The Virtual Classroom: Student Perceptions of Podcast Lectures in a General Microbiology Classroom

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Abstract: Podcasting has taken the world by storm, expanding and an astronomical rate as a form of entertainment. Despite the huge popularity of podcasting as entertainment it has yet to be well studied as an educational tool. In this study we developed and presented podcasts to completely replace three in class lectures in a General Microbiology Course. The podcast lectures were made available to students both via an RSS feed as well as presented on the screen in the actual classroom during what would have been the regularly scheduled class time. Student response to the podcast lectures was extremely positive with a large majority of students enjoying the flexibility of podcast lectures for review. Students also thought that they learned the podcast material as well the material from in class lectures. Ninety percent of students indicated that they thought the podcast project should be continued.

Introduction:

Podcasting was introduced as a new technology in the summer of 2004 and since then has seen marked growth. In 2005 it was estimated that over six million Americans had listened to at least one podcast, (Rainie & Madden, 2005). A recent study that was conducted in August of 2006 found that 12% of Americans have listened to a podcast (Madden, 2006). In April of the same year 7% of Americans had listened to a podcast a number that increased 12% in only 3 months (Madden, 2006)! The two largest podcast directories, Podcast Alley and Apple’s iTunes service each list over 33,000 and over 100,000 podcasts respectively (AppleComputer, 2007; PodcastAlley, 2007) Despite the huge popularity of podcasting as entertainment it has yet to be well studied as an educational tool with only a few studies completed at this time (Hollandsworth, 2007; Lane, 2006; Lee & Chan, 2007; Liu & McCombs, 2007).

The definition of podcasting as reported on Wikipedia is: a digital media file, or a series of such files, that is distributed over the Internet using syndication feeds for playback on portable media players and personal computers (Unknown, 2007). This definition contains many elements that are currently in use in most educational settings: digital media files, internet and personal computers. With the huge popularity of podcasts as well as portable media players like the iPod, combined with the complete saturation of the internet and computers, podcasting seems to be a natural choice for enhancing teaching and learning in college classrooms.

Despite the natural fit of podcasting into higher education there have been very few studies done on the use of podcasting in higher education. The few that have been reported find that students like the “time shifting” feature that is made available by podcasting (Lee & Chan, 2007; Pasnik, 2007; Price, Gay, Searle, & Brissenden, 2006). An additional advantage of podcasting is that allows the listener to keep a permanent record of information presented in the podcast (Price et al., 2006). Keeping a permanent record is useful for students enabling review and (Brittain, Glowacki, Itersum, & Johnson, 2006) make up of missed material (Lane, 2006). In addition podcasting is thought to be more convenient way for students to attain knowledge because listening to audio on a
portable device does not require complete attention from the student, allowing them to listen while they are traveling
to class or working out (Lee & Chan, 2007; Pasnik, 2007). Some instructors feel that giving students the ability to
have complete control over the sequence and review of instruction can improve student attitudes toward learning as
well as result in higher achievement (Liu & McCombs, ; Pasnik, 2007). In a survey study by Brittain et al. students
who had the opportunity to engage in podcasted material generally thought that it had a positive effect on their exam
grades (Brittain et al., 2006). In addition other studies have found that students thought using a podcast was a
positive experience they would recommend to others (Brittain et al., 2006; Lee & Chan, 2007; Liu & McCombs,
2007).

In light of these positive finding and in the hope to augment the existing knowledge in the field we
conducted a study in the spring semester of 2007. The purpose of this study was to determine student perceptions in
regard to three podcast lectures created for a General Microbiology class at the University of Wyoming. Three times
during the spring semester the instructor of the course missed class, she was reluctant to cancel class or have a guest
lecturer so she created podcasts of the lecture material for the missed days. Information on student perceptions of
these podcasts, how the students used the podcasts and whether students thought they were useful was collected
using a survey instrument developed for this purpose.

Materials and Methods

Podcasts were created using a Panosonic GS150 digital video camera and an InFocus LCD Projector. The
camera was mounted on a tripod and focused on the projected screen only. For class demonstrations, the camera was
moved and focused on the instructor and pertinent demonstration paraphernalia. The video was then imported into
iMovie where edits were done. For the first podcast, the edited video was exported as a quicktime movie and
compressed into an MP4 using rooVid Lite. Subsequent podcasts were exported from iMovie for iPod. A podcast
site was created using iWeb and uploaded to a streaming media server that is provided by University of Wyoming
for faculty use. This site can be accessed at http://multimedia.uwyo.edu/molb2021/Podcast/Podcast.html.

