LECTURE CAPTURE:
A GUIDE FOR EFFECTIVE USE

Erping Zhu
Inger Bergom

Lecture capture is an exciting technology that is drawing the attention of instructors and students on college campuses across the country. A number of faculty members at the University of Michigan (U-M) are already capturing lectures and creating podcasts and screencasts as additional learning resources for students. Other institutions, including Duke,[1] Stanford,[2] UC Berkeley,[3] and University of Wisconsin-Madison,[4] are also experimenting with offering podcasts to students to provide supplementary learning material, to free up class time for active learning experiences, or to make learning material accessible to the general public.

What Is Lecture Capture and Why Is It Used?

Lecture capture involves the recording of classroom activities or special events using specific software and making that recording available electronically. The audio or video recording is normally stored digitally on the Internet or in iTunes U for downloading and playing back on computers and portable media players, such as MP3 players and iPods. The recording is sometimes referred to as a podcast or a screencast, and may be audio-only or include video of the lecture. Some software synchronizes lecture slides for viewing alongside the relevant sections of audio and/or video recordings of the instructor. Depending on the software used for recording, students may be able to speed up or slow down lectures, pause the playback, and move forward or backward in the presentation.

Survey results indicate that the majority of college students prefer courses that offer podcasts over those that do not. Students cite convenience, flexibility, and positive impact on learning as the main reasons to have recorded lectures (Nagel, 2008; Fernandez,

[1] http://itunes.duke.edu
[2] http://itunes.stanford.edu
[3] http://itunes.berkeley.edu
[4] http://www.uwebi.org/news/uw-online-learning.pdf

Erping Zhu is an Assistant Director at the Center for Research on Learning and Teaching. She has a Ph.D. in Instructional Systems Technology. Inger Bergom is a Research Assistant at CRLT. She has an M.A. in Higher Education.

Simo, & Sallan, 2009). As is the case with any new technology, lecture capture has the potential to benefit students and faculty, but it also presents producers and consumers with a set of challenges for getting the most from this technology.

Lecture capture
- provides additional resources for students:
  - archived lectures,
  - tutorials for lab work,
  - demonstrations of difficult concepts and complex procedures like printmaking or CPR, and
  - presentations by guest speakers;
- allows students to review material at their own pace and convenience (Coghlan et al., 2007);
- offers students more flexibility in note-taking;
- makes time for active learning during class by having the lecture available for viewing before the class meetings (Lund, 2008);
- allows students to catch up with a missed lecture;
- offers another tool for student learning projects (e.g., student-generated podcasts for interviewing locals and sharing with peers in a study-abroad program).

This paper reviews research on the use and impact of lecture capture technology, discusses challenges and implications of using this technology in classrooms, and provides guidance for using this tool to enhance teaching and student learning.

What Have We Learned About Lecture Capture?

Although many anecdotal reports about lecture capture circulate in higher education, only a few notable evaluation studies have investigated its impact on student learning. Below is a summary of key points from such evaluations, many of which rely on students' self-reports about their lecture capture usage and perceptions.

Impact on student behavior and learning

• *No noticeable impact on students' class attendance*
Despite a common fear among instructors that students will stop coming to class if they have access to a lecture recording, surveys at various institutions in the US and the UK have indicated that access to lecture podcasts generally does not impact students' decision to attend class (Bongey, Cizadlo, & Kalnbach, 2006; Brotherton & Abowd, 2004; Dale, 2007; Harrity & Ricci, n.d.). In one study, students explained that they continue to attend lecture because it offers opportunities for interaction in a structured learning environment (Copley, 2007).

• *Potential benefits for student learning and grades*
Offering podcasts of lectures has the potential to improve students' mastery of course material. In surveys, students report gaining a better understanding of class material in courses that used the technology (Brotherton & Abowd, 2004). At U-M, undergraduates in Engineering and graduate students in Dentistry who listened to or viewed recorded lectures overwhelmingly believed that their use of the media had a positive effect on their exam grades (Pinder-Grover, Millunchick, & Bierwert, 2008; Brittain, Glowacki, Van Ittersum, & Johnson, 2006). In particular, U-M students in one study indicated that screencasts are helpful in clarifying misunderstandings, supplementing lecture material, and reviewing for exams (Pinder-Grover, et al., 2008).

• *Deeper engagement with course material*
Undergraduate students have reported in focus groups and surveys that podcasts helped them stay focused on the course, made learning more fun and informal, supported independent learning, and enabled deep engagement with course material (Edirisingha & Salmon, 2007; Duke University, 2005). Improved learning may also be a result of changes in students' note-taking practices. Some students have reported that, because they had access to this learning tool outside of class, they took fewer notes during class and were able to pay closer attention to the lecture (Brotherton & Abowd, 2004).

