Lecture capture: Early lessons learned and experiences shared

Christopher J Andrews,
Richard C Brown,
Charles K W Harrison,
David Read* and
Peter L Roach
School of Chemistry
University of Southampton
Southampton
SO17 1BJ
*d.read@soton.ac.uk

...we found that a number of students had already been recording audio of lectures for their own purposes, and these students in particular were keen to contribute to this work.

Abstract
Lecture capture has been on the minds of university level teachers for some time. The ability to record teaching sessions for delivery online has a number of potential impacts, not all of them positive. The technology now exists to make it feasible and relatively affordable to deliver entire lectures online. But should we do it just because we can? This article aims to share our experiences in recording a series of organic chemistry lectures, and the findings of the evaluation that followed.

The rationale behind our approach
Due to timetable constraints, we identified that it would be useful to capture our first semester organic chemistry lectures and make them available to a small group of students (5 out of c. 120) online. Organic chemistry is a very visual subject and, as such, we regarded an audio-only recording as being unfit for purpose, and some sort of video deemed essential[1,2]. The first of the two lecturers on the course in question largely used PowerPoint slides containing images, animations and videos, while the second employed more of a 'chalk-and-talk' approach. These differences would require us to be flexible in the way we captured and delivered the lectures to ensure that we would do each teaching style justice.

Techsmith's Camtasia Studio[3], a relatively inexpensive form of 'screen capture' software, has been used previously to support the teaching of chemistry.[4] We concluded that capturing the first lecturer's PowerPoint presentation directly as a video file would be the optimum way of getting this content into an appropriate form. Audio was recorded onto a voice recorder[5] in conjunction with a tie-clip microphone, and was then synchronised with the video using the consumer editing tool Sony Vegas.[6] Final processing was completed in Camtasia Studio, allowing the addition of captions as and when required. As this particular lecturer is very active in his delivery, we decided that it was also essential to use a camcorder to capture live video and to present this alongside the screen captured material in the video window. An additional benefit was the fact that this would allow us to capture any impromptu board work that one might expect to see in an organic chemistry lecture.

In the case of the second lecturer in the series, we decided to use a Tablet PC to annotate notes on the screen directly, rather than trying to capture extensive board work with a camcorder. Using Camtasia, we were able to capture the slides and the lecturer's annotations in real-time as a video file, similar to the process described in another article in this issue.[7] Once again, we used a camcorder to capture video of the lecturer and to act as a backup in case there were any technical problems with the Tablet PC.

Methodology
We have extensive experience of the recording and processing of video and audio files, and we devised a step-by-step method to put together our final videos. To reduce staff input, we identified students who were able to handle the recording of the lectures, and we found that volunteers were very keen to be involved, particularly when there was a small financial reward on offer. Interestingly, we found that a number of students had already been recording audio of lectures for their own purposes, and these students in particular were keen to contribute to this work. Further details of our methodology will not be discussed here, but more information is available from the corresponding author on request.

Camtasia allows the production of video in a wide range of formats. Camtasia 6 introduced a Flash compatible MP4 format, which appears to offer a combination of good video quality and manageable file sizes. After some experimentation with settings, we settled on a format that produced files which could be delivered from within Blackboard

(assuming a robust broadband connection) and were of a suitable quality for teaching purposes. Figure 1 shows the screen layout for the lectures given by the second of the two lecturers.[8]

In terms of evaluation of this project, we had two main goals. The first was to ascertain whether or not captured lectures are considered by students to be an adequate substitute should they be unable to attend the 'real' lecture. Secondly, we wanted to investigate the extent to which students would be willing to view recordings of lectures at which they had been present as part of their revision programme, or to reinforce aspects of their learning. The powerful statistics tracking features of Blackboard gave us insight into usage patterns, while interviews were used to garner detailed feedback from individual students. The findings are outlined in the relevant sections below.