Students could access and play these podcasts from campus computer labs or on their own computers. In
addition to the online access of the podcast lectures a lab teaching assistant played a DVD of the lecture in the
scheduled lecture room during the regularly scheduled class time. This allowed students to watch the lecture in the
place and at the time they were used to having class or to access the podcast via the internet.

Formative evaluation was performed using the WebCT discussion board for student comments. These
comments guided the later creation of the summative evaluation survey tool and can be viewed at
http://surveyprojectitec5070.blogspot.com/.

The Survey Research Handbook by Pamela L. Alreck and Robert B. Settle was used as a guide in
composing the survey instrument. The Likert Scale was used to measure student opinion and some demographic
information was also collected. The survey was made available online using the UWyo Survey Tool (Classapps
Professional Survey Software).

Student participation was voluntary with an inducement provided. All students were offered 2 points of
extra credit if an 80% response rate was obtained.

Results

Fifty-one of the 75 students in General Microbiology responded to the survey, a 68% response rate. Six
percent of the respondents were freshmen, 28% sophomores, 36% Juniors and 22% Seniors. Of the remaining 8%,
one was a second-year senior, one was working on a second bachelor’s degree, one was a senior in credits but a
sophomore in his or her degree program and the last was simply fulfilling dietetics requirements. Sixty-six percent
of respondents were female, 34% male and 12% of the respondents considered themselves to be members of a
minority group.

The first question asked students if they preferred podcast lectures to traditional in-class lectures. A large
percentage, 49%, of the students were neutral with the remainder of the students aligned in an almost equal split
between agreement and disagreement with this statement. For complete results of the survey please see Table 1. In a
related question a majority of the students, 59%, agreed or strongly agreed that it was easier to fit podcast lectures
into their schedule.
<table>
<thead>
<tr>
<th>#</th>
<th>Item</th>
<th>% Strongly Agree</th>
<th>% Agree</th>
<th>% Neutral</th>
<th>% Disagree</th>
<th>% Strongly Disagree</th>
<th>SD</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I preferred podcast lectures to traditional in-class lectures.</td>
<td>3.9</td>
<td>15.7</td>
<td>49</td>
<td>29.4</td>
<td>2</td>
<td>0.831</td>
<td>2.9</td>
</tr>
<tr>
<td>2</td>
<td>It was easier to fit lectures into my schedule when they were podcast lectures rather than traditional in-class lectures.</td>
<td>23.5</td>
<td>35.3</td>
<td>21.6</td>
<td>15.7</td>
<td>3.9</td>
<td>1.134</td>
<td>3.59</td>
</tr>
<tr>
<td>3</td>
<td>I learned the material presented in podcast lectures as thoroughly as I learned the material presented in traditional in-class lectures.</td>
<td>11.8</td>
<td>43.1</td>
<td>21.6</td>
<td>23.5</td>
<td>0</td>
<td>0.985</td>
<td>3.43</td>
</tr>
<tr>
<td>4</td>
<td>I enjoyed the flexibility of being able to stop and rewind podcast lectures.</td>
<td>56.9</td>
<td>29.4</td>
<td>13.7</td>
<td>0</td>
<td>0</td>
<td>0.728</td>
<td>4.43</td>
</tr>
<tr>
<td>5</td>
<td>It was helpful to be able to view the podcast lectures more than once.</td>
<td>43.1</td>
<td>33.3</td>
<td>23.5</td>
<td>0</td>
<td>0</td>
<td>0.8</td>
<td>4.2</td>
</tr>
<tr>
<td>6</td>
<td>When lectures were podcasts, I missed the in-person interaction of traditional in-class lectures.</td>
<td>13.7</td>
<td>47.1</td>
<td>27.5</td>
<td>7.8</td>
<td>3.9</td>
<td>0.963</td>
<td>3.59</td>
</tr>
<tr>
<td>7</td>
<td>For all podcast lectures, I would have liked to see a screen displaying the instructor as well as a screen displaying the slides.</td>
<td>15.7</td>
<td>39.2</td>
<td>29.4</td>
<td>15.7</td>
<td>0</td>
<td>0.945</td>
<td>3.55</td>
</tr>
<tr>
<td>8</td>
<td>For all lectures given in General Microbiology, I would have liked to have been able to attend a traditional in-class lecture and watch the lecture as a podcast.</td>
<td>17.6</td>
<td>43.1</td>
<td>29.4</td>
<td>9.8</td>
<td>0</td>
<td>0.883</td>
<td>3.69</td>
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<td>9</td>
<td>When the General Microbiology professor had to miss a lecture, I would have preferred a guest lecturer to a podcast made by the professor.</td>
<td>0</td>
<td>4</td>
<td>8</td>
<td>38</td>
<td>50</td>
<td>0.798</td>
<td>1.66</td>
</tr>
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<td>10</td>
<td>Podcast lectures should continue to be used in General Microbiology.</td>
<td>58.8</td>
<td>31.4</td>
<td>7.8</td>
<td>2</td>
<td>0</td>
<td>0.731</td>
<td>4.47</td>
</tr>
<tr>
<td>11</td>
<td>How many podcast lectures did you watch during the regularly-scheduled lecture time in the usual classroom?</td>
<td>11.8</td>
<td>13.7</td>
<td>17.6</td>
<td>13.7</td>
<td>43.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>How many podcast lectures did you watch prior to the next in-class lecture.</td>
<td>25.5</td>
<td>19.6</td>
<td>13.7</td>
<td>13.7</td>
<td>27.5</td>
<td></td>
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</table>

