

Staff perceptions on the new RF clicker system at the College of Science and Engineering

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Background

In 2008 the University embarked on a lengthy procurement process to replace the existing Infrared (IR) technology with Radiofrequency (RF) technology. RF technology is becoming the current standard, promising a number of benefits, such as simple installation with a single USB wireless receiver, stronger signals, no line of sight issues and confirmation for students on receipt of their votes. In July 2008 the decision was taken to purchase Interwrite Crickets (<http://www.einstruction.com/products/assessment/cricket/index.html>), mainly because of its cross-platform compatibility and automatic allocation of channels.

During summer 2008, RF receivers were installed in 90 centrally bookable lecture theatres and teaching spaces and the clicker software was upgraded. Although the University had already used Interwrite IR clickers in previous years, the RF technology came with a new software, Interwrite Response, which needed re-training and practice. The clicker support team in the CSE in collaboration with a colleague of the Teaching, Learning and Assessment (TLA) Unit offered a number of training sessions for lecturers to upgrade the software, try out the new system and also discuss how to effectively use clickers in teaching and learning (see http://www.scieng.ed.ac.uk/LTStrategy/clickers_effectiveUse.html).

The new RF clicker system has now been in use for one academic year. To collect feedback from staff using the system we developed a questionnaire using the Bristol Online Survey tool. The following report summarises the results of this survey. We previously collected staff perceptions on clicker usage in April/May 2008. Feedback from lecturers on clickers was very positive, highlighting benefits of clickers such as increased interaction between lecturers and students, improving feedback for both students and lecturers by revealing common misconceptions and giving students an insight on how they compare to their peers. However, they also reported challenges when using clickers, such as technical issues lecturers were encountering, especially with the software and problems using the managed desktop machines in the lecture theatres to run clicker sessions. It became evident they expected a significant improvement through the RF upgrade in the set up and running of clicker sessions. I will compare the data gathered then, with the data gathered this academic year, to see whether the RF clicker system delivered on its promises and whether the new system resulted in a different use of clickers by academic staff at the College.

Clickers in the CSE

As mentioned above, 68 lecturers are currently using clickers in the CSE. To all of these lecturers an email was sent out at the end of July 2009 with a link to an online questionnaire to collect their perceptions of the new RF clicker system.

In total 24 responses were received by Mid August 2009, which represents a response rate of 35%. The responses were from six of the seven schools that used clickers last year:

Figure 1: Respondents and Users by Schools

School	Respondents per School		User per School
Engineering	4	17%	20
Chemistry	4	17%	11
Physics	5	21%	10
Informatics	1	4%	8
Biology	6	25%	13
Geosciences	4	17%	5
Maths			1
Total	24	100%	68

Most respondents have been using clickers for more than a year (83%), which puts them in a good position to judge whether the RF clickers represented an improvement to the previous IR technology.

Figure 2: How long have you been using clickers?

One year:	4	17%
Two years:	7	30%
Three or more years:	12	53%
Total	23	100%

RF clicker upgrade

This year's RF clicker upgrade seems to have been a success. The majority of lecturers perceive the RF clicker system as an improvement to the previous IR system.

Figure 3: Has the RF clicker technology been an improvement to the previous IR technology?

Yes	12	80%
No	3	20%
Total	15	100%

On the positive side, lecturers perceive the system as more reliable and easier to use ("Less flaky, better response rates, easier to set up." "The new technology proved extremely reliable and hassle-free for me. It is basically plug and play."). They particularly approve of the possibility of using their own laptops with a USB receiver ("It is particularly an improvement if using the clickers in a lab or other room that is not fitted with a receiver.")

Lecturers have reported some problems due to the change of system, including the necessity to select a channel for students, the decreased battery life of the clickers, the decreased number of choices on a clicker handset (six as opposed to the previous 10 options) and the missing confidence level buttons.

Although the upgrade has been seen for the majority of users as an improvement, more than 50% of staff still experienced technical problems (but less than last year).

Figure 4: Did anything go wrong with the clicker sessions?

	2008/2009		2007/2008	
I had no problems at all:	11	38%	9	24%
With the clicker software:	9	31%	13	35%
With the data projector:	1	3%	2	5%
With the managed desktop machines:	4	14%	7	19%
With the receivers:	4	14%	6	16%
Total	29	100%	37	100%

We had also hoped that the new system would increase student response rates, which have caused concern in previous years, especially in courses, where only a few members of a course team used clickers and in Semester 2 courses, which in general seem to have had lower response rates than Semester 1 courses. However, the response rates have only slightly increased. This might not be as big a problem as it appears, as one of the lecturers points out: "I think although only 30% of students actually vote, most students are participating in thinking about the questions and are formulating responses."

Figure 5: How many of the attending students do, in general, vote on a clicker question (approximately)?

	2008/2009		2007/2008	
25%	2	8%	3	10%
50%	11	46%	14	47%
75%	9	38%	9	30%
100%	2	8%	4	13%
Total	24	100%	30	100%

Difference in technical usage of RF clickers

One of the main advantages of the RF clicker system is the possibility of using a lecturer's laptop to run the clicker questions, since all lecturers now need is one USB wireless receiver to collect responses from students. The old IR system had to be run through the managed desktop lecture PCs, which were wired to up to seven receivers, depending on the size of the classroom.

