Downloading the Current State of Podcasting on Campus: What Are the Implications for Teaching and Learning?

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Abstract: A podcast is any digital media file, or series of files, distributed over the Internet for playback on portable media players and personal computers. In this study, we explored the attitudes, perceptions, and use of podcasting as reported by instructors and students at a large Midwestern university. We examined the results of an online survey focusing specifically on items related to teaching and learning. Findings suggest that students use podcast materials largely for reviewing concepts and issues raised in lectures that they previously attended. While instructors and students agree that podcasts help students learn, students are less sure about podcasts improving instructors' teaching. We argue that podcasts can help instructors change face-to-face instruction from traditional didactic lectures to more constructivist learning practices.

> Every new generation of learning technology brings with it a new deep conceptual issue that learning technologists must untangle in order to unlock the learning value of raw technological potential (Roschelle, 2003, p. 260-261).

Take a stroll across the campus of any major college or university in America today and you will inevitably see students with white earbud headphones nestled into their heads. Recent national studies indicate that more than 80 percent of college students own at least one portable audio device like an iPod that can download and play audio, and sometimes video, recordings (Lum, 2006). As institutions of higher education begin integrating this technology into courses, questions arise about implications for teaching and learning. Is podcasting a technological tool that can expand the "space" where learning occurs (Zukowski, 2007), or will students inevitably "be replaced by iPods, (and) professors … by tape recorders?" (Schneider, 2006, p. B5). These kinds of conceptual issues and questions are increasingly important as podcasting moves from solely audio and video entertainment to potential tools for learning.

In the study presented here we explored the attitudes, perceptions, and reported use of podcasting by instructors and students from a large Midwestern university campus where podcasting and other technologies are used to supplement traditional face-to-face classroom instruction. We examined the results of an online survey, focusing specifically on items relating to teaching and learning. To examine if the results from the podcasting survey were representative of the larger campus population, we compared these results with a larger survey about information technology (IT) and our campus' Learning Management System (LMS).

Theoretical Framework

Many, if not most, 21st century students expect to learn by doing and constructing their own conceptions of the world, usually by trying things out (Tapscott, 1998). Technology can support student learning by designing learning environments and situations that actively engage and guide learners through their construction process and help them organize their knowledge outcomes (Andone, Dron, Pemberton & Boyne, 2007). Additionally, technology can help create an environment that aids students' retention and development of high quality thinking and reflection so that students may become lifelong members of a learning community (Fisher & Baird, 2006).

The majority of today's students co-construct a social reality and establish norms for participation through multiple online information sources. Students demonstrate digital fluency by simultaneously operating and managing multiple devices and multiple media types including cell phones, the Internet, and television (Hsi, 2007). With the proliferation of iPods and easily-shared video through websites such as YouTube, learners are also gaining digital fluency in audio and video media formats as well. Through technologies like podcasting, audio and video formats are beginning to find a place in higher education where learners can continue to exercise and grow their digital fluency and use media to construct their social reality.

A podcast is any digital media file, or series of files, distributed over the Internet for playback on portable media players and personal computers (Wikipedia, 2006). These files can either be downloaded individually or via a subscription feed and aggregator that finds the most recent materials automatically. Thus, an instructor who records and distributes their lectures via podcasting provides audio/video materials that can be automatically downloaded by students on a regular basis. Audio and video podcasts can "provide students with the ability to learn *on-demand* based on their own learning styles" and can also provide a mechanism motivate students to "actively engage in the course content" (Fisher & Baird, 2006, p. 8, 22).

Using iPods and podcasting for higher education gained national notoriety when Duke University passed out free iPods to all of its 1,650 freshman in fall of 2004. While some skeptics derided the giveaway as a gimmick, Duke found that 75 percent of freshman surveyed reported that they used the devices in at least one course and that the iPods allowed students to replay important passages from lectures on their own time (Read, 2005). Recently, Duke scaled back their program, now loaning or selling discounted iPods to students in about 50 select courses (Read, 2006). Recently, many higher education institutions such as Yale, MIT, Purdue, Stanford and UC Berkeley have begun making audio and video lectures available to their students via a password-protected service or via publicly available sites such as iTunes U, a clone of Apple's popular iTunes Store (Brown & Green, 2007).

