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When knowledge ‘clicks’: Facilitating a flexible classroom through the use of in-class technology

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This paper provides an overview of the recent introduction of in-class technology (‘clickers’) into the English Literature & Film course, which is offered in the Open Foundation enabling program at the University of Newcastle’s Ourimbah campus. The shifting demographic composition of this particular student cohort necessitates a substantial degree of flexibility within the course – not only in terms of the variety of content (which is, admittedly, relatively easy within this particular discipline) but also in the practice of teaching this group. Therefore, the original motivation for trialling clickers in this course was to identify a way of better accommodating the needs of a rapidly changing student cohort, whilst attempting to find an effective means of gauging knowledge acquisition in a fast-paced Intensive study program.

The development of my teaching practice and an enhancement of student engagement were the key motivating factors behind the introduction of in-class technology (‘clickers’) into the Ourimbah Intensive English Literature & Film course in Semester Two of this year. Although the course is also offered in Part Time mode at the Ourimbah campus (and in both Part Time and Intensive modes at the University of Newcastle’s Callaghan campus), I decided to incorporate the technology into just one of my courses in order to better compare the effects of adopting this new approach. The Intensive course was chosen for this test because it is particularly fast-paced, with a new topic introduced in each of the twelve weeks of the semester. Also, unlike the Part Time course, the Intensive offering is available to students from both the Open Foundation and Newstep enabling programs, which demands even more flexibility due to the greater diversity of the student cohort, especially in terms of age and gender. Whilst the Part Time course is comprised entirely of mature-aged students, with an average age of 25, the average age of students in the Intensive course is 23, with an age range of 18 to 50. The gender ratio of students between the two courses is even more pronounced, with approximately half of the Intensive students being male (46%) compared to less than a quarter (24%) of Part Time course being male students. In addition to the formidable task of setting texts that will appeal to both male and female students who fall into such a broad age range, there are the additional practical concerns of classroom management (where anecdotal evidence suggests a noticeable dissonance between students from each of the enabling courses). One way that I have attempted to try and overcome these challenges has been to promote greater student engagement in class, with a particularly strong emphasis on stimulating texts, practical learning activities, and more opportunities for peer interaction.

In order to effectively incorporate these elements into the course, whilst ensuring students can keep up with the rapid pace of the introduction of new material, I am aware of the need to be especially flexible in my approach to teaching this cohort. I aim to be mindful of the unique demands of these adult learners and, at the same time, I need to find efficient methods to quickly monitor, record, and reflect on the impact of these changes that I am making to the content of the course and how it is taught. The pedagogical impetus driving such reflection is a desire to link changes to my approach to teaching to empirical evidence that demonstrates its impact upon student performance. In other words, I wish to provide a thorough consideration of the practical outcomes of the introduction of interactive technology that Lundeberg et al. (2011) note has largely been missing from most studies into the effects of clickers (p. 645). One final consideration is how to translate the evidence of these improvements into practical outcomes that may shape my own research and professional development. Therefore, one of the key drawcards of this technology was the way the real-time feedback provided by clickers could be linked to a number of interrelated benefits for both lecturer and students. As Cotner et al. (2008) explain, “the pedagogical potential of instant feedback methods lies in three functions of the techniques: fostering student engagement; encouraging student-student interaction; and providing immediate feedback on student understanding” (p. 441). Keeping in mind the specific characteristics of non-traditional adult learners – in particular the prior experience these students bring (Jarvis, 2004, p. 144) and their ability to take responsibility for their own learning if they find the content meaningful and the approach practical (Rubenson, 2011, p. 53) – I was intrigued by the possibility of a technology that could enhance engagement whilst providing opportunity for more in-class interaction, where students could learn from each other. For all of the reasons outlined above, I decided that clickers (alternatively labelled ‘personal response devices’ or ‘audience response systems’) would likely be the best tools that I could employ to ensure this greater flexibility.

Engaging adult learners with technology

The introduction of clicker technology was relatively simple, as it requires only a brief training session as well as some additional contribution of the lecturer’s time for the one-off installation of technology on office and in-class computers and some ongoing preparation of individual polling sessions throughout the semester. Once the lecturer has familiarised themselves with the technology they can easily introduce the clickers to the class by distributing the handheld devices to students and a setting up a wireless receiver on the class computer, which captures the responses and then displays them on screen. Being able to immediately display the anonymous aggregated responses is a very effective way to allow students to gauge their own learning against their classmates. It also provides a useful real-time response to teaching as those students who incorrectly answer questions are given further instruction to see where they went wrong – either directly from the lecturer or as part of a wider class discussion about why one option is better than another. As Molborn and Hoeskstra (2010) explain, these impromptu conversations are integral to the pedagogical argument for supporting clicker use (p.24). In addition to the function of assessing knowledge acquisition and simple polling activities – that can be either embedded in PowerPoint presentations or provided as ‘Anywhere Polling’ – the clickers can also be used for class games or as a way to generally engage students and provide variety in delivery. An added benefit of

