The Pedagogy of Lecture Capture

Abstract

This report looks at technologies that allow lecturers or tutors to record their lectures (lecture capture) and make them available digitally. The 21st century is the digital age, and to provide students with the learning experience that they expect, universities have to continually examine their learning, teaching and assessment strategies and introduce new pedagogies, commensurate with 21st century student expectations. Research has shown that using visual information (lecture capture) as an additional channel can aid the retention of verbal information (Mayer & Anderson, 1991) and help improve course retention rates, as well as student grades (Briggs, 2007). This paper examines some of the pedagogic benefits, as well as caveats of lecture capture systems in higher education, and discusses some of the conclusions drawn from the experiences of higher education institutions using lecture capture systems.

Keywords

lecture capture, pedagogy, visual information, Echo 360, Panopto CourseCast, student retention
Introduction

Lecture capture is an all-encompassing term describing any technology that allows lecturers or tutors to record their lectures and make them available digitally (Educause, 2008). The term covers a wide array of software, system capabilities and hardware options. Using visual information (lecture capture) as an additional channel can aid the retention of verbal information, according to Mayer and Anderson (Mayer & Anderson, 1991). Initial studies at Coppin State University show that lecture capture technology that allows students to view lectures online after the lesson can improve course retention rates as well as student grades (Briggs, 2007). Universities are increasingly looking at introducing lecture capture systems into their learning and teaching, and, according to Whatley and Ahmad (2007), video can enable improved communication of lecture material. Whatley & Ahmad (2007) posit that learning requires visual as well as auditory stimulus, particularly when technology is being used, in order to promote cognitive processing. Mayer (2001) describes some principles of learning which are relevant to designing multimedia for learning, which include the:

- **Multimedia principle** – learning is improved using words and pictures in preference to words alone;
- **Contiguity principle** – learning is improved when pictures and related words are presented at the same time or next to each other on the screen;
- **Modality principle** – spoken words are better than printed text for explaining images;
- **Signalling principle** – learning material should be organised with clear outlines and headings;
- **Personalisation principle** – a conversational style is better than a formal style for learning;
- **Sorden (2005)** also posits that using a framework based on the Mayer (2001) principles of learning is essential for producing effective multimedia teaching material.

Some of the more widely used lecture capture systems are Echo 360 (Echo360, 2010), Panopto CourseCast (Panopto, 2010), Camtasia Relay (Techsmith, 2010), Mediasite (Sonicfoundry, 2010), and Tegrity (Tegrity, 2010). Lecture capture allows students to customise their learning environment by individualising their experience in a way that they cannot do in a conventional classroom. For example, Mediasite allows students to increase or decrease the listening speed of a lecture, while maintaining audio pitch, and this contributes to active learning. Students who want to multitask can watch lectures faster and can even isolate and view specific sections. In addition, the lecturer can gather statistics, such as how many lectures are being viewed and which parts, since the recordings can be split into sections that can be viewed either via thumbnails or via the video timeline, as illustrated in Figure 3.

Lecture capture ranges from simple audio podcasts to screen captures, through to media rich lecture captures that include sophisticated video cameras capturing the lecturer, the students and the content on projection screens. Universities like Anglia Ruskin are upgrading their classrooms and refitting them with some of the emerging technologies, like 16:9 high definition projection, wireless projectors, 3D projectors, video conferencing, interactive whiteboards/flipcharts, classroom response systems (clickers), document cameras/visualisers, and so on. The introduction of lecture capture is a logical progression of this process. Lecture capture systems include a suite of software applications with specifications for preferred hardware, which typically consists of items such as a video camera and a microphone that are available in many classrooms (Educause, 2008). It is difficult to classify lecture capture, as it requires more than a hardware or a software solution, since it crosses the boundary between audio visual (AV) and other technologies. On the AV side, primary considerations include deciding what kind of camera and microphone should be used, and whether or not the lecture capture equipment should capture the students as well as the lecturer and the content he/she is presenting. Additional considerations include the nature of the interface with remote students and the issue of content management. Another key issue involves the file format to be used for recording and distribution. Storage of the recorded lectures is a crucial element of lecture capture: how and where recordings should be archived; whether storage should be short-term or long-term storage and what to do with them when demand wanes (Ramaswami, 2009). Another important issue to consider as well is the question of accessibility by visually impaired and/or deaf students, who would need the recorded lectures to be transcribed and captioned. This process can be costly and time-consuming and adds to the resources needed to run the system fairly and impartially so that all students can have equal access to the recorded lectures.
How Does It Work?