Other research supports students' perceptions of their increased ability to focus on lecture when they have access to lecture capture. In an experimental study of 195 students enrolled in a U-M physics class,

researchers found that students who watched a video presentation of a lecture with slides were better able to apply what they had learned than students who attended the same lecture in person. One explanation for this finding is that students in the live lecture looked at the professor significantly more often and paid more attention to what the professor was saying than to the material being conveyed through the accompanying slides (Dey, Burn, & Gerdes, 2009). For this reason, audio podcasts with slides "might be particularly useful for disciplines that are 'equation heavy'" (p. 391).

When students use podcasts and why

A survey of over 29,000 undergraduate students at the University of Wisconsin-Madison reported several perceived benefits of lecture capture technology, including the opportunity to make up a missed class, the convenience of watching lectures on demand, and the potential for increased retention of class materials (Veeramani & Bradley, 2008). Additional evaluation reports and case studies indicate that when students do use podcasts, they use them for specific reasons and at specific times in a course of study.

A number of studies examine *why* podcasts appeal to students, sometimes more than traditional course materials. Students report that they appreciate the flexibility of accessing podcasts anywhere and anytime (Fernandez, Simo, & Sallan, 2009; Winterbottom, 2007), and they like resources that are presented in a video or audio format, since this allows for self-paced learning and multitasking. Researchers at U-M found that students who viewed video presentations of lectures with slides tended to back up and repeat slides containing information that they had difficulty understanding (Dey, Burn, & Gerdes, 2009). In addition, students at a university in the UK who reported using podcasts more than their textbooks for reviewing indicated that podcasts are more efficient than their own notes in helping them learn (Evans, 2007). Although students may appreciate podcasts, this technology tool should not replace traditional learning resources but, instead,

should serve as a complement to them (Fernandez, Simo, & Sallan, 2009).

In terms of *when* students use podcasts, studies show that lecture recordings (audio or video) are used mainly to prepare for exams and review course material in order to gain a better understanding of complex topics (Soong, Chan, Cheers, & Hu, 2006; Lane, 2006). Research on when students tend to access podcasts during a course of study supports this finding, showing that students usually view podcasts shortly after a lecture has occurred and in the few days before an exam (Copley, 2007). In one study, lecture recordings were accessed within one week of when the lecture occurred almost one-third of the times they were accessed (Brotherton & Abowd, 2004). It should be noted, however, that student use of podcasts may vary across disciplines or social backgrounds. A study at U-M, for example, found that underrepresented minority students were more likely to view screencasts, and students in one engineering department accessed screencasts more than all of the other engineering majors combined (Pinder-Grover, Millunchick, Bierwert, & Shuller, 2009).

Issues to Consider Before Getting Started

Lecture capture technology offers students a new way to access organized course content. However, the potential benefits of podcasts are accompanied by unique logistical, technical, and pedagogical challenges for faculty.

Technology and support

Most lecture capture systems at U-M are managed by school/college technology support services and are automated in ways that allow faculty to use a touch screen interface to start and stop the recording of a lecture. (For information about lecture capture support and services in individual schools and colleges, see http://www.crlt.umich.edu/inst/lecturecapture.php). The recording is then processed and uploaded to a location that can be accessed by students. Editing is

usually possible, but not absolutely necessary.

When an automated system is available, the skill level required to capture lectures and make them available to students is fairly minimal. However, if a faculty member teaches in a location where an automated recording system or a portable recording system is not available, she or he will need to use commercially available software applications to capture the computer screen, PowerPoint, and audio. Software applications include Camtasia, Elluminate, and Echo360. An instructor who records lectures using such software will need to gain familiarity with the selected application before starting to record classes or events.

When considering the use of lecture capture technology, faculty should also understand students' technological competencies. It is important not to assume that all students possess the same technology skills and have had equal exposure and access to technology (e.g., computers and MP3 players). Some segments of the U.S. population, such as rural or lower-income Americans, are less likely to have Internet connections in their homes or to be familiar with commonly used technologies (Zhu & Kaplan, 2011). Other researchers note that instructors should recognize that students without experience and comfort using techonogy may be disadvantaged when class materials must be retrieved from the Web (Lewis, Coursol, & Khan, 2001). Given the potential differences in levels of access and technological skills, instructors may want to consider administering a short survey at the beginning of the term to determine students' comfort with and access to technology required for using lecture capture (Zhu & Kaplan, 2011).

