Enhancement of learning with classroom response systems (clickers)
Lecturer reports and feedback 2011

Classroom response systems or clickers offer a tool for engaging students in the classroom. These systems have been used in a variety of fields and at all levels of education. The teacher or lecturer poses a question to the students; the students use the clickers to transmit answers by pressing the clicker buttons. The teaching strategy of Peer Instruction (Mazur, 2007) has been widely associated with the use of clickers with large group teaching. Benefits of clicker use are generally described to be: Increased participation of students; Peer engagement of students, Interactive teaching, Enhancement of large group learning and teaching. Proposals were called from DIT teaching staff outlining how they would integrate clickers into the design (learning and teaching strategy) of a module. This award granted teaching staff with a set of clicker devices to use for teaching purposes on the proposed module during semester 2 of the academic year 2010-11. This report details the evaluation that each lecturer carried out on using clickers with students.

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The Interactive Organic Chemistry Module.

Dr. Barry Ryan, Food Science & Environmental Health

Abstract

Students are becoming ever more aware and comfortable with technology (Sharples et al, 2010). It is part of their everyday life, and as such, integration of technology into the classroom is a ‘fait accompli’ (Skiba and Barton, 2006). Research has proven that an engaged student will absorb and understand more, with blended learning a key method of student engagement (Johnson & Lillis, 2010). Personal Response Devices or ‘Clickers’ provide a simple blended way in which to generate an atmosphere of student interaction that can simultaneously enhance critical thinking and problem solving amongst groups and individuals. Clickers can also provide an immediate source of feedback for the academic and student, rapidly identifying areas of misunderstanding (Morredich & Moore, 2007). Previous publications have cited the enthusiastic response of students towards Clickers (Caldwell, 2007) and also the potential improvements in student learning based on Clicker use (Beatty et al., 2006). More specifically, educationalists who have used Clickers effectively in the classroom have reported improved student interaction (Weerts, 2009), engagement (Mayer, 2009), active-learning, participation, and an increased level of advance preparation (Cook & Hazelwood, 2002). All these benefits could also be easily transferred to the laboratory, though the integration of the Clicker System.

Background and Context

The aim of this project is to maximise the learning associated with undergraduate lectures and laboratories for first year science students by redesigning and aligning assessment and teaching strategies, devising and implementing appropriate and timely feedback processes, and integrating transferable skills at key stages in the curriculum. In a pilot study in Semester I (2010/2011), a first year module basic laboratory skills (TFCH 1007) was used to trial the student engagement with Clickers and also as a method of initiating debate and providing rapid feedback within the laboratory. Students were generally very enthusiastic about the use of Clickers in the lab and, following pedagogic evaluation, it was perceived that the Clickers would be easily integrated into the lecture hall also.

Description of Project

Clickers have traditionally been reserved for the lecture hall; however, recent research has shown that the integration of Clickers into the laboratory has positively contributed towards the students understanding of the given topic, as well as enhancing their learning involvement and interaction (Johnson & Lillis, 2010). In this project, the use of Clickers was not only confined to the classroom, but was extend to further the investigations carried out in the Johnson & Lillis (2010) study by integrating the Clickers at every part of the laboratory session (pre- and post- laboratory).

In the lecture environment, a Clicker was anonymously given to a group of students (n=3 or 4) at the beginning of the class. The class were asked to work together in their groups to answer a Multiple Choice Questionnaire (MCQ) based on organic chemistry nomenclature. Once the group had decided on
which answer they thought was correct, they clicked in the groups’ decision. The Clickers were used in groups in the lecture for two reasons; firstly the limited number of Clickers (n=40) and the large size (n=130) and also the students could peer-share if they worked together to figure out the MCQ. Once the question was answered by all the groups the correct answer was revealed, the feedback graph was displayed and the lecturer facilitated a discussion based on the explaining why the distracter answers were incorrect and how the correct answer was right. Initially the lecturer led the discussion, however, with time and experience the student population (those who got the answer correct) lead the discussion and, as such, facilitated peer-teaching.

In the laboratory setting, a Clicker was given anonymously to each student (n=32) and the individual was asked to complete a pre-lab MCQ based on apparatus, experimental and safety knowledge. This was not graded, but did give the students and the academic an indication of the level of understanding and served as a starting point for further discussion. After the laboratory was completed the students were asked to submit their data via Clickers. This served as a reminder to students to collect all personal data before the lab was finished and also it allowed each individual to see how they compared to the results of the rest of the class. It is important for the individual to compare and contrast results as part of their scientific report on the laboratory. Once the results were collected, the lecturer and the students discussed the general trends observed (facilitated by the instant graphical representation of the data) and this supported the students as they prepared their reports on the laboratory session.

A visual representation of the work/system developed

![Image](image1.png)

**Figure 1:** Screen capture of a typical lecture based Clickers question based on the alkyne organic chemistry functional group. MCQ questions were written with best pedagogical practice in mind.
Suitable “distracter” answers were provided to force the student to discuss each option with the group members to work out which was the correct answer.

Figure 2: Screen capture of a typical laboratory based Clickers questions. Part A represents a pre-lab MCQ, in which the student must individually answer questions based on their preparation for the lab. Items quizzed here include apparatus, experimental and safety knowledge. Part B depicts a post-lab survey in which the data generated in the lab session was collected and collated by each student clicking in their results.

Evaluation

In this study, Clickers were introduced into both the lecture and laboratory environment for a first year undergraduate foundation organic chemistry module taught across Levels 6, 7 and 8 courses. Clicker usage encompassed small groups of three or less in lectures (n=130) or individually in laboratory situations (n=32). In the lecture environment, Clickers were employed to poll student comprehension of the fundamentals of chemical structure, nomenclature and reaction prediction, after a small group discussion on a given multiple choice question. Pre-laboratory concept understanding, experimental outcome prediction and safety issues were polled individually with the Clickers in the laboratory. Pedagogical evaluation of Clicker usage took the form of an anonymous student multiple choice questionnaire (n=80), an anonymous feedback form (n=60) and a student discussion forum facilitated by an independent academic (n=15).

Figure Three: Pedagogical evaluation of Clicker usage in the lecture environment (n=80).
I enjoyed the use of Clickers in lectures
Clicker work was better than a normal lecture
I felt working in groups during Clicker work was best
I felt more confident working in groups as the semester went on.
When in Clicker groups we stayed on task and discussed the question
I would like to see more Clicker work in Organic Chemistry lectures.
My discussion skills improved over the course of the semester by using Group Clicker work
My understanding of the lecture content improved when there was a Clickers element included.
The instant feedback (graph) was helpful for me in my understanding of the content of the question.
The feedback was useful, even when I got the question wrong.
I feel there should always be a class discussion on each Clicker question.
Would you buy your own Clicker if they were regularly used in all lectures?
I was more focused/concentrated more when the Clickers were being used.