Recent research in several different academic contexts has shown that podcasting can be an effective learning tool. Stoten (2007) argues that the prevalence of podcasting keeps increasing because it gives instructors in nursing education "the option to take the

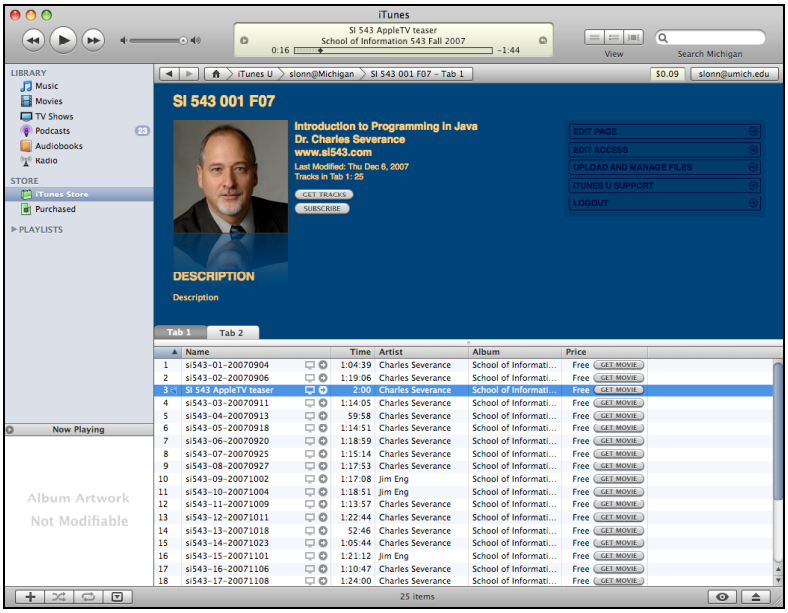
learning to the learners when they have time to learn" (p. 57). A history professor, writing about her own instruction, reported that podcasts freed up time for in-class discussion and higher order learning activities (Vess, 2006). In distance education, podcasting has been effective in reducing isolation-induced anxiety and promoting a sense of belonging to a community of learners (Lee & Chan, 2007). In our study, we explored how podcasting technology might impact teaching and learning by examining the results of an online survey focusing specifically on instructor and student uses of podcasting and their attitudes and perceptions of this technology.

Method

Design & Data Sources

This study focused on the use of podcasting within the context of iTunes U, accessible at our university using the campus LMS (see Figure 1). The LMS is used by 99% of students and 87% of faculty. Instructors must make a request to the LMS support staff to have an iTunes U link placed on their course home page. The LMS is based on the Sakai (http://sakaiproject.org) community-source architecture. This environment is comparable to other popular systems such as Blackboard (http://www.blackboard.com), WebCT (http://www.webct.com), and Moodle (http://moodle.org).

Figure 1: Example of a course available in iTunes U



Our study used data from an online survey about podcasting administered in June 2007 at a large Midwestern research university. All instructors and students who used iTunes U in the 2006-2007 school year were invited to participate. A total of 22 instructors (29% response rate) and 879 students (14% response rate) participated in the survey. Results from the most recent general survey about IT and the campus LMS were also used to compare the results of the podcasting survey with a larger campus

population. A total of 1,481 instructors (20% response rate) and 2,281 students (26% response rate) participated in the campus-wide survey.

Procedure

Our analysis began by using two general technology questions to help describe podcasting and iTunes U users. In order to accurately compare responses to these general technology questions, we removed any respondents from the general IT/LMS survey sample who were also part of the podcasting survey sample. Next, we explored what types of materials were used for podcasting and how often they were uploaded/downloaded. Then, our analysis focused on how students listened/watched podcast materials and explored why students downloaded these resources. Finally, we explored instructor and student perceptions of how podcasting improved teaching and student learning and grades.

