Podcasting in higher education: 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. This study explored the attitudes, perceptions, and use of podcasting as reported by instructors and students at a large American Midwestern university. The results of two online surveys were examined, 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 have previously attended. While instructors and students agree that podcasts help students learn, students are less sure about whether podcasts improve instructors’ teaching. The authors argue that podcasts can help instructors change face-to-face instruction from traditional didactic lectures to more constructivist learning practices.

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1. Introduction

Take a stroll across the campus of any major college or university today and you will inevitably see students with white earbud headphones nestled in their ears. Recent studies indicate that more than 80% of American 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 move from audio and video entertainment to potential learning tools, learning occurs (e.g., Zukowski, 2007), or will students inevitably stop coming to lecture sessions that can simply be downloaded and professors relegated to recording their thoughts into a microphone (e.g., Schneider, 2006)? These questions are paramount as podcast moves from audio and video entertainment to potential learning tools.

This study explored the attitudes, perceptions, and reported use of podcasting by instructors and students from a large university where podcasting and a learning management system (LMS) supplement traditional face-to-face classroom instruction. Results were examined from two online surveys, one specifically about podcasting and one a more general IT/LMS survey, focusing specifically on items related to teaching and learning.

1.1. Podcasting in higher education contexts

A podcast is a method for distributing any digital media file, or series of files, over the Internet for playback on portable media players, such as iPods, and personal computers (Lazzari, 2009). These files can either be downloaded individually or via a subscription feed and aggregator that finds the most recent materials automatically. Thus, instructors who record and distribute their lectures via podcasting provide their students with audio/video materials that can be easily downloaded on an automatic and 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 that motivates students to "actively engage in the course content" (Fisher & Baird, 2006, pp. 8, 22).

The majority of today’s students co-construct a social reality and establish norms for participation through multiple online information sources. They demonstrate digital fluency by simultaneously operating and managing numerous 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 which are slowly beginning to creep into higher education through technologies such as podcasting. Using iPods and podcasting for higher education gained national notoriety when Duke University passed out free iPods to its entire freshman class in the fall of 2004. While some skeptics derided the giveaway as a gimmick, Duke found that 75% 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). Many other 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 as well as publicly using iTunes U, a clone of Apple’s iTunes Store (Brown & Green, 2007).

As the literature on the use of podcasts has grown, there is a disagreement about whether this technology is beneficial for student learning. Several studies have shown that podcasting has a similar effect on student learning as other review materials (e.g., Copley, 2007). Both Deal (2007) and Lazzari (2009) found that podcasting does not have a positive effect on students’ grades. A study by McKinney, Dyck and Luber (2009) found that students only benefited from podcasts if they took notes, listened to the podcast several times, and generally behaved similarly to the way they already do during lecture sessions.

By contrast, several research studies have shown that podcasting can be an effective learning tool. For example, students in business (Evans, 2008) and dentistry (Brittain, Glowacki, Van Ittersum, & Johnson, 2006) reported that using podcasts helped them revise their notes more effectively than using the textbook. 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 his own instruction, reported that podcasts freed up time for in-class discussion and higher order learning activities (Vess, 2006). Used for distance education in a wide variety of subject areas, podcasting has been shown to be effective in reducing isolation-induced anxiety and promoting a sense of belonging to a community of learners (Lee & Chan, 2007). Furthermore, podcasting amplifies the sense of contact between students and instructors and thus is able to increase students’ motivation while respecting the different ways in which students learn (Fernandez, Simo, & Sallan, 2009).

This study looked at podcasting use at a large university in order to reveal what kinds of materials are podcast, when those materials are sent and accessed, and how and why those materials are used. In addition, this study investigated whether students and faculty perceived podcasting to have a positive effect on teaching, learning, and student achievement. To gauge whether podcasting users were different from users of more general information technology (IT) and a learning management system (LMS), the study compared the results of two online surveys: 1) an online survey focusing specifically instructor and student uses of podcasting and their attitudes and perceptions about how this technology impacts teaching and learning, and 2) a general IT/LMS survey administered annually on campus that also includes items about the impact of technology on teaching and learning.

2. Method

2.1. Setting

The participants in this study were instructors and students at the main campus of a large American Midwestern university. According to the Carnegie Classification of Institutions of Higher Education (http://www.carnegiefoundation.org/classifications/), this institution is a large, public, four-year research university with very high research activity and a majority undergraduate enrollment. The university enrolls approximately 26000 undergraduate and 15000 graduate and professional students. Approximately 5700 faculty members are employed by the university.

This study focused on the use of podcasting delivered via iTunes U, accessible at the university using the local LMS. Instructors who used iTunes U needed to make a request to the LMS support staff to have a link placed on their LMS course page. In order to produce the media for podcasts, instructors relied on a variety of software tools such as Apple QuickTime™ and ProCast (http://www.procast.com). There was no formal institutional support for instructors’ production of podcast media.