Responses of the questionnaire show that lecturers have taken advantage of this: 67% of respondents used their own laptops as opposed to the managed desktop machines.

Figure 6: Which system do you use to run your clicker questions (most of the time):

The managed desktop PC:	8	33%
My own Windows laptop:	10	42%
My own MAC laptop:	5	21%
My own Linux laptop:	1	4%
Total	24	100%

Clickers sessions can be run in various ways: questions can be prepared beforehand using an MS PowerPoint add-in, which integrates MS PowerPoint and the Interwrite Response software or the software can run "standalone", with the question bar on top of any other application displaying the question. This year lecturers have made more use of the MS PowerPoint add-in than last year. This could be due to the increased use of lecturers' own laptops as mentioned above.

Figure 7: How did you mainly use clicker questions?

	2008/2009		2007/2008	
Integrating clicker questions into MS PowerPoint using the PPT add-in:	16	67%	12	40%
Using the PRS standalone version, but with questions prepared beforehand:	5	21%	18	60%
Making questions up "on the spur of the moment":	0	0%	0	0%
A mix of the above:	3	13%		
Total	24	100%	30	100%

Difference in pedagogical usage of RF clickers

Lecturers seem to have gained confidence in using clickers: they use clickers more regularly during the semester and ask more questions per lecture.

Figure 8: Did you use clickers:

	2008/2009		2007/2008	
In all lectures you were teaching in this course:	12	50%	11	37%
In several lectures:	8	33%	11	37%
In one or two lectures only:	2	8%	2	7%
Not in lectures, but in workshops, labs, practicals etc.:	1	4%	1	3%
Other (please specify):	1	4%	5	17%
Total	24	100%	30	100%

Figure 9: How many questions do you generally ask per lecture?

	2008/2009		2007/2008	
1-2:	8	35%	17	59%
3-5:	15	65%	12	41%
over 5:	0	0%	0	0%
Total	23	100%	29	100%

The most basic way of using clickers is to ask students to vote individually on a question and only allow one voting. However, nearly half of the lecturers (n=10) now use clickers in more innovative ways, such as encouraging students to discuss with their peers before voting. Stephen Draper, a lecturer at University of Glasgow and one of the first clicker users in the UK, is convinced that: "Possibly the most productive application, [...] is in using the equipment to initiate a discussion" (Draper nd). Lecturers also ask students to revote on questions, after having explained a question in more detail or allowing students to discuss with their peers (see e.g. Nichol and Boyle 2003 or Bates, Howie and Murphy 2006). Clickers are also used for revision (either of a previous lecture, lecture block or in a special session before exams). A few lecturers use clickers for a 'pub-quiz' style assessment, individually or in groups, where clickers are assigned to specific identities and a cumulative score is being calculated at the end of the quiz (Figure 10).

Figure 10: How do you use clickers?

	08/09
I encourage peer discussion before voting	8
I ask students to revote on questions	8
I encourage students to vote in pairs/groups	3

Lecturers perceive clickers to be a useful teaching tool (see Figure 11). This year, some lecturers even rate clickers as an essential tool in their teaching (see Figure 12).

Figure 11: How useful were the clickers as an aid to teaching?

	2008/2009		2007/2008	
Not at all useful:	1	4%	0	0%
Not very useful:	1	4%	2	7%
Useful:	5	22%	11	37%
Very useful:	13	57%	11	37%
Extremely useful:	3	13%	6	20%
Total	23	100%	30	100%

Figure 12: Would you say clickers are an essential part of your lecture/practical/lab etc.?

Yes	10	45%
No	12	55%
Total	22	100%

CSE staff view clickers mainly as a tool to increase interactivity in large lectures and to improve students' engagement. But they can also give valuable anonymous feedback to lecturers and students and improve understanding of concepts. The following are statements from academic staff on the usefulness of clickers:

On increasing interaction / engagement

- I clearly see learning/thinking going on in lectures.
- The clicker section comes half way through the lecture and provides an important method of keeping the audience engaged.
- I find them useful as they are a way to engage the students and have them actively participating in the class.
- Useful to break up the one-way traditional lecturing style; to engage students by giving them time to reflect on material being presented.
- I found the clickers increased the student's "enjoyment" of the lectures.

On giving feedback

- I find them very useful in providing a form of feedback during the lecture that would be difficult to obtain by other means.
- I use them mainly to gauge understanding and then adjust pace etc. accordingly.
- They give me instant feedback on how well [students] have understood a concept I have just described. This gives me the opportunity to go over it again if required.
- To let student know how well they are doing compared to rest of class.
- [They help me] determine the course of the lecture based upon student understanding.

Conclusion

The College of Science and Engineering has been successfully using clickers for more than five years now. What started as small pilots has now grown into a college-wide initiative with more than 2000 students and about 80 lecturers involved. The recent upgrade to Radiofrequency technology has been a success. It is seen as an improvement by the majority of lecturers, providing more flexibility and reliability. Through the years of experience, lecturers have gained the confidence to use clickers more regularly and frequently in lectures, trying out innovative ways of engaging students and encouraging discussion and interaction, to a point where some lecturers perceive clickers as an essential part of their teaching in first and second year. However, some technical problems persist, especially with the PRS software, which need to be addressed.

References

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