**Table 1:** Responses to Likert-type questions on Podcasting questionnaire. (scale from 1 to 5)(n=51)

When asked if they enjoyed the flexibility of being able to stop and rewind podcast lectures, 86% agreed or strongly agreed that they did. A slightly smaller percent, 76%, agreed or strongly agreed that it was helpful to be able to view the podcast lectures more than once. The answer to an additional question that asked, “For all lectures given in General Microbiology, I would have liked to have been able to attend a traditional in-class lecture and watch the lecture as a podcast.” shows that 65% of students would have liked to be able to attend a traditional in-class lecture as well watch the lecture as a podcast. One student noted, “I like the idea of having back up podcasts because they enable an alternative time to get the lecture material if something comes up and I would have to miss the regular schedule. This would be extremely helpful since this class is only offered at one time-- there are no other sessions to attend if one misses lecture.” Several students echoed this comment. It is possible that this positive response for the ability to review material provided by the podcast also contributed to students’ perceptions of their learning. More than half of the students, 55%, thought they learned the material presented in podcast lectures as thoroughly as the material presented in tradition in-class lectures.
Though students did agree that they liked the aforementioned qualities of podcast lectures, 61% responded that when lectures were podcasts, they missed the in-person interaction of traditional in-class lectures and only 11% indicated that they disagreed with this statement. In fact, in the additional comments section of the survey, one student stated, “The only real downside to podcasts that I saw, are 1.) interaction and working with other students, and 2.) being able to ask questions in class to the instructor.”

As the podcasts had been filmed in such a way that only the slides were shown during a majority of the lectures, students were asked if they would have liked to have been able to see both the instructor and the slides throughout the podcast. Fifty-five percent of the students agreed or strongly agreed that they would.

When asked, “When the General Microbiology professor had to miss a lecture, I would have preferred a guest lecturer to a podcast made by the professor.” 88% disagreed or strongly disagreed that they would have preferred a guest lecturer as opposed to a podcast made by the professor. One student commented, “The podcasts were nice because I did get to see Rachel presenting the material and teaching the way that I expect (which is very well, by the way!). I would prefer a podcasted lecture over a sub any day.”

As mentioned earlier the podcasts were played both during the regularly scheduled class time and posted online. Fifty eight percent of students watched at least one podcast in the classroom at the regularly scheduled lecture time. Only 25% of the responding students watched all four of the podcast lectures prior to the next in-class lecture and 27% of respondents did not watch any of the podcasts prior to the next in-class lecture.