A) I enjoyed the use of Clickers in lectures
B) Clicker work was better than a normal lecture
C) I felt working in groups during Clicker work was best
D) I felt more confident working in groups as the semester went on.
E) When in Clicker groups we stayed on task and discussed the question
F) I would like to see more Clicker work in Organic Chemistry lectures.
G) I would like to see more Clicker work other modules.
H) My discussion skills improved over the course of the semester by using Group Clicker work
I) My understanding of the lecture content improved when there was a Clickers element included.
J) The instant feedback (graph) was helpful for me in my understanding of the content of the question.
K) The feedback was useful, even when I got the question wrong.
L) I feel there should always be a class discussion on each Clicker question.
M) Would you buy your own Clicker if they were regularly used in all lectures?
N) I was more focused/concentrated more when the Clickers were being used.
Evaluation of Clicker usage in lectures was overwhelmingly positive. Student statements included: “best thing about the lecture, full stop”, “allowed me to chat to my neighbour to figure out the question ourselves” and “I looked forward to the Clicker questions, it kept me switched on to what was going on in the lecture as I knew I’d have to help my group-mates work out the Clicker MCQ”. The vast majority of students enjoyed the use of Clickers in the lecture environment (97%), however, although group work was pedagogically beneficial the student, only 63% of those polled enjoyed working in groups. The students did become more confident working in groups over the semester, this may be linked to the fact that these are first year students and this was the first time they were exposed to group work in a large lecture environment. Using the Clickers was beneficial to the students learning (94%) and the feedback and discussion after Clickers usage was helpful to students even if they got the question incorrect (89%). Indeed the students would like to see more Clickers in the current module and other modules (97% in both cases), citing the post Clicker discussion as a crucial component of Clicker time (92%). Although the students would like to see more Clicker usage, they were not overly enthusiastic about purchasing a personal Clicker (only 62% would purchase one at a cost of €50). The monetary output purchasing a Clicker may be outweighed by the student engagement with the course content, as students (95%) were more engaged and focussed during Clicker work.

Feedback after employing Clickers during laboratory session was very positive. Student comments such as “use of Clickers really made the topic interesting” and “stimulating way of learning” indicate the use of Clickers in the laboratory is both achievable logistically and of tangible benefit to the students learning. However, pedagogically relevant use of Clickers is crucial so maximal student benefit can be achieved. Students were encouraged to use the Clickers as means of communicating their answers to in-lab questions, results generated in the lab and outcomes from group discussions, and not as a distraction in class (Lantz, 2010). Effective use of the Clickers opened new and interesting debates, based on student feedback (both pre- and post-laboratory); but also areas of mis-understanding were be identified and focussed on in subsequent lab sessions. This allowed the lecturer to close this gap in the students “zone of proximal development” (Vygotsky, 1978).

Overall, students learning experience was enhanced through the use of the Clicker system; resulting in a deeper understanding of the course content through an active and engaging learning tool.

Significance of work for others

Clickers provide a simple way in which to generate an atmosphere of student interaction that can simultaneously enhance critical thinking and problem solving amongst groups and individuals. Clickers can also provide an immediate source of feedback, both for the academic and student. Furthermore, active learning and increased level of advance preparation are reported by educationalists employing Clickers. This resource provides a suite of Clicker ready questions based on the fundamental functional groups of organic chemistry; a commonly taught module across all first year science courses. The resource is divided into eight quizzes; each quiz is split into two sections (nomenclature and lecture content revision). Individual student performance can be recorded if the quizzes contribute towards a continuous assessment grade. Alternatively, the quizzes can be completed anonymously in class or as part of a group work activity for large classes. The resource will be made available on the National
Digital Learning Resources (NDLR) portal, and as such can be accessed by any Irish academic. This resource was showcased at NDLR Fest (March, 23rd 2011) with several comments passed as to its usefulness across the introductory chemistry higher education sector by those in attendance. The poster presented is available at: http://www.ndlr.ie/scop/NDLRfest2011/images/DIT_Inter_5.gif. Some of the content from this study will also be presented at NAIRTL’s 5th Annual Conference “Engaging Minds” at NUIG. The title of the talk is “Clickers in the Classroom”, and will form part of the “Engaging Large Classes” session.

Furthermore, the general awareness and use of Clickers within the School of Food Science and Environmental Health has increased over the course of the study. Students are also more empowered to request the use of such technologies in other modules that are not currently using Clickers. This will lead to a change of approach to Learning and Teaching practice with students in the school initially.

**Future work**

Students commented that Clickers effectively improved their interaction, engagement and participation in class. Furthermore, active-learning and an increased level of advance preparation was also evidenced. However, although very successful in this study, there remains issues hindering increased Clicker usage in large undergraduate classes such as initial cost, maintenance and logistics.

**References**


Using clickers in a foundation physics course

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Abstract
Classroom interactivity and participation are seen as critical components of teaching and learning. Research shows that students appreciate the anonymity, immediate feedback, and opportunity of self-assessment provided by the clicker response system. This paper reports on the use of clickers in a foundation physics course and compares student’s responses on exam questions to similar or identical clicker questions and written multiple choice tests. Although there is some enhancement in physics knowledge due to the use of clickers many of the students were unable to demonstrate this enhanced knowledge when the questions were posed in an exam despite the similarity in the questions.

Introduction
Preliminary Engineering in Bolton Street is a level 6 programme and offers an alternative route to professional engineering for those who have not fulfilled the points and/or subject requirements for enrolment in level 8 engineering programmes. (These requirements are 2 honours from at least 6 subjects including a C in higher Maths and a science subject in the Leaving Certificate.)

The students enrolled in the course have a range of academic abilities and backgrounds; 2010 Leaving Certificate points range from 270 to 450; less than 20% had studied physics to Leaving Certificate level. The engineering physics module in semester 2 introduces the student to such subject areas such as waves and sound, electricity, circuits, and electromagnetism. There is also a laboratory programme designed to support the lecture programme.

Rationale for project
The use and advantages of clicker response systems have been detailed elsewhere [1][2][3]. They have been cited as improving student engagement and participation in the class/lecture environment and promoting deeper learning of the course material [3]. Anonymity and immediate feedback are the main advantages of the clicker response system. Every student can answer each question without fear of embarrassment if their answers are incorrect. This greatly increases the student’s willingness to participate in the class much more than a traditional oral question and answer process. This is particularly useful for those students who may feel intimidated by their fellow student’s prior knowledge of the subject. In addition the clickers also offer a fun diversion during the lecture making the time spent more interesting for students and lecturer alike.