Results

Respondent Characteristics

In order to describe the users of podcasting and iTunes U, we asked respondents two general technology questions replicated from our general IT/LMS survey and then compared these results to the general survey responses. The first item asked respondents to rate their expertise with computers (1=Novice, 2=Intermediate, 3=Advanced). The podcasting instructors rated their computer expertise significantly higher than students rated their own expertise, (t (20.948) = 3.061, p = .006) (see Table 1). Compared to the general IT/LMS survey, instructors using podcasting rated themselves significantly higher for computer expertise than the instructors who responded to the general IT/LMS survey, (t (20.600) = 2.273, p = .034) while students using podcasting rated themselves significantly lower for computer expertise than the students who responded to the general IT/LMS survey, (t (3031) = -3.005, p = .003). In the IT/LMS survey, instructors and student respondents were not significantly different on their self-reported level of computer expertise.

Table 1: Instructor and Student Computer Expertise

Podcasting Survey			2007 Annual IT & LMS Survey		
Instructors *n*=21	Students *n*=871	Mean Difference	Instructors *n*=1,462	Students *n*=2,162	Mean Difference
2.52	2.18	.34*	2.27	2.24	.03

Note: * p = .006

The second survey item asked respondents to rate their overall use (instructors) or preference for use (students) of IT in their courses (1=none, 2=limited, 3=moderate, 4=extensive, 5=exclusive). Both podcasting instructors and students responded that most used/preferred an extensive level of IT in their courses (see Table 2). Compared to the general IT/LMS survey, the podcasting instructors rated their use of IT significantly higher than the instructor respondents of our general IT/LMS survey, (t (22.156) = 4.864, p < .001). The podcasting students' preference for IT use was nearly identical to the

students responding to the general survey. In the general survey, instructors reported using a moderate level of IT in their courses while students preferred an extensive level, (t (3755) = 15.107, $p < .001$).

Table 2: Instructor Use of and Student Preference for Information Technology in Courses

Podcasting Survey			2007 Annual IT & LMS Survey		
Instructors *n*=22	Students *n*=867	Mean Difference	Instructors *n*=1,462	Students *n*=2,160	Mean Difference
3.55	3.31	.24	2.92	3.32	.40*

Note: * $p < .001$

Podcast Contents and When They Were Uploaded/Downloaded

We next examined what types of materials were uploaded to iTunes U (respondents could select multiple material types), how often instructors uploaded those materials, and how often students accessed them. Sixty-four percent of instructors responded that they uploaded audio-only lecture recordings, the most popular type of uploaded material. Similarly, 52% of students reported that they downloaded audio-only lecture recordings. Video recordings of lecture and slide shows with narration (enhanced podcasts) were also popular types of materials (see Table 3).

Table 3: Types of Podcast Materials Used by Instructors and Students

	n	Audio-only lecture recordings	Video lecture recordings	Slide shows with narration	Audio summaries of key lecture points	Other
Instructors (Uploads)	22	64%	27%	23%	0%	27%
Students (Downloads)	879	52%	44%	33%	3%	6%

When asked how often they uploaded materials to iTunes U, 76% of instructors responded that they uploaded materials once a week or more frequently. Students, however, downloaded materials far less frequently with 67% of students responding that they downloaded materials only a few times a semester. Overall, there was a significant difference in how instructors and students answered this question (X^2(4, N=892) = 51.692, $p < .001$) (see Table 4).

Table 4: How Often Instructors Uploaded / Students Downloaded Materials

	n	Few times a semester	Few times a month	Once a week	Few times a week	Daily
Instructors	21	14%	9%	24%	48%	5%
Students	871	67%	16%	8%	8%	1%

How and Why Students Use Podcasts

In order to better understand the context in which students were engaging with podcast content, our survey asked how they most often listened to/watched materials downloaded from iTunes U (see Table 5). Over three-quarters (76%) of students

responded that they most often listened/watched content on their laptop computers, whereas only 9% responded that they used their iPod or other portable audio device. Despite the seemingly "near-ubiquitous use of iPods" by university students, they may not listen/view to academic podcasts in the same way that they consume other audio/video media using portable technologies (Brown & Green, 2007, p. 7). In future research, we hope to further investigate why most students do not utilize the portability of digital audio/video players for academic purposes.

