RMIT University
Learning and Teaching Investment Fund 2008
Final Report

Project title	**Enhanced Teaching and Learning Interactivity in a Large Enrolment Course:** **Marketing Principles**
Project leader	**Dr Raju Mulye**
Team members	**Dr Kate Westberg**
Funds approved	**$ 28,870**
Funds acquitted (attach financial statement)	**$ 11,784** **Financial Statement Attached.**
Introduction	This project introduces a new level of interactivity to lectures and feedback in a large enrolment, first year course: MKTG1025-Marketing Principles. Application of new technology is used in lectures to enable students to respond carefully to multiple choice questions with immediate feedback to the lecturer on collective responses and then lecturer response, reflections and tailored feedback to the students. In addition, students receive immediate feedback on their understanding of the concepts and how well they are performing compared to their colleagues. The use of this technology encourages more active listening and involvement with the lecture material. These activities and feedback are accommodated within the lecture thereby engaging students with the material being covered, encouraging reflection by students (and lecturer!) and providing an extra spark of interest in student experiences of lectures. The second technology being applied in the course is Podcast – whereby the course coordinator and other teaching staff provide commentary on the lectures and student work. The teaching staff highlight key points arising from (1) student questions (elicited in classes and using the DLS) and (2) their observations of students' work in progress including student performance on DLS administered marketing debates. This is based on the successful experience in this discipline of Peter Wagstaff (Dept of Marketing, Monash University and winner of a Carrick Citation for Outstanding Contributions to Student Learning for his work). The aim of the pod casts is to provide additional feedback to students in a form they can readily access and assimilate. They will be delivered through the DLS using multiple technologies. The pod casts will be implemented in second semester 2008 again with thorough evaluation. Other School staff will be involved in developing the pod cast to help expose a wider group of staff to the potential of technology and these staff members will be consulted to provide their key insights. These project initiatives follow a long personal history of innovation and change aimed at student learning improvement on the part of the course coordinator in this course. A small scale trial of the mechanical version of the CRS (or clickers) was trialled in 2006 with excellent outcome. Marketing Principles is conducted twice each year as well as online and in Vietnam. The initiatives proposed here will be applied in the Melbourne campus delivery though pod casts will also be available to online students.
Detailed project	**PI see attached**

description and outline of what was done	
Attach the full and detailed report and evaluation of your project outcomes including evidence of the impact the project has had. Also make reference to how the outcomes address the five key objectives: • Improved student learning experiences, outcomes and employment opportunities • Innovation • Strategic alignment • University wide application • Value for money	. **PI see attached**
Dissemination of project outcomes both completed and planned. This should include both within RMIT and externally.	**The outcomes of this project were presented** **a) at RMIT's Teaching and Learning Forum, and** **b) in the education stream of the World University's forum.** **The outcomes will also be presented later this year in the School's research seminar series and submitted to an education journal for wider publication.**
Summary of the project, outcomes, impacts and dissemination	This LTIF project aimed at exploring the enhanced learning opportunities provided by the new technology of electronic response systems and pod casting. A review of the literature suggests that when such initiatives are used as part of a wider effort to support active engagement with learning there is evidence that they can support increased motivation and attainment, at least in part as a result of their ability to provide rapid feedback on the learning process. The SRS system was most successful when it was used with mature age students and available free of charge. The Pod casting system, on the other hand, was wholeheartedly embraced by all students and was viewed as the most important feature of the course. The participation rate increased from 40% to 90% over two semesters with the implementation of the hybrid SRS system. The SRS technology appeared to have a positive impact on the learning environment with more class participation ensuing from the discussion of the polled results. More importantly, the feedback from these trials helped Click On developers to come up with a world first system based on the integration of CSIRO's Votapedia technology. We believe the enthusiasm for these approaches will grow as the system is developed further and the technical impediments in its implementation resolved. In terms of learning outcomes, although there was no appreciable decrease in failure rate, there was a substantial increase in student satisfaction rating measured by the course experience survey. In fact this is the first time in the history of the course that a Good Teaching Score (GTS) as high as 71 was

	attained in the lecture stream in which the clickers were tested. Of particular significance is the contribution this project has made toward RMIT's T & L priorities to engage students in active learning and provide timely feedback to both student and lecturer in large classes.