The introduction of clickers into the lectures was motivated by several factors;

- Encourage greater student participation and interactivity in the lectures especially among students with no prior knowledge of physics
• To determine to what extent the ‘deep learning’ gained by the learner during clicker sessions is retained and can be applied in a written formal assessment format.

Project overview

At the start of the semester all of the students were supplied with comprehensive notes on the course material including problem sets. Each student was supplied with the same numbered clicker at the start of each lecture. This ensured that every response by each student throughout the semester was logged. (It also provided a useful attendance record). All the questions posed were multiple-choice with a histogram showing the responses made. The strategies employed were similar to those introduced by Mazur[3].

Concept questions

Questions to confront preconception(s) and misconceptions were posed prior to the introduction of a new topic. Three to four more conceptual questions were posed during the course of the lecture to engage the students and assess their understanding of the material. The provision of immediate feedback in the form of a histogram of responses allows the students (and the instructor) to assess their understanding of the course material relative to the other students. The students were then allowed to argue their case to the other students, explaining their reasoning for making a particular choice before the correct answer is supplied. Several times this produced lively discussion in the classroom on many physics topics (sometimes digressing into seemingly unrelated areas!). This proved to be very beneficial, not just for comprehension purposes but also made the lecture time more enjoyable and interesting for lecturer and student alike.

Reading quizzes

To prepare the students for the lecture, and to free up time for the use of clickers for concept questions during the lecture time, the students were asked to read the notes on the subject to be covered before the lecture. The students were then given a clicker quiz on the material in the reading. The reading quizzes were not graded but the students were made aware that similar questions would be included in mid-term and the end-of-semester exams giving them a good incentive to participate.

The reading tests were then followed by a lecture on the material which concentrated upon key areas in the reading, from sometimes a different aspect and with different examples. During the reading quizzes the students were given around two or three minutes to read the question and consider their answer before transmitting their answers. During this period they were allowed the same opportunity to convince their colleagues (and themselves) of their decision before transmitting their response. For each question a countdown of about 20 seconds was employed to bring an end to the discussion/consideration and start the voting. Once the histogram of results was displayed and the correct answer displayed there was a brief discussion regarding the merits of each their response incorrect or otherwise.
Project evaluation

Some of the results of clicker tests are shown below in table 1. These results are also compared with answers to two forms of traditional assessment: written multiple choice and end of semester no-choice exam question format. The written multiple choice test comprised about 10 questions, each with four possible answers similar to the clicker test. The multiple choice test was given to the students about three weeks after the corresponding clicker test. The exam was held four weeks after the final written multiple choice test. The exam question was a compulsory question composed of ten parts. The question type in each of the written assessments (multiple choice and exam) was twinned with the clicker tests. That is they were very similar and in some cases identical to questions given to the students in the clicker tests. Table 1 presents the percentage correct student responses from two reading tests: basic dc electricity and wave theory. The na (not applicable) entries refer to questions that did not have a twinned question in that particular assessment or in the case of the written multiple choice for wave theory; the papers corrected papers were given back to the students long before the time of writing and so unfortunately no data is available.

The multiple choice format is predominantly ‘all or nothing’, such that all the marks are riding on the student picking the correct answer. The exam format is obviously very different. That the student must now supply an answer of their own is reflected in the two columns of fully and partially correct for written responses. Partially correct meant that the student response received 25 to 75% of the available marks.

<table>
<thead>
<tr>
<th>Question Type</th>
<th>Clicker mc %</th>
<th>Written mc %</th>
<th>Fully correct %</th>
<th>Partially correct %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resistors 1</td>
<td>25</td>
<td>92</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Resistors 2</td>
<td>38</td>
<td>58</td>
<td>6</td>
<td>60</td>
</tr>
<tr>
<td>Resistivity</td>
<td>54</td>
<td>na</td>
<td>13</td>
<td>20</td>
</tr>
<tr>
<td>Electric Power</td>
<td>81</td>
<td>83</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Waves 1</td>
<td>100</td>
<td>na</td>
<td>25</td>
<td>17</td>
</tr>
<tr>
<td>Waves 2</td>
<td>33</td>
<td>na</td>
<td>6</td>
<td>53</td>
</tr>
<tr>
<td>Waves 3</td>
<td>50</td>
<td>na</td>
<td>13</td>
<td>28</td>
</tr>
</tbody>
</table>

Table 1 Correct responses and assessment format

While many researchers have found the effective use of clickers can create a dynamic learning environment through peer instruction, few studies document the relationship, if any, between clicker question scores and results from traditional written tests\(^5\),\(^6\). A reproducible pattern in correct
responses across the three types of assessment can be derived from the - albeit limited- data shown in Table 1.

The students appear to be gaining physics knowledge as a result of the clicker quiz and discussion process even though initially the clicker results for the most part are quite low. The evidence for this is the step up in scores in the written multiple choice test a few weeks later. In the written multiple choice test the students were answering as individuals and this is suggestive of improvements in understanding. But the notion that the students studied more for the gradable written test than for the non-graded clicker test cannot be discounted. Nevertheless despite these improvements the students did not perform well on the corresponding exam questions for which one would expect maximum preparation. Other work in this area suggests that poor performance in exams compared to clicker responses is not solely due to a lack of knowledge of the subject matter[6][7]. The authors suggest that the students may have difficulty in a written exam context expressing the knowledge previously exhibited in a different context, such as a multiple choice test be it using clickers or not.

**Conclusion and Further Work**

One of the motivations for this project was to increase student engagement in the lectures and level the field between those with and those without prior knowledge in physics. The introduction of clickers into the lectures definitely boosted student engagement and interaction with the course material. The anonymity afforded to the students in responding to questions via clickers meant that all the students with or without prior knowledge of physics could confidently express themselves without fear of embarrassment. Comparison of the responses to similar questions posed under different assessment formats shows that even if the use of clickers promotes deeper learning the majority of students have difficulty in communicating this knowledge in an exam context.

Beatty et al report dramatic improvements in teaching and learning by devoting the whole lecture time to clicker concept questions and doing away with the mini-lecture on the key points in the reading material[6]. They suggest that this solely question driven instruction is particularly suited to conceptual and foundational material such as introductory physics or mechanics. The pedagogical approach outlined by Beatty et al [6] is designed to not only not only examine the student’s knowledge of the material but will also address how students utilise that knowledge and examine they routes they take to solve a particular question. A data base of the question is available online[6].