Initial response from students

As mentioned previously, in the first instance these files were made available only to a small group of students who wished to attend another lecture in the same time slot. It happened that this group of students were quite conscientious and we received rapid feedback on the videos and their value. One student was particularly excited, pointing out that she:

"…watched the video with textbook in front of me. I paused it whenever there was a new concept so I could look it up in the book, before moving on when I was happy with it."

This is an interesting point, as it is obviously not possible to pause a 'real' lecture, and there may be genuine pedagogical benefits to this capability. The initial response showed that it was worth the effort to continue recording all of the lectures, and further evaluation is discussed later.

Widening access to the videos

After some discussion, it was decided that the whole series of videos would be made available to the entire year group during the Christmas holiday and the first two weeks after their return to university. The aim was to help them with their

Figure 1: Screen layout.

revision for the end of semester exams and to give us an opportunity to investigate how students make use of such resources and to get feedback from a larger sample size.

We also experimented with the iPhone compatible video preset available in Camtasia. A survey of our first year showed that 18% of them had either an iPhone or an iPod Touch with similar capabilities. Although this is a small proportion we thought it would be valuable to investigate the extent to which students would take the opportunity to 'learn on the move', as uptake of smart phones certainly appears to be increasing.[9]

The availability of the videos was only announced on the day of the last lecture before Christmas, and this was met with a very positive response from the students. We monitored the usage of the videos over the holiday period using the statistics tracking functionality of Blackboard, and the resulting data was analysed using Excel.

Student usage of the video files

It should be noted that Blackboard statistics only record that a student clicked on the link to the video, meaning that we cannot say for sure what proportion of each video is watched by each student. When processing the data, we noticed that while most students registered only one hit on a given video, some of the students had unrealistically high viewing figures (e.g. 9 hits), and we took the decision to revise the figures to set all positive values on a given day to 1. This gave us information about how many students had viewed each video rather than the total number of hits.

Figure 2 shows the number of students viewing videos over the duration of their availability. It should be remembered that prior to the Christmas break, the videos were available only to the small number of students discussed earlier and this group also had access after the videos were made generally unavailable once again. The heaviest periods of usage were at the start of the holiday and after the students returned to Southampton. Figures 3 and 4 show the numbers of students viewing the captured lectures for each of the two academics. In the case of the first
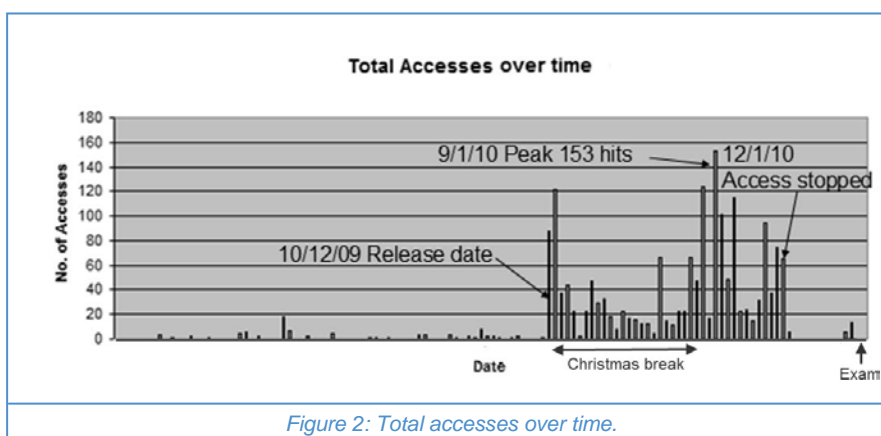