Preamble

The large university lecture environment is increasingly prevalent as it provides a cost effective method of delivering material to students and is therefore unlikely to change (Schornavacca and Masrshall, 2007; Williams and Boyle, 2008). However, these large lectures are creating student disengagement as they are not challenged to think and participate (Cooper and Robinson, 2000). Criticism of large classes by students relate to the lack of interaction with teaching staff (Carbone and Greenberg, 1998) and their impersonal nature creates a disconnect between lecturers and students (Cooper and Robinson, 2000). Students gain a better understanding of concepts through active engagement rather than passively listening to verbal presentations (Hake, 1998; Knight and Wood, 2005). The first crucial step in raising students' awareness of their own learning involves providing them with fast, accurate and individual feedback about their learning engagement in context (Meyer and Shanahan, 2004, p.446).

One strategy used to overcome the issues of limited student engagement or passive learning in large lectures is the use of technology, particularly in the form of student response systems (SRS), also known as clickers (e.g., Wood, 2004). An SRS is generally a hand held device that provides a mechanism for students to send responses to questions and for the lecturer to obtain immediate feedback (Richards, Braiding and Vaughan, 2006). This technology is generally used with multiple choice questions, providing the lecturer with quantitative information on students' understanding of key concepts as evident by selection of the correct answer. Data also can be collected about each student's set of responses over time. This has the potential to provide valuable feedback so that future lectures can be tailored to meet the needs of the class currently bring taught as well as future classes (Elliot, 2003).

Another avenue for providing technology based feedback explored in this LTIF project was the use of podcast. Many Universities, including RMIT have adopted the practice of webcasting lectures using Lectopia – a web-capture system. Such practices have been demonstrated to have significant benefits to student learning and engagement and are being increasingly adopted across Universities. Preliminry research on the effectiveness of this approach is mixed, with some researchers cautioning against its use due to perception of reliability of the technology, the lack of education pedagogy supporting this technology, the differing engagement levels of students, and inability to accommodate different curriculum and teaching styles. Against this backdrop, short podcasts which provided critical commentary on the lectures and student work were adopted in favour of Lectopia. The podcasts highlighted key points arising from student questions elicited in classes or through e-mail and observations of students' work in progress including student performance on DLS administered marketing debates. The aim of the podcasts is to provide additional feedback to students in a form they can readily access and assimilate.

LTIF Project Background

MKTG1025 Marketing Principles in Melbourne has annual enrolment of about 1400 students with contact hours comprising a two hour lecture and a one hour demonstration lecture. Class sizes range from 150 to 350 students per lecture and about 100 students per demonstration lecture. The course is not supported by small tutorials. As part of assessment students undertake an online simulation game, write submissions on issues of marketing based on local press, and take a in-class mid-term test. An active online presence is maintained via the DLS. The course has students from each undergraduate discipline as well as a high proportion of onshore international students.

The LTIF project has emerged as a result of the School's participation in the Carrick funded Academic Leadership project entitled "Developing multi-level leadership in the use of student feedback to enhance

student learning and teaching practice," headed by the Deputy Vice Chancellor. The Business Action Research Team led by Dr Kate Westberg identified a number of issues associated with the student learning experience in the four common core courses (including Marketing Principles) delivered by our School. These issues include poor student motivation and engagement as well as students' desire for more feedback and support. Hence, the pedagogical objective of this trial was to enhance student learning outcomes by creating an active learning environment and providing instantaneous feedback to both student and lecturer. This is consistent with the academic priorities within the Business Portfolio, which include increasing the GTS in the Common Core Courses and enhancing the student learning experience in those courses. While the GTS scores have improved in recent semesters the failure rate has remained the same. We attribute this to lack of engagement and motivation of students in the course. A focus group of students in the first year core units as part of the Carrick project confirmed the need for more feedback as one of the common themes across all the core courses.