Copyright and privacy

The use of lecture capture technology raises issues of privacy and copyright (Brittain, Glowacki, Van Ittersum, & Johnson, 2006; Flanagan & Calandra, 2005; Vogele, Garlick, & The Berkman Center Clinical Program in Cyberlaw, 2006). When a lecture is recorded, synchronized with PowerPoint slides, and uploaded to the Internet, the resulting podcast has the potential to reach anyone who has a mobile device or computer. Faculty who choose to podcast lectures should be aware of this and take precautions to protect their intellectual property. Equally important is the responsibility to obtain copyright clearance for material (e.g., graphics, images, and audio/video clips) referenced or used during lectures. If the podcast will include students' questions or responses, you should ask students to sign a consent form when the podcast audience is broader than the class itself. A sample consent form is available from the CRLT website (http://www.crlt.umich.edu/inst/lecturecapture.php). If, however, the podcast is put on a secured website (e.g., CTools) for *only* that class to view, no release is required. In general, the technology to capture and share lectures may run ahead of many institutions' policies and faculty understanding of the legal issues involved (Kim, 2009). It is always a good idea to consult with U-M's Office of the Vice President and General Counsel if you have questions concerning copyright.

Changing expectations and practices

The availability of lectures in podcast form may change students' learning behaviors as well as their expectations about the use of class time. Since students take fewer or summary style notes in courses using lecture capture (Brotherton & Abowd, 2004), they have more time to process course material on the spot, which may lead them to ask more questions and want more interactivity during lecture. Students may, therefore, expect the format of lectures to shift from a process of information transfer to a more student-centered and interactive format. As a result, instructors may need to devote more time to in-class activities that enable students to practice skills, think critically about material, and apply what they've heard in lecture to grappling with real-world problems (McKenzie, 2008).

Lecture capture technology also expands the range of possible presentation options. For example, instructors could record presentations made by

guest lecturers so that students in future years can benefit from experts who may not be available each time the course is offered. Podcasts can also make a significant contribution to online courses, so that students have access to lectures even though they are not on campus. Moreover, when lectures are posted in open platforms, such as iTunes U or YouTube EDU, their viewership may include many more students than those enrolled for the class (Young, 2008). In hybrid courses that meet only occasionally in person, instructors could ask students to watch lectures in advance, and the limited resource of class time could be used for questions and applied learning, such as case studies, problem-based learning, or group projects. The integration of lecture capture technology into teaching may thus create opportunities for developing a range of teaching innovations and for investigating the impact of these approaches on student learning (i.e., the scholarship of teaching and learning).

Recommendations for Using Lecture Capture Effectively

Getting started with lecture capture can be quite simple, especially when faculty have access to the automated systems described earlier. Despite this potential ease of use, it is important for instructors to think carefully about the content and style of their lectures and any possible implications the technology may have for student learning. Below is a list of recommendations worth considering before adopting lecture capture technology for your classes.

1. Before you start, make sure that
   - you have clear goals for podcasting lectures and the time to prepare them consistently throughout the entire semester;
   - you have adequate and continuing technology support and podcast hosting if you don't teach in a room with an automated lecture capture system/service;
   - you attend to the relevant copyright policies regarding podcasts (e.g., acquiring copyright clearance for materials and release forms from students if their questions and answers will be recorded and the podcasts will be shared beyond the current semester's classroom).

2. Once you decide to podcast, make time to experiment with recording quality. Poor sound quality may prevent students from using the resource.

3. Make podcasts available as soon as possible after a lecture, since most students download podcasts within a few days of a given lecture, as well as right before an exam.

4. If you require students to listen to podcasts before lecture, provide them with content-related questions or other learning activities.

5. When podcasts are assigned in advance of a class meeting, use class time for interactive discussion, student-centered learning activities, or demonstrations to complement and build on podcast content.

6. Before making podcasts available, be sure that all of your students have access to and are comfortable using devices to download and play podcasts.

7. When appropriate, make reference to podcasts during lectures or when responding to students' questions so that students will be more likely to use them.

8. Make accessing and using podcasts easy and fast by providing detailed instructions for downloading and ensuring that the file format is compatible with common media-playing devices (e.g., MP3 players and iPods).

9. Provide students with a clear explanation of instructional goals and technical requirements if podcasts are used for student projects or assignments.

10. Draft an evaluation plan for your lecture capture project to investigate what did and didn't work for you and your students.

Additional Resources

Visit the CRLT website (http://www.crlt.umich.edu/inst/lecturecapture.php) for resources to support the use of lecture capture for teaching. Information is available on the following topics:

- lecture capture technology available in U-M schools and colleges
- examples of U-M faculty using lecture capture technology
- checklist of technical practices before, during, and after recording lectures
- articles on podcasting as an instructional tool for the college classroom

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