the technology is the ability to easily collect data, as session details can be recorded by the system and later turned into automatically-formatted reports. The following four case studies demonstrate the ways in which clicker technology has enhanced the lecturer’s ability to respond to shifting student demands, whilst also improving peer interactions and student engagement with the course.

Example 1: Gauging student expectations

As mentioned in the introduction, one of my key concerns in designing the course is selecting stimulating set texts that will be educationally beneficial whilst appealing to a diverse student cohort. With a brief clicker poll, conducted in the second lecture of the first week of semester, I was able to quickly gauge which topics students were most excited about and which topics were causing some apprehension (Figure 1). With this additional knowledge, I was able to immediately address the issue of student preconceptions about different texts and could begin to allay some fears about upcoming topics. In addition, the data will prove very useful when I poll students about text choices again at the end of the semester to get feedback on the topics they most engaged with during the course.

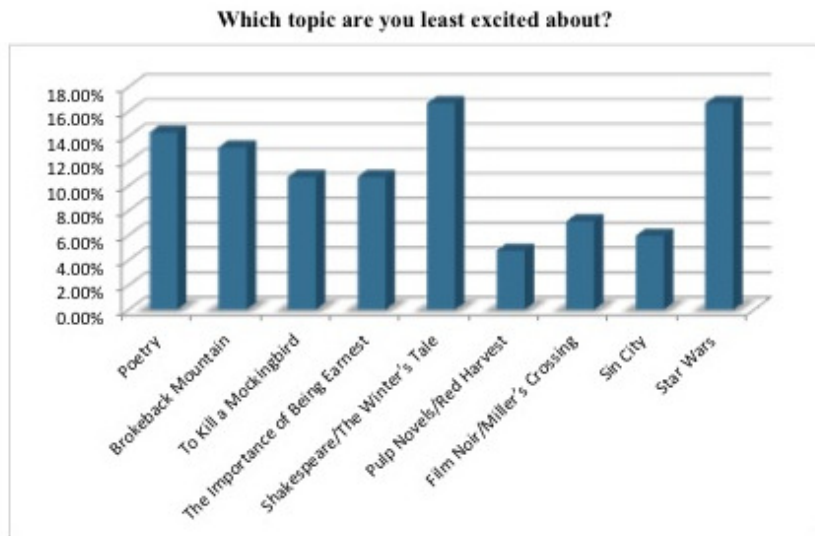
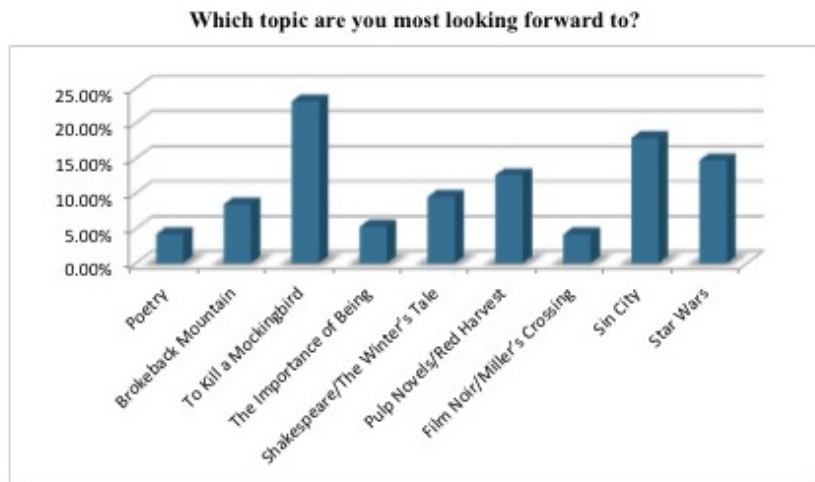


Figure 1: Gauging student expectations

Example 2: Measuring student confidence

At the end of the same lecture in which I gauged student expectations about course texts I also attempted to measure the relative confidence levels of students across the full spectrum of key course areas (poetry, drama, prose, film) as well as their own diagnosis of current essay-writing ability. By conducting this exercise in the second lecture (at the end of the first week) meant that, by the second week of the semester, I was able to incorporate this knowledge into my teaching plan. Although I was asking students “How would you rate your current knowledge of ...?”, the task was ultimately less about gauging real ability than it was to get students thinking about their prior knowledge whilst providing me with some evidence of student confidence levels.