SRS Technology in Education

Whilst clickers have existed since the early 1990's, the first easy-to-use and reliable systems were introduced in 1999 (Bergstrom, 2006). Since then features and usability have continued to improve and in 2007, there were at least six low cost radio frequency systems available. The use of a SRS has been introduced into a variety of educational contexts for a range of objectives, including the enhancement of large scale lectures (Cheung, 2008; Draper and Brown, 2004; Elliot, 2003). There is substantial research to suggest that the use of an SRS results in improved student outcomes (Caldwell, 2007). Specifically, the educational benefits that can be derived from SRS usage include active student learning and engagement (e.g., Hall, Collier, Thomas and Hilgers, 2005; Hatch, Jensen and Moore, 2005), improved student attendance, particularly if linked to marks (e.g., Jackson and Trees, 2003), immediate feedback for both student and lecturer (e.g., Richards *et al.*, 2006; Scornavacca and Marshall, 2007) and in some cases, improved student results (e.g., Knight and Wood, 2005; Nguyen, Fraunholz, Salzman and Smith, 2006). Further, student attitudes are generally positive in relation to the use and value of an SRS (e.g., Greer and Heaney, 2004; Hinde and Hunt, 2006; Scornavacca and Marshall, 2007).

The difficulties, or challenges presented by use of an SRS relate primarily to the reduced lecture time for delivery of course content as a result of these activities (Hinde and Hunt, 2006) as well as the skill required to develop questions at the appropriate level (Draper and Brown, 2002). Further, lecturers need to be suitably skilled to be able to respond appropriately to the feedback suggested by student responses. These challenges suggest increased demands on staff. In addition, the reliability and ease-of-use of the technology has inhibited the adoption of this form of student engagement ().

An SRS is available in a variety of forms. The most popular are handheld devices connected either physically or wirelessly to a central computer. In some universities, systems have been built into the armrest of the chairs in the lecture theatre. However, the initial set up cost and ongoing maintenance of these systems make them very expensive. In an environment where budget expenditure must be heavily scrutinised, their installment and maintenance may be difficult to justify economically. Features of different SRS vary from brand to brand and relate to keypad design, cost, compatibility with presentation software, data reporting, wireless interface, training and support, and bundling with textbooks (Barber and Njus, 2007). However, with any SRS, there are implementation issues which must be overcome such as systems malfunction and the time required to distribute and collect the handheld clicker devices (Simpson, 2007).

An alternative system to clickers is for students to use text messages via their mobile phones (Cheung, 2008; Goh and Hooper, 2007; Scorarnvacca and Marshall, 2007). Although this system alleviates the need for separate and expensive hardware, there are also problems with its use. For example, student

