & Gulchak, D. (2013). Embedding “clickers” into classroom instruction: benefits and strategies. *Intervention in School and Clinic*, 48(4), 246-253.
- Brady, M., Seli, H. & Rosenthal, J. (2013). “Clickers” at metacognition: A quasi comparative study about metacognitive self-regulation and use of electronic feedback devices. *Computers and Education*, 65, 56-63
- Camacho-Minano, M. & del Campo, C. (2014). Useful interactive teaching tool: clickers in higher education. *Interactive Learning Environments*. 1-18
- Chen, T. & Lan, Y. (2013). Using a personal response system as an in-class assessment tool in the teaching of basic college chemistry. *Australasian Journal of Educational Technology*, 29(1). 32-40.
- Chui, L., Martin, K. & Pike, B. (2013). A quasi-experimental assessment of interactive student response systems on student confidence, effort and course performance. *Journal of Accounting Education*, 31. 17-30.
- Flies, C., & Marshall, J. (2006). Classroom Response Systems: A Review of the Literature. *Journal of Science Education and Technology*, 15(1), 101-109.
- Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement: Potential of the concept, state of the evidence. *Review of educational research*, 74(1), 59-109.
- Freeman, M., & Blayney, P. (2005). Promoting Interactive In-class Learning Environments: A Comparison of an Electronic Response System with a Traditional Alternative. *Proceedings of the 11th Australasian Teaching Economics Conference*, 23-34.
- Kay, R. & LeSage, A. (2009). Examining the benefits and challenges of using audience response systems: A review of the literature. *Computers & Education*, 53. 819-827.
- Latham, A. & Hill, N.S. (2014). Preference for anonymous classroom participation: Linking student characteristics and reactions to electronic response systems. *Journal of Management Education*, 38(2). 192-215.
- Nesbit, T. (2012). *SMS Messaging Enhancing Student Engagement in Large Lectures: A New Zealand Based Study*. *Proceedings of the Annual Conference of the Society of Research into Higher Education*, Newport, December 2012.
- Nesbit, T. & Martin A. (2010). *Use of Mobile Technologies to Enhance Student Engagement in Large Lectures: An Initial Exploration and Experiment*. *Proceedings of the 23rd Annual Computing and Information Technology Research and Education New Zealand (CITRENZ) Conference*, Dunedin, July 2010

- Nesbit, T., O'Steen, B. and Bell T. (2013). *Prevailing Personal Social Communication Technologies Enhancing Engagement in Large Lectures: From Texting to Mobile Web Enabled Devices*. Proceedings of the Annual Conference of the Society of Research into Higher Education, Newport, December 2013.
- Nesbit, T., O'Steen, B. and Bell T. (2014). *Using Mobile Apps to Enhance Student Engagement in Large Lectures*. Proceedings of ITX 2014, incorporating the 27th Annual Conference of Computing and Information Technology Research and Education New Zealand, Auckland, October 2014.
- Nesbit, T., O'Steen, B. and Bell T. (2015a). *Using Apps on Mobile Devices to Enhance Student Engagement in Large Lectures: Learning Adviser Perspectives*. Proceedings of Annual Educational Innovation in Economics and Business Conference, Brighton, United Kingdom, June 2015.
- Nesbit, T., O'Steen, B. and Bell T. (2015b). *Use of Applications on Mobile Web Enabled Devices to Increase Student Engagement during Lectures for Accounting Information Systems Courses*. Proceedings of World Accounting Frontiers Series Conference, Macau, May 2015.
- Scornavacca, E., Huff, S.L. and Marshall, S. (2007). *Developing A SMS-Based Classroom Interaction System*. Proceedings of the Conference on Mobile Learning Technologies and Applications, 47-54.
- Stewart, S. & Stewart, W. (2013). Taking clickers to the next level: a contingent teaching model. *International Journal of Mathematical Education in Science and Technology*, 44(8). 1093-1106.
- Wolter, B., Lundeberg, M. Kang, H. & Herreid, C. (2011). Students' perceptions of using personal response systems ("clickers") with cases in science. *Journal of College Science Teaching*, 40(4). 14-19.