Table 5: How Students Most Often Listen/Watch Podcast Materials

	n	On my laptop computer	On my desktop computer	On my iPod or other portable audio device	Other
Students	843	76%	14%	9%	1%

A major concern of instructors new or unfamiliar with podcasting is that students will stop attending lecture *en masse* when recordings are readily available online (Campbell, 2005; Fernandez, 2007). Our survey therefore asked instructors and students what they believed was the most common reason students downloaded podcast materials (see Table 6). Nearly two-thirds of both instructors and students responded that the most popular reason for students to download materials was to review lecture material for a class they had already attended. There were no significant differences between instructors and students for this survey item.

Table 6: Most Common Reason Students Downloaded Podcast Materials

	n	Review of lecture material after attending class	Substitute for class attendance	Interest in supplemental material	Other
Instructors	22	64%	18%	0%	18%
Students	853	63%	22%	7%	8%

Does Podcasting Improve Instructors' Teaching and Students' Learning and Grades?

To gauge respondents' perceptions of whether the use of podcasting and iTunes U improved teaching, learning, and course grades, our survey asked instructors and students to respond to three statements (see Table 7) using a 5-point Likert scale from 1=Strongly disagree to 5=Strongly agree. Respondents responded positively for all three statements and there were no significant differences between instructors and students. Instructors agreed more than students that podcasting improved instruction, and students agreed more than instructors that podcasting improved learning. These teaching and learning items followed a similar pattern as items from the general IT/LMS survey which asked instructors and students to respond to statements about how the use of IT in courses improved instructors' teaching and students' learning (see Table 8). In the general survey, instructors agreed significantly more than students that IT improved instructors' teaching (t (3673) = 7.530, $p < .001$) and students agreed more than instructors that IT improved students' learning. It is possible that the lack of a significant difference between instructors and students on the podcasting survey item about improving instructors' teaching due to a low sample size.

Table 7: Podcasting Effect on Instructors' Teaching and Students' Learning & Grades

Item	Instructors *n*=21	Students *n*=818	Mean Difference
Podcasting improved instructors' teaching	3.82	3.45	.37
Podcasting improved students' learning	3.73	3.90	.17
Podcasting had a positive effect on students' grades	3.67	3.70	.03

Table 8: 2007 Annual IT/LMS Survey Items about Information Technology's Effect on Teaching and Learning

Item	Instructors *n*=1,415	Students *n*=2,250	Mean Difference
IT improves instructors' teaching	3.94	3.71	.23*
IT improves students' learning	3.96	4.02	.06

Note: * $p < .001$

Using an open-ended question, instructors and students were invited to describe how podcasting and iTunes U contributed to learning. A qualitative analysis of these results showed that 27% of instructor responses stated that podcasting made lectures available for students to review for exams. For example, one instructor responded that she believed that her instruction changed as a result of using this technology:

> "…it has made me focus more on articulate delivery of material, the combination of visual and audio information and interactivity. It has also helped me cut down on repetition in lectures and so cover more material."

When students were asked how podcasting and iTunes U contributed to their learning, the majority of their responses (61%) referred to lecture review, particularly for quizzes and exams. For example, one student explained his learning process using the podcast materials to augment his understanding of a lecture:

> "When I have had a question about specific material presented in lecture, and have been afraid to ask the professor to clarify the information, I first listen to my iTunes recording to make see if I can better understand the material myself. … I would say that podcasting has contributed to my learning by giving me the chance to re-clarify and better understand points discussed."

Eighteen percent of the student responses stated that podcasting allowed students to catch up if they missed a lecture and 9% of the responses mentioned issues of filling in missing pieces of lecture notes or supplementing the lecture material in some way. Overall, 94% of the student responses indicate that students felt that podcasting and iTunes U contributed to their learning in some way.