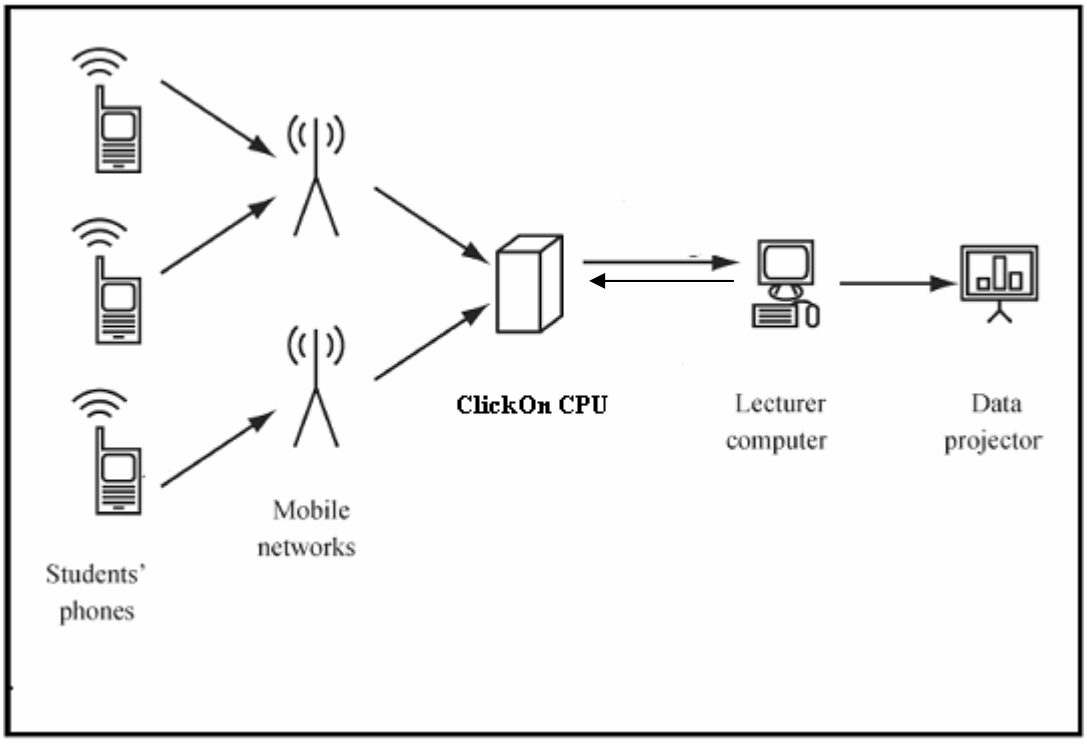
concern about the cost of sending text messages and the delay in receiving a high volume of messages sent within a very short period of time.

This project explores the use of mobile phone technology designed to overcome the limitations previously experienced using this medium, while allowing a lecturer to achieve the potential benefits of an SRS in a large lecture environment. It has been suggested that despite technological advances, the current literature exploring the area of SRS has been "very much pedagogically focused rather than led by technical innovation and development (Simpson and Oliver, 2007, p.203). This project seeks to address this gap in the literature. Further, this study examines the attitudes and usage of an SRS by a group of school leaver students compared to a cohort of mature aged, part time students. The following section outlines the method undertaken.

Click On System

The SRS system used in this study – Click On, was provided by a third party through Wiley Publishers. The Click On system essentially replaces the use of standard keypad remote controls with mobile phones. Keypad responses from mobile phones to a multiple choice question posed during a lecture are transmitted over wireless internet network to a central computer for processing. The collated responses are then accessed, instantaneously, through an internet enabled lecture theatre computer and projected on to the screen for class viewing. The system is compatible with multiple inputs and students who did not have internet enabled mobile phones are able to use the system through SMS messaging on their mobile phones, or through laptop computers connected to the University's WiFi network.

Figure 1. Click On System



To set up the system, students were given a presentation in the first week of class explaining the system, how it worked, its benefits to their learning experience, and the registration process. Students were given a short demonstration of the system and a handout explaining the registration process in a step-by-step manner. Students were also sent periodic e-mails to encourage them to register for the system prior to

week 3 when the trial commenced. The process was somewhat complex, but most students were able to navigate through it without difficulty. It involved the following process:

- Access the Click On homepage on the internet and register their details by week 3.
- Receive a confirmation e-mail from Click On with an activation link.
- Activate the link to confirm registration.
- Receive a SMS message from Click On with an URL of their homepage.
- Bookmark the homepage on their mobile for easy access during class.

Once these steps were completed, students are ready to use the system during lectures. To vote on a particular question, students are required to:

- Turn on their mobile phones
- Connect to the internet using the WAP option on their phones
- Access Click On website which they had bookmarked during the registration process
- Read and discuss the question projected on the screen with their peers and decide upon the answer
- Scroll down to the selected answer on the mobile phone and press the return key to transmit the answer to the Click On server.

Once all the answers are keyed in the lecturer would progress to the next screen to reveal the correct answer along with a histogram showing the distribution of answers in the form of a histogram collated by the Click On server.