Crouch and Mazur[4] have replaced the clicker reading tests with written homework assignments based upon the reading material to be covered in the next lecture. For this to be successful the authors note that the homework must be submitted and assessed well in advance of the lecture as the findings of the assessment shape the design of the lecture. They report that the students learn more from the reading material as a result and this increases student engagement in discussions to concept clicker questions in the subsequent lecture. While it undoubtedly is a worthwhile exercise to pursue with small student numbers it would be impossible to implement with large student numbers without the aid of a teaching assistants.
Ideally future work on this project would be to combine both the homework assignments and the question driven instruction as outlined above, as a mechanism of improving not only the student’s knowledge and learning, but would also have a positive impact on how the student expresses that knowledge in an exam context. Although as stated above this would only be viable with small student numbers.

References
Towards enhanced student engagement and student performance in Abnormal Psychology class

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Abstract

The use of clickers in the classroom has been promoted as a method of engaging students, facilitating learning and teaching and improving performance in third level students. Clickers were introduced in an Abnormal Psychology module for Social Care students. Previous methods of teaching included didactic lectures, class discussions and group presentations. The aim of this project was to enhance student engagement and improve performance through the use of quizzes in class as learning and teaching method and the use of multiple choice examinations based on these quizzes. Students gave positive feedback on their experience of using the clickers in class, describing them as ‘fun’ and enjoying the discussions that were facilitated by this method of teaching. Attendance was good and performance on examination was excellent throughout the class group. It should be noted that the change of teaching method – i.e. quizzes may have contributed to these effects as much as the use of clickers.

Background and Context

This module runs over two semesters. The focus of the second semester is on understanding a range of mental health difficulties in terms of diagnostic criteria, prevalence rates, how people present with these difficulties and the evidence for how to help people with these difficulties. It is a 2 hour class each week. Previous teaching methods used included didactic lectures, group discussions, group presentations and online discussions using webcourses.dit.ie (DIT’s Virtual learning environment). Concerns that motivated a need for change were in relation to class attendance, low levels of student engagement in class despite invitation to share knowledge and experience and the extent to which students were learning the material being provided, as evident in their examination scripts. Research indicating improved learning based on the use of electronic 2 voting systems in class (see Masikunis, Panayiotidis & Burke, 2009) suggested that this might be a useful tool for enhancing students’ learning. In addition, immediate feedback would be available to the students through the use of clickers. Finally, the use of multiple choice questionnaires for examination was introduced this year as an assessment strategy that is adaptive to different levels of learning outcomes (see Burton, Sudweeks, Merrill & Wood, 1991, for a guide on using MCQs). Therefore, the use of quizzes in class using clickers as a teaching strategy was deemed to be closely aligned with the assessment method.

Description of the development work

Quizzes were developed based on the Instructor Companion Website (www.wiley.com) for the course textbook (Kring, Johnson, Davison & Neale, 2011). This website was a significant support as the site has a test bank on which to draw examples of questions that have been rated as easy, medium and difficult, providing a range of questions in terms of topic and conceptual...
difficulty as well as being directed at different levels of learning. Initially the plan was to administer two quizzes in the 2 hour class, one at the beginning before the material was presented and a second quiz at the end of class. In this way, immediate learning could be evaluated. However, this proved much more time consuming than anticipated. Students were encouraged to consult with each other before answering the question, as a method of facilitating peer learning (Mazur, 1997).

However, within the first class, it became evident that following each question students were actively looking for more feedback, seeking clarification that appeared to be much more conducive to learning than the original structure planned of quiz-lecture/discussion-quiz. The discussion was therefore being embedded within the quiz section of the lecture as directed by the students. The implementation plan for the project was therefore adapted to facilitate the use of the quiz as a structure for the entire class. This is reflective of the concepts “contingent teaching” described by Draper and Brown (2004) and “agile teaching” by Beatty, Gerace, Leonard, and Dufresne (2006), whereby the students’ behaviour in class changes the course of the lesson. Following each question, class discussion took place on the various answers to the question with input from the lecturer. Students who unexpectedly got the question wrong were curious and motivated to understand the question better and were actively challenging in order to clarify their understanding. Time constraints dictated that only a select number of questions could be used in class. Therefore, for each class, two quizzes were prepared for each class – one that consisted of about 35-40 questions, covering all the material necessary for that part of the course, and was posted on webcourses.dit.ie in advance of the class (at the request of the students) and the second quiz consisting of about 10-15 questions, all drawn from the larger bank, and used in class to structure the lecture.

A visual representation of the work/system developed

Below is an example of a slide used in class in a quiz on Schizophrenia (Figure 1) followed by the summary information depicting students’ responses (Figure 2).

**Figure 1. Sample slide from quiz on Schizophrenia (Question 2, n=30)**

Among those with schizophrenia who suffer from delusions, a large majority experience

A) delusions of persecution.
B) thought broadcast.
C) delusions of impulses imposed by others.
D) hallucinations with the delusions.
Figure 2. Question 2 on Schizophrenia

A) delusions of persecution.
B) thought broadcast.
C) delusions of impulses imposed by others.
D) hallucinations with the delusions.
An example of a question where most students answered correctly is given in Figure 3 which shows the results of students’ responses. The correct answer is indicated in italics in the associated table.

**Figure 3. Question 5 on Schizophrenia**

<table>
<thead>
<tr>
<th>A) hallucinations</th>
<th>2</th>
<th>6.25%</th>
</tr>
</thead>
<tbody>
<tr>
<td>B) anhedonia</td>
<td>2</td>
<td>6.25%</td>
</tr>
<tr>
<td>C) loose associations</td>
<td>26</td>
<td>81.25%</td>
</tr>
<tr>
<td>D) inappropriate affect</td>
<td>2</td>
<td>6.25%</td>
</tr>
<tr>
<td>Totals</td>
<td>32</td>
<td>100%</td>
</tr>
</tbody>
</table>

**Evaluation**

Unfortunately, due to time constraints, structure of the academic timetable (Easter break) a change in arrangements for a guest lecturer, and very limited attendance at the final class, it was not possible to comprehensively evaluate the use of clickers in this project.

Feedback from students both during class and when reviewing this teaching method with them, as well as spontaneous comments made on Q6 forms submitted in the evaluation of the module in general indicated that the clickers facilitated a ‘fun environment for learning’ and that they were able to learn from their mistakes through immediate feedback. Students tended to remember the ones they got wrong. Some students commented on the difference in their experience from Semester One (before clickers were introduced) and Semester Two (after clickers were introduced) and described the classes in Semester Two as much more useful and enjoyable. As the module lecturer, I found students much more engaging that previous classes in this module. The quiz structure facilitated clearly defined
parameters for examination preparation and this paid dividends for students in the form of excellent grades in their end of year examination.