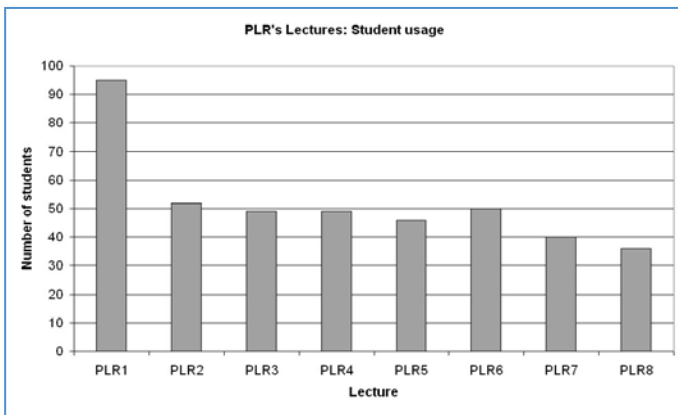Figure 2: Total accesses over time.
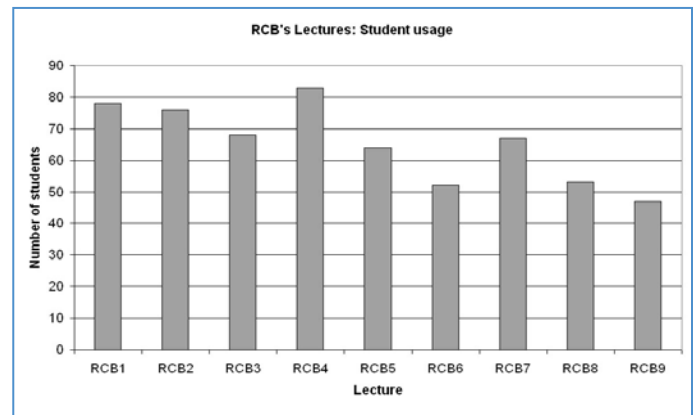
Figure 3: PLR's lectures: Student usage.

Figure 4: RCB's lectures: Student usage.

lecturer (Figure 3), there was a decline in the numbers of students viewing the later videos compared with the first one (although viewing numbers were still good), but this trend was less noticeable in the case of the second lecturer (Figure 4). Overall, this suggests that a significant proportion of students found the videos useful and felt inclined to view most of them.

touch, as discussed earlier. The video quality at this resolution (480x360 pixels) is not as good as the video delivered from within Blackboard (864x480 pixels), although most text is still readable. The data shows that the number of hits holds up well over the whole series, particularly in the case of the second lecturer.
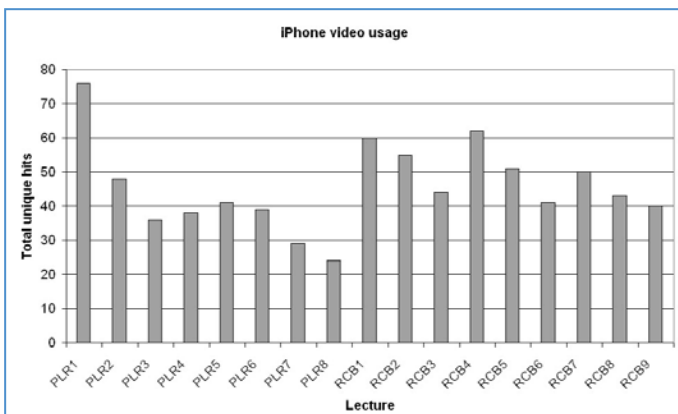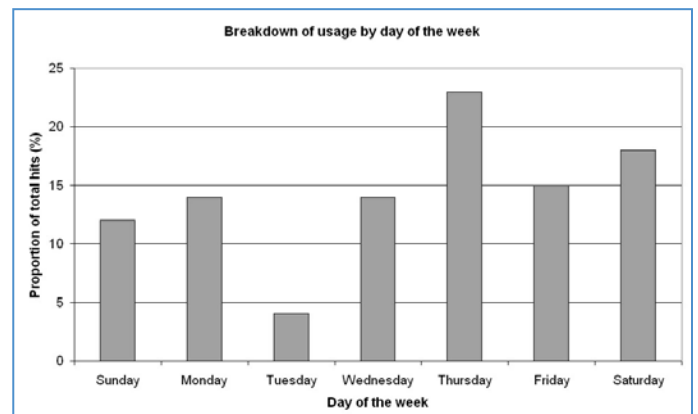

Figure 5: iPhone video usage.