The LMS in use at this university is based on the Sakai community-source architecture (http://www.sakaiproject.org). This LMS is comparable to other popular systems such as Blackboard (http://www.blackboard.com) and Moodle (http://www.moodle.org). Approximately 85% of instructors and 99% of students use the LMS for at least one course per school year (Lonn & Teasley, 2009). This system has been in full production as the sole LMS for this campus since 2004.

2.2. Data sources, participants, and procedure

This study used data from two data sources. An online survey about podcasting was administered to all instructors and students who used iTunes U in a single school year (fall and winter semesters). Participants were invited via email. The survey instrument consisted of 18 quantitative items and 3 qualitative short answer items that asked participants about podcast media, reasons for podcasting, and general opinions about podcasting technology and the iTunes U interface. A total of 22 instructors (29% response rate) and 879 students (14% response rate) participated in the survey.

Selected data from a general online survey about IT and the campus LMS (the general IT/LMS survey) conducted about two months before the podcasting survey were also used to compare the results of the podcasting survey with a larger campus population. All instructional faculty and a random sample of 25% of university students (stratified by school/college) were invited to participate in this survey by email. This survey consisted of 27 items that asked participants their general opinion about using IT for their courses and participants’ perceptions and opinions about the local LMS. Four of the general IT items were used in this study based on their specific relationship to selected items in the podcasting survey. A total of 1481 instructors (20% response rate) and 2281 students (26% response rate) participated in the general IT/LMS survey.

3. Results

The analysis for this study began by using two general technology questions to help describe podcasting and iTunes U users. An exploration about what types of materials were used for podcasting and how often they were uploaded/downloaded followed. Then, the analysis focused on how students listened/watched podcast materials and investigated why students downloaded these resources. Finally, the analysis explored instructor and student perceptions of how podcasting improved teaching, learning, and achievement.

3.1. Respondent characteristics

To describe the users of podcasting and iTunes U, respondents were asked two general technology questions replicated from the 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). Podcasting instructors rated their computer expertise significantly higher than students rated their own expertise with a small effect size, \( t (890) = 3.103, p = .002 \) (see Table 1). On the general IT/LMS survey, instructors and student respondents were not significantly different on their self-reported

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Instructor and student computer expertise</th>
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<td>Podcasting survey</td>
<td>General IT and LMS survey</td>
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<tr>
<td>Instructors (n = 21)</td>
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| Instructors (n = 1479) | Students (n = 2280) | Mean difference |
| 2.27 | 2.24 | .03 *

* \( p = .002 \).
level of computer expertise. Instructors using podcasting rated themselves higher for computer expertise than the instructors who responded to the general IT/LMS survey, and podcasting instructors rated themselves higher than their students as well.

The second item on the podcasting survey 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 instructors and students responded that most used/preferred an extensive level of IT in their courses (see Table 2). In the general IT/LMS survey, there was a significant difference between instructors and students with a medium effect size: instructors reported using a moderate level of IT in their courses while students preferred an extensive level, \( t (3755) = 15.107, p < .001; \) Cohen’s \( d = .49 \). Comparing the podcasting survey results with the general survey showed that the podcasting instructors rated their use of IT higher than the instructor respondents of the general IT/LMS survey, although the podcasting students’ preference for IT use was nearly identical to the students responding to the general survey.

3.2. Podcast contents and when they were uploaded/downloaded

Focusing on podcast use, the study 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. Likewise, 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).

When asked how often they uploaded materials to iTunes U, 76% of instructors responded that they uploaded materials once a week or more frequently (see Table 4). 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 \( \chi^2 (4, N = 892) = 51.692, p < .001 \).

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 |

3.3. How and why students use podcasts

In order to better understand the context in which students were engaging with podcast content, the podcasting survey asked students how they most often listened/watched materials downloaded from iTunes U. 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.

The podcasting survey also asked instructors and students what they believed was the most common reason students downloaded podcast materials (see Table 5). 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.

3.4. Does podcasting improve teaching, learning, and achievement?

In order gauge respondents’ perceptions of whether the use of podcasting and iTunes U improved teaching, learning, and course grades, instructors and students were asked to respond to three statements using a 5-point Likert scale from 1 = Strongly disagree to 5 = Strongly agree (see Table 6). These results were compared with those from the general IT/LMS survey items that asked similar questions about the effects of global IT use. Podcasting instructors and students responded positively for all three statements and there were no significant differences between these 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 (see Table 7). In the general survey, instructors agreed significantly more than students that IT improved instructors’ teaching with a small effect size, \( t (3673) = 7.530, p < .001; \) Cohen’s \( d = .25 \) and students agreed more than instructors that IT improved students’ learning.

The podcasting survey provided an open-ended question for instructors and students to express how they felt podcasting and iTunes U contributed to learning. A qualitative analysis of the instructor comments (\( n = 24 \)) showed that several instructors (38%) recognized that podcasting provided a mechanism for lectures to be available for students to review for exams. For example, one instructor responded:

“(Podcasting) makes lecture material available to students to clarify questions and reinforce important messages.”

There was not, however, much evidence that instructors believed that podcasting affected their own methods of instruction. Only one instructor stated that their instruction changed as a result of using this technology:

“(Podcasting) 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.”