Figure 1 shows a screen capture of the Echo 360 lecture capture system at the University of Sheffield (McElearney & Morley, 2008). The top left part of the screen shows the full motion video of the lecturer or tutor giving the lecture and directly below him are the sections or chapters of his presentation, which are called scenes, numbered from 1 to \(N\), from which the students can randomly select what they want to view. On the right, the system displays what is on the lecturer’s or tutor’s computer screen. To use the system, the presenter has to have it scheduled in beforehand by the information systems (IS) department and recording will start automatically at the scheduled time. Multiple recording sessions can be simultaneously scheduled in at the beginning of the semester for the whole semester. Completed recordings are automatically uploaded to the server for viewing or transcribing and captioning, if required. The output can be in various formats, such as MP3 audio, for listening to as an audio podcast, or MP4 video for watching as a video podcast or vodcast on an MP3 player, such as an iPod or iPhone 3G. Alternatively, it can be rich media that is used to capture the speaker, students, and screen, for viewing on a computer or an MP3 player that supports rich media.

Panopto CourseCast produces digital rich media recordings that include video, audio and screen capture components. It also includes integrated note-taking and text search capabilities. The Panopto suite, for example, includes the CourseCast Recorder, the CourseCast Editor, and the CourseCast Server. These applications integrate with AV hardware to capture a lecture and, because it has a multiple source capture feature, it means there can be dedicated cameras on interactive whiteboards, flipcharts, experiments, etc, and then the remote viewer chooses which stream he or she wants to connect to. Panopto CourseCast also has a basic online editing tool which is web based and therefore can be used anywhere with an Internet connection, without the need for anything to be installed on a personal computer (PC). It is not a particularly powerful editor, but it can easily trim sections from the capture and is relatively easy to use (Laudato, 2007).

Figure 2 shows how the Panopto CourseCast lecture capture system works. The grey and white icons in rows represent the students. The grey triangle represents light being projected from a data projector, which is being projected onto the large screen in front of the lecture theatre or classroom. Panopto CourseCast does not require any special hardware for installation and can use existing classroom recording equipment, as well as simple web cameras, significantly lowering the total cost compared to traditional lecture capture systems. The disadvantage of using a webcam is that the resolution may not be high enough to capture the projection on the large screen.
To initiate a lecture capture, the lecturer or tutor represented by the icon (Instructor) at the top of Figure 2, in front of the class, needs to log into the CourseCast account and load his/her PowerPoint presentation to start the recording. The videographer (icon at the bottom right of Figure 2) simultaneously starts the high-end video camera and a PC recording device to capture the presenter and the content on his/her computer screen. Recordings are ready for posting immediately through a uniform resource locator (URL), which is generated automatically following a recording. Recordings can be viewed on the course website, represented by the web server icon in Figure 2, or the university virtual learning environment (VLE), using any device that is flash-enabled and has a web browser, as well as any portable MP3 devices that can play MP4 video.