Discussion

Our analysis indicates that most students use podcast material largely for reviewing concepts and issues raised in lectures that they have attended. While instructors appear to be diligent about putting up lecture materials weekly, students

download these materials only a few times a semester, typically just before quizzes and exams as so many of the students reported that they used podcasts to review course content. Instructors and students agree that podcasts help students learn, but students are less sure about podcasting improving their instructors' teaching.

Our results suggest that most instructors are simply capturing their lectures and not modifying in-class instruction. Only a few instructors in our study indicated that their instruction has changed as a result of using podcasts in their courses (see quote above), while more instructors instead commented that students would soon expect this type of service just as they now expect copies of PowerPoint slides available online. If students currently view a lecture podcast as just another reference resource, will instructors then begin to use classroom time for more innovative and interactive activities? As the quote from Roschelle (2003) presented above illuminates, before learning value can be demonstrated with this technology instructors and other podcasting stakeholders need to address the conceptual issue of whether this technology is a mechanism for student review or a method for student construction of knowledge.

As educational leaders grapple with issues of what content to podcast and whether podcasting course content changes in-class instruction, institutions must also address how to support the "average" instructor as podcasting becomes more mainstream and expected by students. As our survey results demonstrate, the instructors who currently podcast see themselves as more technically advanced and report a higher level of use of information technologies than their colleagues. While instructional multimedia supplements like podcasts are intuitively attractive and can be received with great enthusiasm by students, their use must be weighed against the cost of production (Ellis & Cohen, 2001). Producing a podcast, particularly video media, remains a technologically difficult endeavor beyond the capabilities of most average instructors, many of whom experience difficulty with comparatively simpler technologies such as learning management systems (Brown & Green, 2007). If widespread use of podcasting for student learning is to become a reality, both practical concerns about production and fundamental issues about content and authorship must be adequately addressed.

Conclusion

Podcasting in higher education is still a relatively new and growing endeavor. As the survey about podcasting at our institution shows, this technology is being used primarily by technologically advanced faculty who capture their lectures via audio or video and post them on a near-weekly basis. Students do not report that they skip class as a result of the available lecture recordings. Instead, students view these podcasts as review materials for their quizzes and exams. A fundamental question remains, however, as to whether podcasting is simply another mechanism for review of material, or if this technology can create an opportunity to transform the face-to-face interaction between instructors and students in the classroom.

Perhaps one of the reasons why podcasting has been slow to gain wider adoption is due to instructors' concerns about their intellectual property. With the availability of all

other course materials in the LMS, what happens within the lecture hall may be the only aspect of the course that still belongs uniquely to the instructor. This conception of the "course" may need to change if podcasting is to succeed in higher education. For example, MIT has led an OpenCourseWare (OCW) initiative (http://ocw.mit.edu) where entire course syllabi, lecture notes, materials, and lecture recordings are freely available to the public. One of the major assumptions underlying this endeavor is that while learning materials are available for anyone, the actual MIT course is more than a collection of materials and lectures; it is the collaborative experience of learning with an instructor and other students throughout a semester. A similar debate exists for podcasting. If class sessions between instructors and students offer more than a "talking head," then a podcast is simply another tool that instructors can employ to help their students learn at their own pace, just as reading a textbook or reviewing PowerPoint slides do not completely capture the complete university course experience. The real "course" is the combination of materials, resources, and interaction between teachers and learners.

While no technology can be a silver bullet to solve all instructional issues, technology like podcasting and OpenCourseware at least offer no more threat to standard teaching practices than coursepacks and at best offer new opportunities to restructure classroom face time. Podcasting can allow an instructor to capture fundamental topics for review while devoting face-to-face time for more discussion, student-led instruction, and other innovative activities. If podcasting is to act as a catalyst to change instruction in higher education, instructors must be willing to adjust their teaching styles and not merely lecture, but create environments that provide a variety of learning opportunities.

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