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 |

Table 5

| Most common reason students downloaded podcast materials. |
|---|---|---|---|
| n | Review lecture material after attending class (%) | Substitute for class attendance (%) | Interest in supplemental material (%) |
| Instructors | 22 | 64 | 18 | 0 | 18 |
| Students | 853 | 63 | 22 | 7 | 8 |
established habits in the way that students use and access web-based materials due to the near-ubiquitous use of iPods and portable audio/video devices. The "near-ubiquitous use of iPods" does not appear to include students’ use for formal education; students may not listen/view to academic podcasts in the same way that they consume other audio/video media using portable technologies (Brown & Green, 2007). These data are consistent with findings in a recent study showing that students’ tendency to listen to podcasts on their computer and not their mobile device is an artifact of pre-established habits in the way that students use and access web-based information (Lee, Miller, & Newnhem, 2009). Over time, the location for students’ consumption of podcast educational materials may change as mobile digital devices become a more popular method for accessing the Internet.

In this study, instructors and students agreed that podcasts help students learn, but students were less sure that podcasting improved their instructors’ teaching. One possible explanation for this finding is that instructors are simply capturing their typical lecture content and not modifying in-class instruction. Contrary to assertions from other researchers in education (e.g., Campbell, 2005; Cebeci & Tekdal, 2006), these data suggest that to date most instructors are not podcasting has contributed to my learning by giving me the chance to re-clarify and better understand points discussed.”

### 4. Discussion

The analyses conducted in this study indicate that students use podcast material largely for reviewing concepts and issues presented in lectures that they have previously attended, replicating findings from several other studies investigating the use of podcasting in higher education (e.g., Brittain et al., 2006; Evans, 2008; McKinney et al., 2009). These findings are contrary to earlier studies that have reported instructors’ concerns that students will stop attending lecture en masse when recordings are readily available online (Campbell, 2005; Fernandez, 2007). While instructors appear to be diligent about putting up lecture materials weekly, students download these materials only a few times during the semester, typically just before quizzes and exams.

Students report listening to podcasting materials far more frequently on their desktop or laptop computers than on mobile audio/video devices. The “near-ubiquitous use of iPods” does not appear to include students’ use for formal education; students may not listen/view to academic podcasts in the same way that they consume other audio/video media using portable technologies (Brown & Green, 2007). These data are consistent with findings in a recent study showing that students’ tendency to listen to podcasts on their computer and not their mobile device is an artifact of pre-established habits in the way that students use and access web-based information (Lee, Miller, & Newnhem, 2009). Over time, the location for students’ consumption of podcast educational materials may change as mobile digital devices become a more popular method for accessing the Internet.

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> “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” (p. 260–261).

As the quote above suggests, before any real value for learning can be demonstrated with this technology, the research on educational use of podcasting needs to address the conceptual issue of whether this technology is simply a mechanism for student review or a valuable method for students to construct knowledge.

As educational leaders grapple with issues of what content to podcast and how or if to have students create their own podcasts in higher education, institutions must also address how to support the “average” instructor as podcasting becomes more mainstream and expected by students. As the survey results demonstrate, the instructors who currently use podcasting see themselves as more technically advanced and report a higher level of use of information technologies than do their colleagues, although the effect sizes for these differences were relatively small (Cohen, 1988). 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 an endeavor perhaps difficult for most average higher education instructors (Brown & Green, 2007). If widespread use of podcasting for student learning is to become a reality, practical concerns about production must be adequately addressed, such as providing a level of institutional support consistent with the support for general LMS use. Further research should also investigate fundamental issues about content and authorship in order to spur more innovative uses of podcasting technology.

### 5. Conclusion

Podcasting in higher education is still a relatively new enterprise, although its use is increasing across higher education. As the podcasting survey in this study 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. Contrary to the instructors’ commonly held expectation, students do not report that they skip class as a result of the available lecture recordings. Instead, students treat these podcasts as review materials as they prepare for quizzes and exams. A fundamental question remains, however, as to whether podcasting is simply another mechanism for the review of course material, or if this technology can help transform what happens in the classroom where instructors and students meet face-to-face. If the instructors use class time simply to be a “talking head,” then a podcast is just another tool that instructors can employ to help their students learn at their own pace, like reviewing PowerPoint slides. However, the authors of this study believe that today’s higher education courses are comprised of a combination of materials, resources, and the interaction between...

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* p = .001.
teachers and students, of which podcasts are one possible resource. In order for podcasting to become more than an archive of past lectures, instructors in higher education need to adopt this view and include learning opportunities for students other than note taking during the classroom session.

While no technology can be a silver bullet to solve all instructional issues, technology like podcasting at least offers no more threat to standard teaching practices than coursepacks and at best offers 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. Future research should focus on exemplars from specific disciplines in which the instructors using podcasts have been able to transform the traditional lecture format into new student learning opportunities (e.g., McKinney et al., 2009). Future researchers will then be able to find commonalities across disciplines that will enable podcasting innovations to scale up throughout higher education.

References