Significance of work for others
Within my Department there was a lot of enthusiasm among my colleagues in relation to the use of clickers as a teaching and learning aid. My experience thus far is that it certainly lends to enhancing student engagement and that many students who were otherwise very quiet in class have come forward and spoken up more in this non-threatening and informal context. The use of clickers lends itself well to classes where the learning outcomes are clearly aimed at imparting factual and research material. However, as with the use of multiple choice questions, they also have potential in modules that aim to enhance students’ understanding of concepts and principles, and their ability to understand cause and affect relationships and make inferences from given data (Burton et al., 1991).

Future work
I am interested in continuing to use clickers as a teaching aid in class, based on my experience this year. I would be interested in using other functions available within the turning point software, such as tracking students’ learning through the identification of those areas that students as a group find most difficult, and the evaluation of individual students’ performance throughout the duration of the module. The software enables the gathering of data that I have not had an opportunity to analyse and I believe that this would be of great benefit to me in developing my teaching.

References


Using Clickers in a Maths Lecture to Increase Understanding.

Dr. Bláthnaid Sheridan, School of Mathematical Sciences, DIT Kevin St.

Abstract

Over the years I have found that students are often nervous about answering questions during lectures. One of the main reasons is that they are afraid of getting it wrong, looking ‘stupid’ in front of their peers but also that they simply don’t know the answers. Using the clickers I could ensure that all students gave an answer but more importantly I was able to see how many students understood a topic before I moved on.

Background

I used the clicker system during the teaching of mathematics lectures to a mixed-group of first year students. Within this group there is a wide variety of mathematical abilities – the majority of students will have Ordinary Level Leaving Cert (LC) Maths, some will have Higher Level LC Maths and some students will be returning to education after many years in the workplace (and hence have had no need to use their ‘mathematical brain’ in a long time). I have found that this group in particular are a tough crowd to teach because it is important to teach at a level that allows the ‘weaker’ students are able to understand but also that moves at a pace which ensures that the ‘stronger’ are kept motivated.

Mathematics is perceived as a very dry subject, is based on incomprehensible theory and applied to complicated problems. Too early in their degree courses students become demotivated where mathematics is concerned. Attendance levels drop, students are unwilling to work independently and as a result performance levels suffer.

Development Work

I was initially interested in the use of the clickers because I wanted to be able to quickly collect and analyse the level of understanding of particular topics. I also wanted to explore types of questions and activities that take advantage of these new technologies to transform the way in which I use lecture times.

I interspersed some clicker questions throughout my lectures with this group. I first asked my students to respond to the question individually, without discussing it. Usually, the bar chart showed me that most of the students either answer correctly or incorrectly. When some of the students answer incorrectly, this tells me that the question is one worth answering. I then ask the students to discuss the question in pairs or small groups and to submit their (possibly different) answers again using their clickers. This usually generates a buzz in the classroom as students discuss and debate the answer choices with their peers.
One use of the clickers which I used to great effect within my group was the use of multiple-choice questions. Such an approach often allowed me to assess more than just the recall of facts.

An example of such a question is:

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**Calculus**

A boat is drawn close to a dock by pulling in a rope as shown. How is the rate at which the rope is pulled in related to the rate at which the boat approaches the dock?

1. They are equal.
2. One is a constant multiple of the other.
3. It depends on how close the boat is to the dock.

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This particular question really generated a ‘buzz’ in the classroom. When students were asked to vote individually I could see many of them looking around them to see what everyone else was voting. However, five or six of the more confident students held their clickers high up and put their vote in immediately. When the class were asked to discuss the question in small groups, more able students were able to discuss ‘how’ the maths applied to the context of the picture and when I asked them to vote again, I saw a much more collaborative response. Questions such as these allowed me to test the level of understanding within the group and not simply test if students could recall the answer.

The choice of question set to the class is highly important. Sometimes this might be a snap question where an instant response is required; students are encouraged to recognise solutions or an appropriate approach without the need to resort to pen and paper or a calculator. Questions may also be broken up into smaller stages and the students may be asked to answer a question at each stage of the process. The use of ‘distracters’ amongst the answers that are offered is also very important. Students make the same simple mistakes every year and in every topic. Using typical answers, I was able to demonstrate common errors amongst students and help to alleviate and eliminate them.
Differentiation is a topic which is covered on many foundation and introductory mathematical modules. The following question is a snap type question where the students were expected to respond quickly.

What is the derivative of \( f(x) = \sin(x^2) \)?

(a) \( f'(x) = 2x \cos(x^2) \)
(b) \( f'(x) = x^2 \cos x \)
(c) \( f'(x) = 2x \sin(x^2) + \cos(x^2) \)
(d) \( f'(x) = x^2 \cos(2x) \)
(e) I don’t know.

Other questions required more thought and students were allowed more time.

Why doesn’t \( f(x) = |x| \) have a derivative at \( x = 0 \)?

(a) The left and right limits of \( f(x) \) don’t match as \( x \to 0 \).
(b) \( f \) is not continuous at \( x = 0 \)
(c) \( f \) has no secant line at \( x = 0 \)
(d) The slopes of secant lines drawn through \((0, 0)\) and points to the left and right of \((0, 0)\) don’t match, no matter how close the other points are to \((0, 0)\).
(e) I don’t know.

**Benefits**

I have found the **benefits** of the clickers to be many-fold:

- They promote students activity and discussion in the class (which has been a traditionally difficult task to master in a maths room!).
- They allow for immediate feedback to the students and they help students to gauge their own performance within the group. Whilst it was not a technique that I used myself, it would be possible to construct assignments based on multiple choice questions. In the same way, students can answer the questions using the clickers and feedback would be immediate.
- The clickers allowed me to be provided with an immediate response. I was able to devote more time to topics/concepts where students performed badly on the clickers questions. Whilst I did save the responses from the quizzes with each group, I didn’t have time to analyse each students/class performance throughout the semester.
• The clickers can be used to monitor attendance in class. This can be helpful when matched with, for example, mid-term assessment marks as an indicator for ‘at-risk’ students. In such cases, support can be offered.

• Students are more confident about their mathematics and methods have become more familiar. Students are also more willing to get involved in discussion ‘about mathematics’ than they would usually be.

• By interrupting the lecture with question sets and subsequent discussions, I was able to maintain student interest and concentration.

• The clickers were useful for gathering student feedback for use in the Q6 (DIT student satisfaction survey) forms at the end of the semester.

**Barriers**

Some of the **barriers** I found whilst using the clickers were:

• Initial construction of the quizzes was time-consuming. I found that whilst some questions worked well, some did not work at all and at times it was necessary to ‘think on my feet’ and change/adopt the question.