Procedure

The Click On system was trialled in two lecture streams of a large first year Marketing Principles class. One class ran during the day and the other in the evening. The day class was largely composed of fist year students in the 17 to 19 year age group, whereas the evening class consisted of mature age students. The trial commenced in week 4 and continued every alternate week until the conclusion of the thirteen week semester. Trials were conducted on alternate weeks to enable the testing of knowledge retention from earlier week as well as comprehension of topics covered in the current lecture. About five or six well crafted multiple choice questions were used in each session. Participation in the trial was voluntary and not linked to any form of assessment.

Students were provided several incentives to participate such as movie tickets, vouchers for crispy cream donuts, and the chance to win an I-Pod Nano if at least half of those who registered for the trial participated regularly. These incentives were seen as a way of compensating students for the charges incurred in the use of their mobile phones. The charges were difficult to estimate as they varied across providers and mobile plans. Students estimated them to be anywhere from $1 to $5 per lecture, although the Click On developers estimated it to be around $0.20. Furthermore, some mobile plans did not allow users to access a web site other than their own, and in some cases blocked users from using the internet unless they switched to a higher value package. Given these difficulties it was not possible to tie participation in the trial with assessment as has been done in other studies.

The initial uptake in student registration for the trial was slow with only 110 or 24% of the class registering for the trial by week 4. The registrations increased progressively through the semester reaching a high of 40% towards the end of the trial. Regrettably, these registrations did not translate in to actual use of clickers in the classroom. There was a marked downturn in participation after the first two trials and this trend continued through the rest of the semester. By the end of the trial only 22% of the class had used their mobile phone at least once over the trial period.

This low participation was troublesome and unexpected given the high participation rates reported by majority of earlier studies on clicker use. These studies, however, had used clicker participation as a proxy for recording class attendance or offered extra course credits as incentive to encourage participation. In studies that did not use such incentives participation rates were comparable to that of the current trial. For instance Jones, Marsden and Gruijters (2006) reported an average participation rate of 7%– 38% for their SMS based mobile phone response system and a rate of 15% for their PDA based response system. The authors of these studies speculate on several possible reasons for the low participation rate, including the cost incurred by students in using the system, nature of the student cohort or some limitations of the system itself (e.g., time latency of SMS messages). To get a better understanding of student attitude towards use of clickers, two focus groups - one with the day class and the other with the evening class were conducted. The main objective was to explore possible barriers to clicker use and participation.

Project Evaluation

This project sought to explore the results of a trial of an SRS using mobile phones to access the internet to provide 'real time' results of student responses to a number of multiple choice questions posed throughout a large lecture. As discussed, the trial did not receive the student participation rates that had been anticipated, however student participation differed by class. Students in the mature age class (part time students) had higher participation than did the class consisting of primarily of school-leavers (full time students). Focus groups were conducted to explore student reactions to both the concept of using an SRS to engage students and provide feedback in a large lecture environment, as well as the views on the specific technology employed in the trial. The results indicated three key themes relating to student participation in the SRS trial: perceived cost, ease of use of the technology and perceived benefits of participation. These themes will be discussed in the following sections.

Perceived cost

One of the major hurdles to participation was found to be the perceived cost of using mobile phones, which in most cases was unknown by students. The full time students were particularly conscious of the cost, and even seemed to resent having to pay anything at all, despite the benefits of participation. As one student commented,

> *I personally got a bit cranky about it because it costs money to send texts or to have the internet on your phone. Why should we have to pay to participate in class?*

The part time students, although less concerned with the cost in general, were conscious that they were participating without really knowing the financial commitment involved. However, these students were willing to use their mobile phones despite the uncertainty. The following comment by a part time student illustrates this view,

> *I use my mobile phone to access the internet. Sometimes I find it cumbersome to use. I prefer using wireless technology that would be free. I'm just waiting to see the charges and costs at this stage, because different plans will have a different cost bearing to the internet usage.*

Many students were on pre-paid plans which didn't include costs associated with internet access. Others had plans which included internet downloads, but were unclear as to how to gauge the quantity of access covered. One part time student commented,

> *If you haven't used it before, you don't know how much it's going to cost. I have a 40 gig download limit ...*

Whereupon, another student chimed in with, "*I don't even know what a gig is.*"

Overall, participation was clearly hampered by the uncertainty associated with the cost. In reality, the mobile phone charges would have been between 20 cents and 1 dollar per class, as was explained by the lecturing staff. However, even a small incremental cost to enhance their learning experience was resented by the full time students in particular.