Conducting this brief self-diagnosis exercise at the start of the semester gave me a quick snapshot of overall student confidence levels in key areas and allowed me to allocate a greater proportion of subsequent lectures to those topics that students were less comfortable discussing. Specifically, I was able to see that 94.87% of students had rated their knowledge of film to be ‘Average’ (or higher) and 92.11% of students believed their knowledge of prose to be ‘Average’ (or higher) whilst, at the other end of the spectrum, 38.46% of students reported their knowledge of poetry to be ‘Below Average’ (or lower) and 33.34% of the class believed their knowledge of essay-writing was ‘Below Average’ (or lower) (Figure 2).

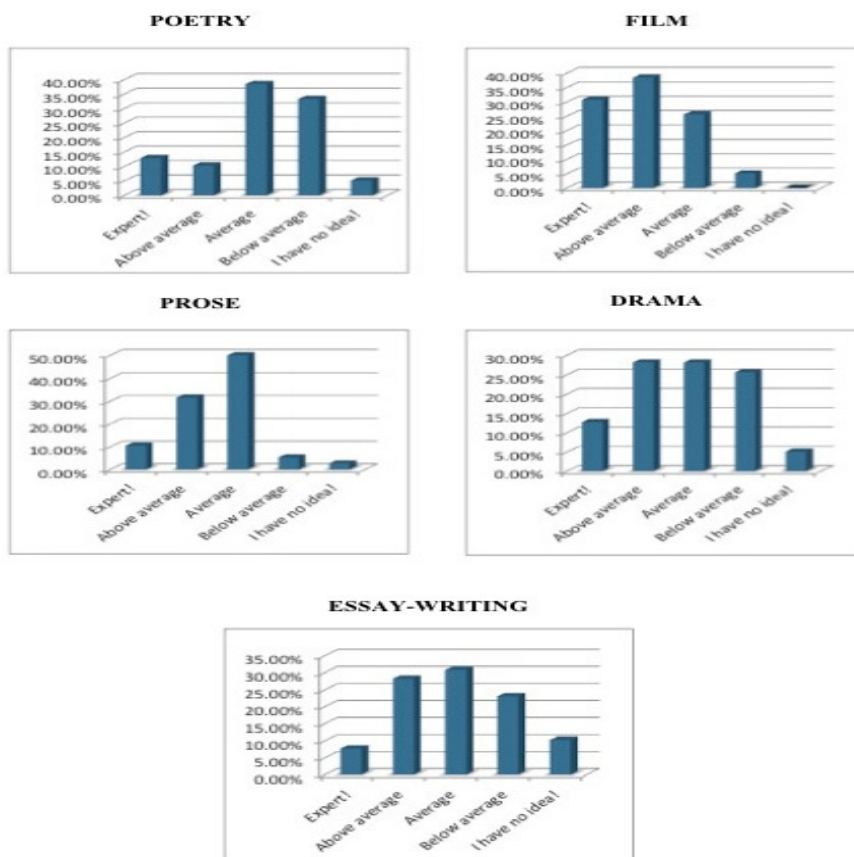


Figure 2: Measuring student confidence

In addition to allocating more class time to covering troublesome concepts, the knowledge gained from measure levels of student confidence in the key areas of course content meant I could also use the clickers to facilitate additional in-class learning and revision activities based on those topics, as documented below.

Example 3: Revision activities

A new feature of the course, which directly resulted from the feedback gained in early clicker polls, was the introduction of pop quizzes used for quick revision of simple concepts (such as new terminology) at the start of lectures. Even a very short session would often be enough to bring most students back up to speed on topics covered in previous lectures. See, for example, the following reports from two such revision quizzes – the first based on the identification of modes of narration used in poetry and literature and the second designed to re-familiarise students with key poetic devices.

Revision Activity 1: Identifying mode of narration

Opening lines from classic novels were presented on screen and students were asked to identify whether the author had used first- or third-person narration. After the first slide was shown, 24 of 38 students (63.16%) correctly identified the mode of narration being used. After a short reminder of the key features of first- and third-person narration, a second example was shown. This time, 39 of 40 students (97.50%) correctly identified the mode of narration (Table 1). Note: the one student who had selected the wrong response then identified herself – revealing that she had joined the class late (i.e. after the explanation had been given).