Figure 6: Breakdown of usage by day of the week.

In the case of iPhone video usage (Figure 5), it is worth noting that this format allowed students to download files to store and use on their own device or computer, whereas other versions of the videos were played from within Blackboard and download was not permitted. This partly explains why there are more hits than there are students with an iPhone or iPod

The statistics tracking features of Blackboard log the date and the time of day that students are using resources, providing valuable insight into their study habits. The peak day for access was Thursday (Figure 6), although this may have been skewed by the fact that the videos were made generally available for the first time on a Thursday, and the five students who had access throughout the semester invariably watched the videos before the following session on a Friday. The small proportion of views on Tuesdays is hard to explain, and is perhaps somewhat anomalous. Discounting these points, one can see that the usage is fairly consistent over the whole of the week. The data regarding time of day is interesting, showing an upward trend through the daylight hours, with a peak at around 16:00. Usage is then fairly constant until around midnight, with small numbers of students accessing resources in the early hours. A key point to draw from this is the fact that students have made considerable use of this material outside of normal office hours, indicating that such resources have utility in what is becoming more of a '24/7' culture.
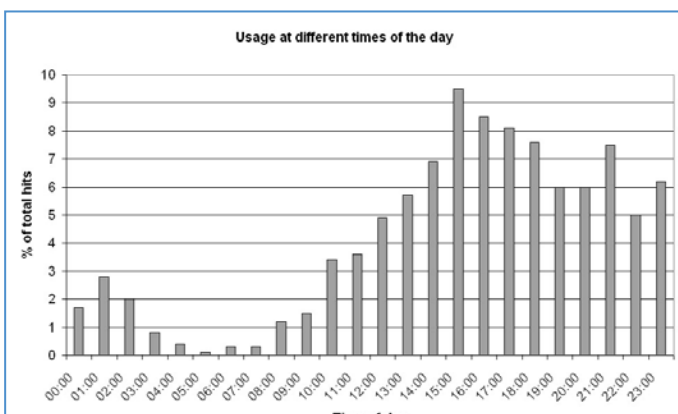

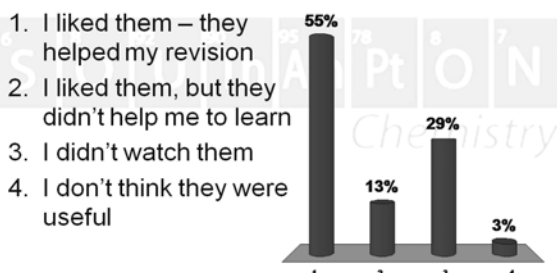Figure 7: Usage at different times of the day.

Figure 8: 'How did you find the organic lecture recordings?' - student responses.

Qualitative evaluation

In a routine survey at the end of the semester, we used electronic voting systems[10] to ask the students what they thought of the captured lectures. The data (Figure 8) indicates that a little over two thirds of students watched the videos, which was in agreement with the other data described. A large majority of students who viewed the lectures liked them, with most of this cohort feeling that they were helpful to their revision. Only a small number saw no value in using the resources.

We decided to tap into the student view further by inviting volunteers to a short interview to discuss their experiences. There are limitations involved in using a restricted sample, but we wanted to strike while the iron was hot, and we did not want to pressurise a random selection of students into being during the lead up to their first set of university exams. The interviews were carried out in an informal setting by a final year project student. The five students interviewed had made use of a number of the videos, with three of them being members of the cohort who had access to the videos throughout the study. Key points were:

- Videos were very useful, and key parts were often watched multiple times.

- All agreed that captured lectures are not a substitute for the real thing, but they have great value in helping students to maximise their learning by allowing them to work at their own pace.