Ease of use of the technology

Students appeared to have varying experiences in using the technology that is, accessing the internet via their mobile phones. Although many students had this function on their phone, few had used it prior to the trial. When using this method to respond to questions in class, students had varying degrees of success. Some students had only attempted to respond to one question in one lecture and gave up after that single experience. After becoming frustrated with the time it took to connect to the internet, one full time student commented,

> *I guess it's really new so it's not really working that well. If it was a lot more efficient then I might use it.*

The part time students were less easily dissuaded. When finding the mobile phone technology to be cumbersome, some looked for alternative access via laptops or iPod Touch. As one part time student commented,

> *With the laptop, it's instantaneous. I found that you can answer a question in about 20 seconds ...so with a laptop it's quick, and with a mobile phone it takes forever to connect.*

Full time students were also deterred by the requirement to register and sign up for the system in advance of participating in class, even though they were only required to do this once. As one student suggested,

> *Maybe if you didn't have to register online beforehand as well… It would be good if you were there and you wanted to participate you could; whereas now you have to actually go online and register your phone number. You might not think of that during the week or whatever. Then you come to class and you can't participate because you didn't remember to register.*

Although the mature age students were prepared to make more of an effort to participate, it was found that students in general believed that participation would be greater if technological barriers and effort were minimized.

Perceived benefits of participation

Overall, students believed that, in theory, an SRS was educationally beneficial. However, part time students were more enthusiastic about this strategy and more clearly saw the advantages in providing feedback as to how they are progressing. As one student stated,

> *If you did four questions and you get three of them wrong, you have to say to yourself, well why haven't I grasped this adequately? Do I need to go off and work a little bit harder? Or do I need some help?*

Part time students also recognized the benefit the system provided to the lecturer in terms of the delivery of the material and identifying whether students were struggling with certain concepts. It was suggested that the results could help with revising lecture material, as illustrated by this student's observation,

With that information, you can also look it as historical data on the previous lectures and change the future lectures to provide information on areas where you know students will have problems with.

The full time students were also positive about the use of this strategy. One student stated,

It gives us a chance to have an idea about where we're up to if he's (the lecturer) asking questions and whether we know the answer or not. You can get involved in the class rather than just being talked at.

However, another full time student clearly did not understand the benefit behind having the results aggregated, that is, allowing students to compare their performance to the class and for the lecturer to get a sense of the class's understanding of a concept, and review if required. One student admitted,

I just wanted to see how many people would use it the first time. I thought that not many people would use it. Then I realised that when you see what the questions are you can just write down your answer on a piece of paper and then they show you the answer anyway. So you're pretty much getting the same thing out of it, you're just not doing it properly and so they don't have a record of you doing the test.

Overall, in considering the adoption of a new way of interacting in large lecturers, many students appeared to take a 'wait and see' approach. That is, if others were participating, then they might as well too. This was probably a combination of peer pressure, which is not atypical of this segment of the population, or the lack of understanding of the benefits of the system to their learning. This attitude suggests that students did not independently recognize the benefit of participating, but rather their involvement is something they would acquiesce to if the majority were engaged in it. When asked whether student participation was likely to increase if the lecturer persisted with an SRS, a part time student commented,

I guess the trend will increase once the non-users see the users consistently using it. They might feel a bit left out or think, 'I should be involved in this as well'.

However, full time students felt that the participation would increase significantly only if it was linked to some form of assessment. This suggests that a more external form of motivation for participation would be required.