Figure 3 shows a screen capture of the Panopto CourseCast lecture recording system at Aberystwyth University (Kelly, 2010), in which the screen is divided into sections for viewing by the students. The top left-hand corner of the figure shows a full motion video of the lecturer or tutor. Directly below him, are four tabs:

- The Contents Tab, which is divided into discrete time intervals/scenes/chapters of a minute or two, which the student can navigate and view either sequentially or at random by jumping from one chapter or scene to another, using the scroll bar on the right;
- The Notes Tab, which can be used by the student viewing the recording to annotate the lecture (make notes using highlighting);
- The Search Tab, which is a facility to search for any relevant information within the recorded lecture;
- The Info Tab, which links to basic information about the lecture or presentation.

To the right of the screen in Figure 3, students can select either the full view of the lecturer’s computer screen or his/her slides by using the two tabs (Laudato, 2007; Kelly, 2010).

Also, below the centre screen showing the presenter’s slides there are thumbnails of all the slides that a student can select, by sliding the scrollbar at the bottom of the screen, which slides horizontally across the screen, as opposed to vertically, when choosing the scenes to jump to on the bottom left of the screen. There is also a navigation bar in the presenter’s screen on the top left hand corner, which allows the
student to stop, pause, rewind and fast forward, in addition to using the previously mentioned scroll bars to jump to different parts of the lecture.

**Pedagogic Benefits**

Lecture capture offers many benefits. If, for example, students miss a lecture, they can play back the recorded lecture and catch up on what they have missed. Many university courses have a mix of blended and face-to-face delivery as well as some distance education, and lecture capture comes into its own when students are not located on campus (distributed), but want to feel part of the main university. Initial studies at Coppin State University show that lecture capture technology that allows students to view lectures online after the lesson can improve course retention rates as well as student grades (Briggs, 2007).

<table>
<thead>
<tr>
<th>Purpose of Viewing Lecture</th>
<th>% Agree</th>
<th>Mean</th>
<th>Number of Students Surveyed (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Used to revise for exams</td>
<td>76.4</td>
<td>2.03</td>
<td>717</td>
</tr>
<tr>
<td>Used to pick up on things I missed in class</td>
<td>78.6</td>
<td>2.04</td>
<td>677</td>
</tr>
<tr>
<td>Used to revisit complex ideas and concepts</td>
<td>76.2</td>
<td>2.07</td>
<td>727</td>
</tr>
<tr>
<td>Used to work at my own pace</td>
<td>73.9</td>
<td>2.08</td>
<td>729</td>
</tr>
<tr>
<td>Used to take notes</td>
<td>62.5</td>
<td>2.33</td>
<td>731</td>
</tr>
<tr>
<td>Used to pick up announcements and exam hints</td>
<td>62.2</td>
<td>2.38</td>
<td>712</td>
</tr>
<tr>
<td>Used to revisit as lecturer was unclear</td>
<td>20.8</td>
<td>3.67</td>
<td>557</td>
</tr>
<tr>
<td>Used to review (ESL) student</td>
<td>20.4</td>
<td>3.93</td>
<td>328</td>
</tr>
</tbody>
</table>

1=Strongly Agree, 2=Agree, 3=Neutral, 4=Disagree, 5 =Strongly Disagree (Briggs, 2007)

Table 1. Survey Results of How Students at Coppin State University Use Recorded Lectures
The same study at Coppin State University, which included four other universities in Australia, also showed that recorded lectures are used to revise for examinations, for example, or to focus on complex issues missed in a lecture, and helped them to achieve better results (see Table 1). Students appreciate the convenience of recorded lectures, as they fit in with their lives, but of course there is a downside on the reduced attendance rates. Lecturers could counter this trend by requiring students to watch the recorded lectures, then use classroom time for more active learning, where students participate in group discussions, experiments, collaboration and so on. After the lecture has been recorded, the lecturer could then create audio and video frequently asked questions (FAQs) about the lecture that the students could access afterwards for revision purposes or to consolidate their knowledge of the subject in question. The addition of video conferencing facilities would allow lecturers to invite outside experts or guest speakers to deliver a lecture, which could then be recorded, showing students the relevance of the material they are learning, and enabling them to participate in discussions with an outside viewpoint. Recorded lectures from previous years can be used for reference or to test knowledge in face-to-face activities or events using clickers or classroom response systems.