**Table 1 - Statements Students Asked to Rank Level of Agreement with Ordered by Mean Ranking**

	Statement	A	B	C	D	E	F	G	Mean	SD
11	I would happy with using an application like Socrative to do multi choice quizzes to check on learning during lectures	2	2	8	2	3	4	10	4.4	3.4
7	The lecturer giving feedback on responses to open ended questions helps my learning	5	9	4	6	1	3	4	4.6	2.7
12	Socrative is easy to use	1	1	7	5	6	10	3	4.7	3.1
5	I would be happy to ask the lecturer a question using an application like Socrative	10	14	5	3	2	1	1	5.1	5.0
6	I am happy to work on my own answering questions using an application like Socrative	3	8	10	8	5	5	2	5.9	2.9
15	Questions where there isn't an obvious correct answer are better for my learning	8	7	3	9	10	2	5	6.3	3.2
4	Answering questions out loud and getting them wrong makes me feel bad	13	10	1	7	7	9	9	8.0	3.3
3	I would be happy if we were all required to use an application like Socrative during lectures	7	4	9	14	12	12	7	9.3	3.7
9	If doing questions using an application like Socrative shows I am understanding the content then I am less likely to study it	9	5	6	4	13	13	15	9.3	4.8
1	Being able to respond anonymously using an application like Socrative is important for me	14	13	2	1	11	11	14	9.4	5.7
8	I am happy to work in small groups answering questions using an application like Socrative	4	12	13	11	9	6	11	9.4	2.5
2	It is possible to overdo it using an application like Socrative	11	15	14	13	4	8	8	10.4	4.3
10	I would be happy if an application like Socrative was used to take attendance in lectures	6	6	11	10	14	14	12	10.4	3.0
13	I would be happy if we were all required to get a device to run an application like Socrative on if we didn't have one	15	3	12	12	15	15	6	11.1	4.9
14	The time taken to use an application like Socrative can result in losing time for valuable content	12	11	15	15	8	7	13	11.6	3.4

**Table 2 - Threads Emerging from Literature – Adapted from Kay & Le Sage (2009) and reported in Nesbit et al (2015a, 2015b).**

<p><b>Classroom Environment Benefits</b>  <i>Attendance</i>  <i>Attention</i>  <i>Anonymity</i>  <i>Participation</i>  <i>Engagement</i>  <i>Learning more Enjoyable *</i></p>	<p><b>Technology Based Challenges</b>  <i>Students not having or not bringing the Required Device</i>  <i>Technology not Functioning</i></p>	<p><b>Pedagogical Issues *</b>  <i>Good Teaching Strategies *</i>  <i>Specifically Addressed as Pedagogical Issues *</i>  <i>Issues Relating to Large Classes *</i>  <i>Social Constructivism *</i>  <i>Question Driven Instruction or Contingent Learning *</i>  <i>Instructional Design *</i>  <i>Learning Styles and Cultures *</i>  <i>Optional or Mandatory Participation *</i></p>
<p><b>Learning Benefits</b>  <i>Interaction</i>  <i>Discussion</i>  <i>Contingent Teaching and Question Driven Instruction *</i>  <i>Learning Performance</i>  <i>Quality of Learning</i></p>	<p><b>Lecturer Based Challenges</b>  <i>Responding to Student Feedback</i>  <i>Coverage of Course Content</i>  <i>Development of Effective Questions *</i></p>	<p><b>Cost and Simplicity of Devices *</b>  <i>Cost for Students *</i>  <i>Cost for Lecturers and Their Institutions *</i>  <i>Ease of Use for Students *</i>  <i>Ease of Use for Lecturers *</i></p>
<p><b>Assessment Benefits</b>  <i>Feedback</i>  <i>Formative Assessment</i>  <i>Comparing Responses</i></p>	<p><b>Student-Based Challenges</b>  <i>Adjusting to a new method of teaching</i>  <i>Discussion of topics creating confusion or wasting time</i>  <i>Too much effort required by students</i>  <i>Summative assessment issues</i>  <i>Attendance for grades</i>  <i>Identifying students</i>  <i>Negative feedback</i>  <i>Students with disabilities</i></p>	