- Some students found the layout to be quite 'busy', and the value of having the video of the lecturer was questioned, although this was offset by the fact that this supplementary video allowed the capture of improvised board work.

- Some felt that the ability to download a high resolution version of the videos would be useful as access to the videos through Blackboard was clunky at busy times.

- There were some technical issues regarding the visibility of the cursor, although these are easily fixed using Camtasia.

- Those who had viewed videos on an iPhone or iPod were non-committal about the value of having them in this format. Some had used them 'on the bus' or 'in the café', but it seems that it is preferable to watch the videos on the larger screen of a laptop.

Overall, students were keen for us to develop further our provision in this area, although there was a recognition that a lot of hard work is needed and it is not possible to do this for every lecture course. Although we are not able to comment on the widely-held fears about the impact of lecture capture on attendance, our students indicate that attendance at lectures is more important than watching a video, in agreement with previous studies.[1,2]

Conclusions

Our evaluation of this project has been positive and very encouraging. As discussed above, students who were unable to attend the lectures did find the recordings to be very useful, with the ability to pause and look things up seemingly a genuine pedagogical benefit. Our investigations also show that students do make substantial use of captured material even when they have been in attendance at the 'real' lecture, although it would be interesting to find out if this would be the case outside of a revision period.

> The availability of material at all times of the day fits well with the lifestyle of the modern undergraduate student and may have a positive impact on the value that students extract from their individual private study.

Anecdotal evidence shows that the student view is very positive, but it is not possible to make serious claims about the educational value of such resources without a more controlled investigation. We don't feel that it is valid to compare this year group's exam results with last year's cohort as there are too many uncontrolled variables, but we do feel that a more detailed study would be valuable as there is no doubt that students are keen to supplement their private study with a range of learning resources which exploit developments in technology. The availability of material at all times of the day fits well with the lifestyle of the modern undergraduate student and may have a positive impact on the value that students extract from their individual private study. Furthermore, software such as Camtasia Studio allows the addition of interactive features to video, giving us the opportunity to greatly enhance student learning from online resources. Ultimately, such developments may allow us to provide learning opportunities for our students 'on demand' without necessarily adding to the burden on staff, and further work in this area is essential.

References

1. Davis, S., Connolly, A. and Linfield, E. (2009) *Lecture capture: making the most of face-to-face learning*, Engineering Education, **4**, 4-13.
2. Wang, R., Mattick, K. and Dunne, E. (2010) *Medical Students' perceptions of video-linked lectures and video-streaming*, ALT-J, Research in Learning Technology, **18**, 19-27.
3. Further information can be found at <www.techsmith.com/camtasia.asp> (accessed 31st May 2010).
4. Currell, G., (2007) *The Use of Screen-Capture Video as a Learning Resource*, New Directions in the Teaching of Physical Sciences, **3**, 37-40.
5. We used an Olympus DS-65: <www.olympus.co.uk/consumer/2581_digital_recorder_ds -65_19918.htm> (accessed 31st May 2010).
6. Further information can be found at <www.sonycreativesoftware.com/moviestudiope> (accessed 31st May 2010).
7. O'Malley, P. J. (2010) *Combining a Tablet Personal Computer and Screencasting for Chemistry Teaching*, New Directions in the Teaching of Physical Sciences, **6**, 64-67.
8. A short sample video can be viewed on You Tube: <www.youtube.com/watch?v=5LQQiHJBZt4> (accessed 31st May 2010).
9. See: <www.guardian.co.uk/technology/blog/2010/may/19/ mobile-phone-smartphone-sales> (accessed 31st May 2010).
10. MacArthur, J. R. and Jones, L. L. (2008) *A review of literature reports of clickers applicable to college chemistry classrooms*, Chemical Education, Research and Practice, **9**, 187-195.

All agreed that captured lectures are not a substitute for the real thing, but they have great value in helping students to maximise their learning by allowing them to work at their own pace.