• To get the full benefit from the use of clickers in the maths classroom, I feel it would have been necessary to have had the quizzes on each topic prepared before the start of the semester. Due to time constraints, I wasn’t able to integrate my lecture notes and the clickers’ questions to best effect. However, with a bank of quizzes now prepared, I am in a much better position to utilise the technology to more effect in subsequent semesters.

• Time was not best utilised during lectures with the handing out and collection of the devices. Such restrictions could prove significant in determining whether we could extent the use of the clickers (random allocation) to other larger cohorts of students.

**Evidence of Success**

Feedback from the students who used the clickers was very positive. Interestingly, many students requested that more use be made of the clickers during maths lectures. Student favour theory notes being made available on web-courses prior to the lecture, and this approach, which does not involve much interaction, has proved successful. However, using the clickers in class allows me to involve the students much more actively in the learning process.
The approach described above is essentially a mix of tutorial and lecture. It could be employed in a variety of mathematics classes, although I have found that it is most suited to lower level material or problem solving questions (e.g. Physics). The clickers may prove less satisfactory if proper monitoring is not put in place. Without a specific, labelled clicker, some students will inevitably ‘hide’ behind the clicker, and put in no effort. I have found this to be particularly prevalent in large classes. In conclusion, the clicker system is a very effective means of gathering feedback, and although it doesn’t come without its drawbacks, is a valuable tool to overseeing student performance and understanding in a maths lecture.
Using clickers to Simply Economics

Dr. Ziene Mottiar, DIT Hospitality Management and Tourism

Background and Context

This project is part of ongoing efforts to make Economics more easily understood, entertaining and interesting for first year students in the School of Hospitality Management and Tourism. As an early adopter of http://webcourses.dit.ie (DIT’s virtual learning environment) I developed materials such as animation, rap, avatars and video to enhance my teaching resources and students learning experience. I view clickers as an additional tool in the teaching tool box and I was interested to see if they could help in learning and teaching on this module.

Description of the Project

This project had three objectives, firstly to allow students to test their knowledge, secondly to help them prepare for their multiple choice assessment and thirdly to help evaluate students understanding before moving to a new topic. An ancillary, but nonetheless extremely important factor, was the usage of clickers to create a form of entertainment while learning during the lecture.

I made a decision in the beginning that I would not use clickers every week as I felt that continual usage would diminish the impact. They were used primarily at the end of topics when approximately 5 questions would be posed which allowed students assess to what extent they had understood the topic or unit. An unexpected bonus was how useful the clickers were for me to ask students to evaluate the module as it allowed me to ask specific questions that I wanted the answer to, unlike the Q6 (DIT’s student satisfaction survey) which is standardised.

Outcomes

There were a number of different outcomes identified as a result of using the clickers in the lectures this year. Firstly students enjoyed using them, when asked (via clicker survey) if they like using clickers 90% of them said yes. Interestingly when asked if clickers made it easier to learn concepts and test oneself between 50% to 68% agreed. This is an interesting finding, it shows that using clickers is definitely enjoyable for students but the learning that it creates should not be overstated.

Observing the usage of clickers provided other interesting findings. Once I opened the bag of clickers there was a buzz around the room and students visibly became more animated as they took the device and waited for the questions. It also generated chat among the group and a
liveliness that the rest of the lecture (even though lectures are interactive in nature with me asking questions etc) did not have. In this way using the clickers created an almost natural break in the lecture and rejuvenated interest and attention.

It is clear that using clickers encourages student engagement. The anonymity of using clickers means that all students participated as opposed to when I ask questions in the lecture and only a small number of students regularly respond. Thus using clickers provided a much more inclusive response and allowed those who may be shy or reserved to participate fully. Instead of just one or two people answering the questions everyone in the room was answering them.

The clickers allowed students not only to test themselves but also to evaluate how their answers compared to others in the group. It was clear that this created a bit of competition among some students in particular, and much cheering (or groaning) when the answer was revealed was the norm. From a lecturing point of view results like this give me the impetus to recover material that the majority may have found difficult but did not admit to needing it re-explained.

**Evaluation on the use of the clickers**

**Students**

As mentioned above the clear majority of students favoured using the clickers in the module. Their views were captured using clicker questions in the last lecture, via the Q6 student satisfaction survey and as a result of two open ended questions asked of participants of one group about half way through the semester.

When asked ‘Do you like using clickers’ student responses included ‘they are deadly’, ‘they are fun’, ‘I love them’ and ‘it is entertaining’. When asked ‘How do they help you learn?’ responses included ‘they make me pay more attention, ‘I learn by doing’, ‘I can see what other students are thinking and the answers are explained’ and ‘they help keep me focused’. It is clear that the clickers had a positive impact on the learners in this module.

**Lecturer**

Using the clickers greatly enhanced this module. As discussed above it created an atmosphere in the lecture which encouraged learning and self-testing. In a subject such as Economics which many students find taxing it is useful to try and present things using as many mediums as possible and having clickers in the ‘tool box’ added another dimension to the Teaching and Learning Experience. In particular the responses via clickers influenced the material that I
covered. So for example, as noted above when the majority got one question wrong it was an indicator for me to revisit that section of the course. When I had finished that section I asked ‘does anyone have any questions or does anyone want me to go back over anything’ and there had been silence. Without using the clickers I would not have known that they did need me to go back over that section again. Thus the clickers became the voice of the whole student group. It meant that rather than me just trying to gauge from student’s faces whether they understood the content I was delivering I could use the clickers to get a definitive response.

The other positive factor in using the clickers was being able to get valuable responses to an evaluation of the module. I have completed Q6 for this module every year for the last 11 years but the 5 minutes I spent with clicker questions this year with the groups has provided me with much more valuable and influential results, as the questions were precisely what I wanted to know in terms of planning for next year.

Overall using the clickers has been a positive experience for both lecturer and students and I would hope to use them again next year.

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Project Title: Clickity Clack Safety Check

Dr. Patricia Ennis, Chemical and Pharmaceutical Sciences

Abstract
This project explored the enhancement of learning with classroom response systems’ (Clickers) in the teaching of health and safety to a large multidisciplinary group of Level 7 science students. The class was scheduled for 9 am midweek. The objective of the project was to engage students with the subject matter, provide instant feedback and assessment to a large group (106 students), while registering attendance. The initial assessment of the class followed the old protocols of an ‘open-book’ exam. The second half of the module was assessed using clickers. The students and I were then in a position to compare and contrast both methods of module delivery and assessment. The student feedback was collated using the clickers during the last lecture and supplemented by a student questionnaire which formed a proportion of the assessment.