Finally, the focus was quizzed about their experience with the use of **Podcast**. A majority of students considered the Podcast useful, with some claiming them to be an essential learning resource for exam revision. Not surprisingly the data on hit rates for each podcast show that a majority of students accessed podcasts in the swot vac week, with the hit rate peaking the night before the exam. Very few students accessed them early in the semester when they were made available. Podcast in audio format were preferred over video format, because of the time and cost involved in downloading large video files, and not due to the aesthetic qualities of the presenter! Most students accessed the recordings atleast ones, with some students accessing them up to 7 times. In the unaided open ended question on the course experience survey on "what are the best aspects of this course?' most students pointed the podcasts as the single most important feature of the course and reported it to be most beneficial to their learning. Very few or none viewed the use of clickers in the same light in this unaided open ended question.

System improvement and testing

As the major impediment to use of the SRS system was the cost to students, several options to absorb the cost were discussed with the publisher and the Click On providers. This included sponsorship from telecommunication providers, provision of prepaid SIM cards, posting of a refund cheque, and raising the

price of the textbook. As none of these options were deemed feasible, the Click On developer was asked to explore the use of the Votopedia polling system that the LTIF selection committee had initially recommended for this purpose.

"Recommend Jeremy Keens and Raju Mulye (Large Classes LTIF category), as well as Tony Robins (SIEBS) who has been using ERS, work with Amgad Louka to ensure that an appropriate system is used. There is a risk that multiple systems will be deployed. An Open Source system (Votapedia) has been developed by CSIRO that uses mobile phone technology and could be considered. Prima facie, Votapedia is free and students would not incur mobile charges. Regardless, we do not recommend committing funds for the purchase of hardware etc. until options and impacts are properly canvassed."

The EMG had undertaken an appraisal of Votapedia, and although the system was believed to have potential, it was still in a developmental stage and was not geared for class use. However, the click-on developers were able to integrate their Click On system with the Votopedia back engine to develop a hybrid system which retained some of the functionality of the original Click On system and the free access of Votapedia. This system lacked the real time interactivity and versatility of the original Click On system but it was free and provided the basic output required. The main issue with this system was its reliance on slow signalling channel resulting in low data rates and response latency. Latency results in a time gap between signalling a response from the mobile and the response getting registered by the system. This was a world first system and its beta version was tested in the evening class in semester 2. This class was chosen because it was a relatively small class of about 80 students and consisted of mature age students who were found to be enthusiastic adopters of the system in the earlier semester. There was overhelming support for the hybrid version with over 90% of the class registering and participating in the trial. As this was a beta version it was not trialled in the day class, and the extent to which this hybrid version will be accepted by this group of student is unclear.

Overall Evaluation

This LTIF project aimed at exploring the enhanced learning opportunities provided by the new technology of electronic response systems and podcasting. A review of the literature suggests that when such initiatives are used as part of a wider effort to support active engagement with learning there is evidence that they can support increased motivation and attainment, at least in part as a result of their ability to provide rapid feedback on the learning process.

The SRS system was most successful when it was used with mature age students and available free of charge. The Podcasting system, on the other hand, was wholeheartedly embraced by all students and was viewed as the most important feature of the course. The participation rate increased from 40% to 90% over two semesters with the implementation of the hybrid SRS system. The SRS technology appeared to have a positive impact on the learning environment with more class participation ensuing from the discussion of the polled results. More importantly, the feedback from these trials helped Click On developers to come up with a world first system based on the integration of CSIRO's Votapedia technology. We believe the enthusiasm for these approaches will grow as the system is developed further and the technical impediments in its implementation resolved.

In terms of learning outcomes, although there was no appreciable decrease in failure rate, there was a substantial increase in student satisfaction rating measured by the course experience survey. In fact this is the first time in the history of the course that a Good Teaching Score (GTS) as high as 71 was attained in the lecture stream in which the clickers were tested. Of particular significance is the contribution this

project has made toward RMIT's T & L priorities to engage students in active learning and provide timely feedback to both student and lecturer in large classes.