Table 1. Responses to Revision Activity 1

	Question one		Question two	
	Count	Percent	Count	Percent
Correct	24	63.16%	39	97.50%
Incorrect	14	36.84%	1	2.50%
Totals	38	100%	40	100%

Revision Activity 2: Poetry terminology

In this revision exercise students were shown a line of poetry and were asked to identify the device being used. In total, there were 13 different questions, which were varied in terms of both content and difficulty. Although I haven't listed every response from the session in the following table, I have pulled together a sample of responses related to one specific poetic device to demonstrate the development in knowledge with each subsequent question that related to that particular topic. After the first of these slides was shown 29 of 41 students (70.73%) of students correctly identified the poetry device. A brief class discussion ensued before a second example was presented. 39 of 40 students (97.50%) correctly identified the device used in the second example (Table 2).

Table 2. Responses to Revision Activity 2

	Question one		Question two	
	Count	Percent	Count	Percent
Correct	29	70.73%	39	97.50%
Incorrect	12	29.27%	1	2.50%
Totals	41	100%	40	100%

Example 4: Learning activity

This final brief case study effectively highlights the immediate impact of using in-class technology upon learning acquisition. At the end of a mid-semester lecture I devoted approximately twenty minutes of class time to running the regularly scheduled academic skills ‘mini-workshop’ which, on this occasion, included an image-based¹ discussion about the misuse of apostrophes. The session followed on from a previous lesson in which the correct usage of apostrophes had been briefly addressed. The purpose of the second session was to move from pure instruction to hands-on demonstration of understanding. It was an opportunity for revision for some and a chance to catch up on missed knowledge for others. As the following example demonstrates, the reporting software that accompanies the clicker kit enables the lecturer to effectively track on-the-spot improvements in learning. At the start of the session it was clear that a number of students were struggling with this concept, with 11 out of 19 students (58%) correctly identifying the proper placement of apostrophes. With the real-time feedback provided through the use of clickers, I was able to track learner progress and provide further instruction as required. By the end of the session, I was able to see the immediate effect of this additional instruction as 20 out of 20 students (100%) could consistently identify the correct usage of apostrophes (Figure 3). The real-time feedback provided by the clickers had allowed me to close the gap in knowledge and ensure that no student was left behind.²

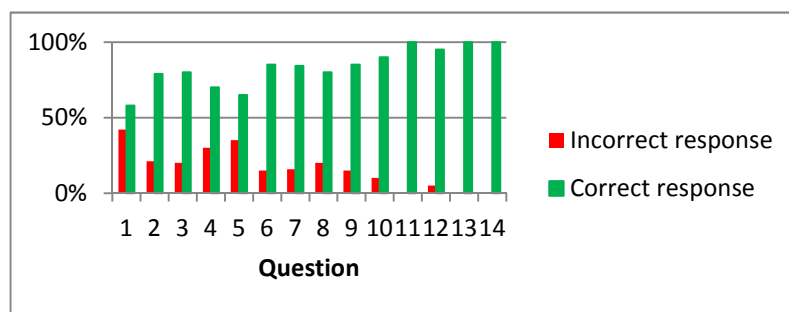


Figure 3. Full session report showing the breakdown of correct/incorrect responses.

¹ Although Gray et al. (2012) note that, “multimedia learning makes use of both words and pictures, and research from cognitive psychology suggests that using both words and illustrations improves student learning” (p. 329), their research into a specific science-based case study demonstrated that there did not appear to be a significant difference in student learning between clicker questions that include corresponding illustrations.

² A slightly modified version of the session was later placed on the course Learning Management System (i.e. Blackboard) site both for those students unable to attend the session and as a tool for revision for those who participated on the day.

Observations

Although the primary focus of this paper has been the effectiveness of employing in-class technology as a way of embedding much-needed flexibility into an enabling-level course, I also wish to highlight the use of this technology as a tool for allowing instructors to record and reflect upon improvements in teaching and learning. I believe the previous examples effectively demonstrate the usefulness of the recording functions of the technology but, in this section of the paper, I wish to briefly discuss some of the observations I have had when I reflect upon how the use of clickers has contributed to practical teaching and learning outcomes.

Some of the more pleasing (and unexpected) effects of the introduction of clickers are the ways in which the technology appears to have strengthened the sense of camaraderie within the class whilst improving students' ability to concentrate. This is particularly evident when students who understand a topic are noticeably more tolerant of staying with a topic a little longer when they can see the evidence that some of their classmates 'just aren't there yet'. In fact, this clear indication that their peers are struggling with a concept often provokes further class discussion as a way for some of the more advanced students to help their fellow classmates gain another perspective on how to get their head around a difficult idea. Furthermore, as Smith et al. (2009) explain, research into the effect of clicker-generated peer discussion indicates that it "enhances understanding, even when none of the students in a discussion group originally knows the correct answer" (p. 122). In addition to provoking useful peer interactions, the use of clickers also extends the duration of student concentration by varying the method of stimulus used to engage them, with students often offering to delay a class break so they may continue discussing a topic for a little bit longer.