Introduction
Health and safety is a core component of the 2nd year professional skills modules for level 7 entry science students in the College of Science and Health at DIT, Kevin St. This component is co-taught to the chemistry, physics, medical physics and biology students. The class is delivered at 9 am midweek to the 2nd yr group (106 students). In the past there have been issues with attendance which have been substantially resolved by allocating a component of the assessment mark for attendance. Currently students must attend 6 classes before they can start to accumulate the ‘attendance’ mark. Therefore attendance must be logged and monitored for the large group every week and collated for each student at the end of the semester. In previous years the module material was examined with 2 take-away open-book exams.

Project Objective
It was envisaged that the clickers would be used:-

1. To automatically register attendance
2. To replace the open book exam with in-lecture clicker tests.
3. To engage students with material
4. To monitor understanding of material delivered

To provide instant feedback for each component of the assessment

Over this section of the module the student is presented with the detail of the extensive requirements of the health and safety legislation in Ireland. Compliance with the statutory requirement for all employees in the workplace is explored.
Clickers for Assessing a Health and Safety Module

There was a delay in receiving the clickers at the start of semester so the material delivered in the first half of the semester was examined with an open-book exam. This provided a direct opportunity for comparison as students experienced both types of assessment (Clickers and open book). The students were asked about their preference for assessment approach at the end of the module.

Corrections of the open book exam 1 took ~6 hrs. There is a big time-saving to be gained when this can be done electronically.

In the second half of the semester the clickers were used to register students and for assessment. A paper sign-in was also maintained.

Clickers and Automatic Registration of students:

The students were registered midway through the lecture (9 am class and a number of students arrive late!), Registration was a reasonably fast process.

Findings from using Clickers to examine material delivered in 3 classes

The amount of material delivered in the ‘clicker’ classes was less than in a normal lecture.

- Students who did not attend the lecture were doubly penalised (No attendance and No clicker result)
- Topics covered in health and safety are easily examined using the clickers.
- Students achieved on average 32% less marks on the clicker component of the examination relative to the open book exam 1.
- It was difficult to include/collate questions for which there was a mark allocated and vs questions for which there was no mark allocated (ie questions used to test preconceptions) within the one session.
- It was easy to identify if there was a specific concept with which the students had a difficulty.
- A number of students arrived at the class without a copy of their presentation which had been provided on webcourses.dit.ie (DIT virtual learning environment) and this presented serious difficulties when presented with ‘clicker questions’
- Independently in the second open book exam students were surveyed on the use of clickers in examination and 72% indicated that they would prefer the open book exam. However when asked their preference between a formal written exam and the ‘clicker assessment’. 92% of those who answered indicated that they would opt for the ‘clickers’. As part of the open book exam students were asked 3 x survey questions and full marks were allocated for any answer given. Zero was allocated if they left it blank. A 96% response rate was obtained.
This contrasts markedly with the Q6A form which was available on-line to students. (3 students out of 106) filled in and returned the feedback form.

Findings from Clicker Survey

The students were surveyed in the last class after using the clickers to gauge their opinions.

1. The students seem to be confident that their attendance in class was recorded accurately. However a significant proportion were not fully assured that the assessment answers would be recorded accurately by the clicker system. Questions and answers to the survey are below

2. The majority of students liked to use clickers in class.

Clickers

1. Are a distraction but fun
2. Give great feedback and I know if I’m correct
3. Are boring and a waste of time
4. Reduce the amount of time available for teaching in the lecture.

3. Using clickers for assessment was not popular amongst the students and as they preferred a second open-book exam in preference to using the clickers at the module end. This was provided and the marks from the clicker assessment were set aside.
4. The students were asked about their opinion on whether the clickers should record their attendance for class.

The requirement for attendance

1. Made me turn up for class
2. This is a student option and should not contribute to mark
3. All attendances should be equally weighted and should count.

Conclusion

Overall I found the experience of using clickers a good learning experience for the students and myself. I used them to provide instant feedback to the students on the module and students were able to see how the feedback was relevant to their course. With the large group it provided for a level of engagement which was absent when the module was delivered in previous years. It also has the potential to reduce the workload for correction and attendance monitoring.

In contrast the Q6A response (DIT teaching quality survey) to this module has been weak (3 responses). I plan to continue to use the clickers again for registering attendance of students and for partial assessment in the future.

Future work will involve using clickers in the delivery of health and Safety training for first years in chemistry at induction. This will provide a record of the training and ensure that the basic requirements in terms of emergency response have been communicated.

References

Using Clickers to encourage discussion and peer learning with postgraduate students on a research methods module

Deirdre Lawless, Computer Science

Abstract
The aim of this project was to investigate the impact of using clickers within a Case Studies module of a taught postgraduate programmes. The modules are designed to expose students to core and leading edge topics in computing is 100% CA and the majority of content is delivered through guest speaker seminars primarily delivered by a speaker from industry. The module is facilitated by a module leader who leads a discussion with the class post seminar. The aim of the project was to employ the clickers in sessions to focus the delivery of material, stimulate additional discussion, track attendance and test student understanding of material.

Background and Context
The aim of this project was to investigate the impact of using clickers within a Case Studies module of a taught postgraduate programmes. INTC9151 Case Studies in IT is a core module of the MSc in Computing (Information Technology). SPEC9220 Case Studies in KM is a core module of the MSc in Computing (Knowledge Management). Both programmes have a full-time and part-time stream and are taught jointly across programmes and streams.

The modules are designed to expose students to core and leading edge topics in computing, providing them with an opportunity to explore computing topics as used industry, understand how such topics fit into the broader area of their programme and potentially identify a dissertation topic.

The module is 100% CA and the majority of content is delivered through guest speaker seminars primarily delivered by a speaker from industry. The module is facilitated by a module leader who leads a discussion with the class post seminar.

Analysis of guest speakers sessions is part of the CA. In addition students are expected to relate this analysis to the core area of their programme to answer key questions relevant to the programme.

Classes are held on Saturdays and interactivity is encouraged to ensure attendance.

The aim was to use the clickers in sessions to:

- Focus discussions
- Interact with the class group
- Track attendance
• Test student progress with assignments through assessing their understanding of previous sessions

• Guide the students through the process of relating guest speaker material to their programme and tracking this through the delivery of the module

• Survey class groups about the relevance of guest speakers to their programme.

Only limited trials were possible due to the constraints of sharing. As this class is on Saturdays and the clickers need to be in use late in the week and returned for use on Monday morning it was not always possible to use them. It was therefore difficult to prepare material in the way envisaged in particular as it was not possible to introduce third party lecturers to the technology in advance and use on the day of speaker sessions took away from the actual seminar time and speakers preferred to allocate the time to questions and discussions.