Lecture capture provides any time and place flexible learning, with the student in control, and caters for different learning styles, as the content is produced in different formats, such as audio, transcriptions of the audio, captioning of the video, graphics, text and video (rich media). Recording lectures also provides an opportunity for the lecturer to get feedback and/or reflect on their delivery, thus enhancing the overall student experience. With more and more students off campus and courses becoming more blended, lecture capture provides more opportunities for richer blended learning and integration with other online activities, such as discussion boards, wikis and blogs. Also, with customised video, like the VideoNotes from Gotuit Media (2010), students can edit lecture content to create their own ‘video notebooks’. Using VideoNotes, students can view entire lectures, remix segments to create their own personal videos, or share videos with other users, all without altering the original full-length lecture video (Gotuit Media, 2010).

Caveats of Lecture Capture

The introduction of new classroom technologies, such as video conferencing, 3D projection, wireless projection, classroom response systems (clickers) and lecture capture requires curricula redevelopment and the introduction of new pedagogies. This may be a bigger challenge for more experienced lecturers or tutors, who may prefer traditional forms of delivery and may not want to change their teaching styles. New models of large group teaching may need to be developed, in which the lecturer or tutor will be acting more as a facilitator, making sure that the students are divided into small groups and assigned activities to do based on a pre-recorded lecture they have watched before the lecture. One of the biggest fears of introducing lecture capture technologies into mainstream learning and teaching is that of reduced student attendance. Preliminary studies at some universities that have been using lecture capture technologies have shown a marked reduction in student attendance (Collins, 2010; Lauer, 2010). However, they also observed that introducing clickers in the classrooms or lecture theatres helped to raise attendance again, as these brought in more interaction and engaged the students more in the learning process (Collins, 2010; Lauer, 2010).

The presence of recording devices might make some lecturers nervous, who are not used to being recorded on camera. They may, for example, be worried about making mistakes, looking bad, etc. Also, if the cameras are being used to record the students as well as the lecturer and course content, there may be legal issues associated with obtaining student consent, as these recordings are likely to end up in the public domain, on websites like iTunes U, for example (iTunes U, 2010). There is also no doubt that lecture capture and classroom response systems require more preparation on the lecturer’s side, particularly at the introduction of the technology, as some of the delivery modes will have to be revised.

One of the questions that some universities are currently grappling with is that of intellectual property rights (Collins, 2010). The problem is deciding who owns the intellectual property rights to the produced material. Universities, for example, may decide:

- to take his/her material and make money out of it by offering it to people outside the university;
- that they do not need the lecturer any more because his/her material has been captured on video and they can play back the lectures when they need them. This may be true particularly for modules with small numbers of students. This issue is preventing more faculties from embracing the technology (Collins, 2010).
Conclusion

Lecture capture is being increasingly embraced by higher education institutions, particularly in the USA, Australia and the UK. It has undoubted benefits for the students, as it enables them to review lectures for examination revision or just understanding more complex issues covered in the lecture. There are, however, some caveats, including reduced student attendance, which should be countered by redeveloping the curricula and introducing different teaching methods and pedagogies, to give the students an incentive to attend face-to-face lectures. This could be achieved by making the recorded lectures required viewing and then using the classroom time for more interactivity, like using classroom response systems, student collaboration in small groups and practical work. Lecture capture would also be of great benefit in an institution that has distributed students, some of whom might be in different countries and who would benefit from viewing the recorded lectures. There are many lecture capture systems available, and making a decision on which one to purchase has to take into account the institutional vision rather than the departmental or faculty vision, as they can be costly to buy, install and maintain.

References


Classrooms, 2010. SCALE-UP classrooms of various sizes have been created across the country. Available at: http://www.ncsu.edu/per/SCALEUP/Classrooms.html [Accessed 22 February 2010].