Through this enhancement of collegiality and the improved ability of students to pay attention for longer periods of time – factors I would argue must be, at least in part, attributable to the use of in-class technology – there has been an impressive improvement in levels of student engagement. For example, by week eight of the semester, 88% of students in the 2013 course were still actively engaged (i.e. attending classes, logging onto the course Blackboard site, and completing assessments), compared to 79% of students in the 2012 cohort who were still active at the same stage of the semester. Feedback from a mid-semester focus group (led by staff of the University's Centre for Teaching and Learning) reinforces this theme of improved student engagement, with the practical nature of the teaching approach and the interactive elements of the class noted as specific aspects of the course that students most appreciate. Students also made direct comment about the use of clickers and explained that it assists with being able to assess where they are at in the course and to 'not feel stupid'. They also commented upon the positive effect of using the learning activities to engage them 'learning with, from, and about each other'. Results from a formal Student Feedback on Teaching survey (offered online to students between weeks six and eight) reveal similar feelings, with the overall student satisfaction score rising from an average 4.41 in 2012 to 4.68 in 2013. In fact, the individual 2013 scores were higher than the comparable 2012 scores in all seven feedback categories. The willingness of students to complete the voluntary survey also attests to their engagement with the course as, in 2012, 11/49 students (22.45%) completed the survey whilst, in

2013, this figure almost doubled, with 20/50 students (40.00%) electing to complete the survey.

In addition to the improved retention rates and positive formal and informal feedback on student satisfaction with the course, I have also noted a greater number of on-time submissions of assessment tasks and higher-than-normal average grades, which demonstrates that this enhancement of in-class student engagement has extended to greater confidence and competence when completing assessment tasks. This increase in confidence with basic academic skills is most readily evidenced in student responses to a query about the relatively low uptake of support sessions for enabling students. The BOOST support sessions were introduced at the Ourimbah campus in 2012 in an effort to help enabling students adjust to the demands of university-level studies, with informal assistance provided by the enabling Learning Advisor and Team Leaders (former successful students of the enabling program). In 2013, the program was extended to the Callaghan campus and, although the uptake of support in these sessions was impressive in Semester One of this year and attendance has continued to climb at Callaghan in Semester Two, there has been a very noticeable drop in attendance levels at Ourimbah. Knowing that the sessions have been very popular with English Literature & Film students in the past (with BOOST being especially helpful for students in Humanities-based courses), I queried my students about why they weren't electing to attend the sessions. The overwhelming response was simply that they felt they received all of the academic and peer support they required just by attending the lectures and tutorials.

Conclusions

My original title for this article was 'Reflections on the cautious embrace of in-class technology to create a flexible classroom', however, I must admit that this wary attitude quickly dissipated as the semester progressed and I was able to see first-hand the immediate benefits of utilising clickers. After this point, the only aspect of clickers that I was hesitant about was the potential to over-use the technology. As demonstrated above, the quick and easy nature of introducing clickers into the class allowed me to rapidly capture student expectations and self-diagnosed abilities within the first weeks of the semester, giving me an invaluable opportunity to add greater flexibility to the course. In the admittedly short period of time that I have been trialling the use of clickers, the only minor obstacle I have identified in the use of clickers is the additional time required for the lecturer to train using the technology, install the software, and prepare new resources that incorporate clicker use. I would strongly argue, however, that the additional effort required is far outweighed by the potential benefits for both students and lecturers. Certainly, I believe clickers are one of the most useful tools for enhancing responsive teaching and the monitoring of the immediate impact of this teaching upon learning. Using clickers clearly benefits students by improving student engagement through the variety of delivery, the promotion of peer interaction, and helping lecturers reach those students who may otherwise lack the confidence to speak up when they don't understand a concept³. For educators, there are additional benefits to

³ Indeed, this specific issue of the anonymity provided by clickers has often been identified as one of the leading factors behind the success of the technology (Draper, Cargill, & Cutts, 2002; Freeman, Blayney, & Ginns, 2006; King & Joshi, 2008).

using clickers, most notably, the ability to track real-time learner progress and record teaching ‘moments’ that can provide a solid basis for later reflection upon teaching practices.

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