However use of them for introducing students to key concepts related to academic ethics and behaviour, programme rules etc proved very effective. The work will be continued into 2011/2012 to support a range of activities.

Description of work

The case studies module runs over a 12 week period, one Saturday in four. Sessions on Saturday are structured as follows:

• Guest Speaker session (10.00 – 12.00)

• Lunch

• Work group session (14.00 – 15.00)

• Group presentations session (15.00 – 16.00)

Given the short timescale the initial plan was to use the clickers in three sessions. The first session to be focused on a ‘housekeeping’ topic, the second with a guest speaker and the third to be offered as an opportunity for the students to use the clickers in a group presentation.

The first session was developed to instruct students on the issues of plagiarism since this had been an issue with this group in the first semester. The classroom session was designed as follows:

• 1/3 presentation of key concepts with supporting examples

• 1/3 engagement of students in testing/re-inforcement through voting on key questions with supporting discussion

• 1/3 wrap-up plus presentation of key rules + regulations

• Final acknowledgement of having read DIT statement on plagiarism (distributed) using clickers.
For the second session a guest speaker was selected and asked to collaborate. After initial agreement it proved impossible to co-ordinate his schedule so that he could participate in the planning.

For the third session students were offered the opportunity to incorporate the clickers into the presentation of their assessment. A class presentation was one of the options for submission of their assessment work. Although the majority chose this route, none chose to use the clickers. Feedback suggests that they felt too much work was involved and no additional incentive to use them.

**A visual representation of the work/system developed**

Below are screenshots from each of the key parts of the plagiarism lecture.

**Presentation of key concepts:**

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**Plagiarism - Definition**

- regarded as either intentionally or unintentionally the ‘passing off’ of others’ work as one’s own. This includes the using of others’ ideas, information presented or accessed in either visual or audio formats and asking or paying another to produce work.” (DIT 2011)

Is this plagiarism?

Copying and pasting text without acknowledging its source.

1. Yes
2. No

Statements of Rules:
Final acknowledgement of having read DIT rules:

I have read and understand the DIT Policy on Plagiarism?

1. Yes
   92%

2. No
   8%

Evaluation work

A discussion session was held with students on the use of clickers in the classroom. Interviews were held with the guest speakers and lecturers involved. The Plus Minus and Interesting (PMI) model was used. Key feedback is listed in the table below:
<table>
<thead>
<tr>
<th>Feedback Type</th>
<th>Plus</th>
<th>Minus</th>
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| Student Feedback      | • Found the session enjoyable  
• Created Discussion  
• Reinforced ideas | • Not all liked the idea of being tracked  
• Some felt it was a little childish  
• Interesting  
• Queried the use during technical subjects  
• Possibility for use in revision session |
| Guest Speaker Feedback| • Lightened mood in room  
• Involved everyone | • Not familiar with the technology  
• Would like to practice with a set well in advance  
• Would require additional preparation which do not have time to do  
• Interesting  
• Would be useful to know in advance what students are interested in  
• Could be beneficial to kick start discussion |
| Lecturer Feedback     | • Helped in lecture design to highlight key ideas  
• Great to be able to track individual student involvement  
• Link of tracking when marking assessment is good | • Takes extra time in class to count back in clickers  
• Extra preparation  
• Working with guest lecturers very difficult |
• Interesting
• Would be interesting to track level of engagement of students over a longer period

Significance of work for others

This project was focused on work conducted with postgraduate learners. These students are very engaged and focused during the class period. This project was targeted at a specific module where interactivity is required with third party speakers. However the need to engage the third party speaker in the process proved a barrier. Attempts to involve the speaker in advance proved difficult and it was not possible for the lecturer in charge to construct a session around their work.

The initial session on plagiarism proved very effective however. Students engaged well, discussion emerged during the session. Particular problems were highlighted and follow up sessions and material created. The students enjoyed the session. Students reported that rather than feeling accused of potential illegal behaviour, they received the messages in an enjoyable way. The programme team feel more secure that there is a record of students who attended the session, who are aware of the issues and committed to the DIT regulations.

Feedback from students about the request to incorporate clickers into their assessment suggests that an incentive is necessary for them to take on additional work.

Future work

The effectiveness of using clickers to engage students in presentation of material related to ethics, plagiarism and programme rules has led to the development of a plan to use the clickers in the following sessions next year:

• Induction and orientation
• Selection of optional modules
• Student feedback sessions

In addition building on the work completed on introducing students to issues of plagiarism the use of clickers will be extended to use in the Research writing and scientific literature module to introduce and reinforce issues around academic voice, citation, references, research sources etc.

1. References

N/A
Active Accounting – Using Clickers for Active Engagement

Alice Luby, School of Marketing, DIT

Project Aim
The Active Accounting Project aims to make first year students more ACTIVE in a lecture environment, encouraging student engagement in the learning process through the use of clickers.

Project context
In the 2010/11 the clickers were used with 2 modules DT341/1 and DT365/1 regularly with two main approaches adopted:

Embedded Multiple Choice Questionnaires (MCQ) into PowerPoint slides along with new content to ensure that students understand the new material and to keep them engaged.

Build MCQs around longer examination style questions to help the student progress through the question and establish key learning gaps.

The use of clickers was both fun and engaging from a student perspective but also hugely informative from a teaching perspective. You could see immediately what sections of the material were understood and gauge the gaps in understanding. When the clickers where used in 2011 with modules DT365/1 and DT341/1 the students showed great enthusiasm for their use and complained when the clickers were not brought into the lecture. In the ‘good features of the module’ section of the Q6 (DIT’s student survey questionnaire) the following comments were received:

Student comments on using Clickers
- ‘Clickers allow students to understand each topic easier’
- ‘I really enjoyed using the clickers in class, as I have never done accounting before I found them very useful’
- ‘clickers were a good way to get the class to interact’
- ‘the clickers were fun’

Of the 22 students in DT365/1 on-line respondents 6 commented positively on clickers. A further 2 respondents from DT341/1 highlighted the use of clickers as a positive feature of the module.

Challenges
However, the clickers currently available (Turning point Technologies) only allow for multiple choice input. This is extremely limiting for teaching accounting, particularly when working through examination style questions. Clickers that facilitate numeric input would be ideal as students would be prompted to enter the appropriate figure without the need to have it in as MCQ format as they work through each key stage of a longer examination style question.

To reap full benefits from the use of clickers the project requires a set of numeric input. The purchase of a pack of clickers which allow numeric input would facilitate the development of an
enhanced learning environment. The delivery of clicker questions would no longer be limited to MCQ format and the scope for development of suitable and cutting edge material is significantly improved.