The last question of Likert Scale format inquired as to whether students thought podcasts should continue to be used in General Microbiology, 90% of the students agreed or strongly agreed that they should be. In the comments section, one student summarized this, “I think it is a great idea and wish that more professors would use this to enhance and supplement learning in the classroom. Not only is it convenient for the student, but it helped in learning topics that were difficult to take in at once in the classroom. I liked the ability to go back and clear up some of the topics that I couldn't find in the notes or the book. Thanks for all your hard work and going the extra mile to make students become engaged and interested in class.”

In addition to the Likert Scale questions there were two open-ended questions. One of the questions asked students if they had any difficulty accessing the podcasts. Of the 25 students reporting difficulties, 18 of them (72%) reported a difficulty with visibility (size, resolution). Only 6 students reported any difficulty actually accessing the podcasts. Four students expressed discontent with the amount of time it took for the podcasts to load. The final open-ended question asked for additional suggestions or comments and resulted in a great deal of positive feedback like, “I thought that having the podcasts were really helpful. If you were wanting to review a topic before an exam, podcasting was a great way to do that because it was quick and easy. That also kept the information fresh in my head. I would definitely continue the podcasting, and possibly even have one for lecture material that you could post after the lecture so you also get good attendance in lecture.” Other comments were more helpful for further development; “Great teaching strategy but sometimes it was difficult to see. I think the screen was too dark.” and “Just try making the viewing screen larger so it is easier to take notes.”

Discussion

Trends in data suggest a very positive response to the inclusion of podcast lectures into General Microbiology. This is encouraging and inspires us to continue development of podcasts. This seems to agree with several other studies that indicate that students like podcasts and would recommend them to others (Lee & Chan, 2007; Liu & McCombs). It was also notable that while students liked podcasts, they did not like the idea of them completely replacing the lecture. Instead they were amenable to their use when the professor needs to miss a lecture or as a supplement to the regular lecture. The avid disagreement that a guest lecturer would be preferable to a podcast made by the professor is notable. However, it should be noted that this finding may hinge the quality of traditional in-class instruction.

Additionally, mirroring the existing knowledge, students felt that the podcasts were easier to fit into their schedule and that they enjoyed the ability to rewind and stop the podcast (Lee & Chan, 2007; Pasnik, 2007). Some interesting information presented by this data is that students liked to be able to view the podcast more than once, indicating that students wish to use podcasts as a review tool. While the idea that users may want to keep useful episodes of a podcast was put forward as a possibility in the study done by Price, et.al. it was not examined from the standpoint of educational review for a class (Price et al., 2006). In a more pertinent study Brittain et al. found that 91% of students used the podcasts for review in a pilot study for a microbiology course (Brittain et al., 2006). The finding that students want to use the podcasts as review relates to the results of the question in this study in which
students were asked if they would like to have both a lecture as well as podcast of the lecture with a majority of students choosing both, implying that they would both attend lecture and use the podcasts as an additional study tool. This appears to agree with a study by Lane which showed that 79% of students surveyed in several classes at the University of Washington indicated that podcasting lectures had no effect on attendance (Lane, 2006).

It was particularly interesting that a majority of student respondents felt they learned the material presented in podcast lectures as thoroughly as they did that presented in traditional in-class lectures. In a similar study it was found that 85% of students thought that using the podcast had a positive effect on their exam score (Brittain et al., 2006). This finding was surprising to the instructor as students were less interactive and seemed to remember less in the lecture immediately following a podcast lecture. However, upon further examination of the data, it seems evident that during the in-class lecture following the podcast lecture, a fairly substantial portion of the students had not yet viewed the podcast. This also agrees with Brittain et al. who found that only 25% of students downloaded the podcasts immediately but 44% downloaded them prior to an exam (Brittain et al., 2006). Thus, their seeming lack of knowledge was partially due to timeliness of viewing the podcast and not inability to learn from that podcast. It is also interesting to note that although only 25% of the students watched all four podcasts before the next scheduled class 58% of the students watched at least one of the four podcasts in the classroom at the regularly scheduled lecture time.

In future, the instructor plans further integration of podcast lectures into General Microbiology. Attention will be given to improving resolution/visibility and possibly the speed of download. Podcasts will continue to be used when the instructor has to miss a lecture but it is hoped that they can also be slowly integrated as a supplementary tool.

References