iPod, uPod? An emerging mobile learning tool in nursing education and students' satisfaction

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An increasing number of healthcare educators are using mobile learning applications, such as educational podcasts, in order to facilitate and enhance students' learning. Ubiquitous mobile technologies are becoming more important in healthcare training because of the scarcity of educators and the increase in the number of first- and second-degree students enrolling in schools of nursing. Academic podcasts provide students opportunities to access face-to-face or distance audio presentations and instructor feedback in a convenient manner. However, further adaptation of this popular technology requires empirical research in order to determine the impact of the mobile media revolution on instructional design and learning effectiveness. Nursing students enrolled in a medical-surgical didactic course report high satisfaction with this up-and-coming mobile multimedia educational opportunity.

Keywords: learning, experiential, educational technologies, M-learning, nursing, education, pedagogy, theories

Introduction

The United States Bureau of Labor Statistics forecasts a critical shortage of one million nurses or more by 2012 (NCEMNA, 2006). However, the good news is the increased interest in the healthcare profession and student enrolments in schools of nursing across the nation are increasing exponentially (Rosseter, 2002). But, the irony is the dearth of qualified nurse educators to impart the necessary nursing knowledge for the increased number of students enrolling in colleges of nursing (AACN, 2003). Therefore, nurse educators are at a pivotal position to seriously look at various learning technologies and instructional designs that will foster students' learning to become competent clinicians while considering the lack of nurse educators. This idea is supported by Burger (2006) who informs us that the healthcare division accounts for 20% of the total US market for mobile learning (M-learning). Mobile learning will become more a norm than an exception in the near future. According to the Wikipedia (2006), "M-learning is the term given to the delivery of training by means of mobile devices, such as Mobile phones, PDAs and digital audio players." Compact personal learning devices, such as Apple Computer's infamous iPod, and the ubiquitous cell phone, that store large amounts of data may be carried in a student's pocket and perhaps in the future wireless technology will allow for educational material to be delivered from students' shoes (Engadget, 2006) while they meander across college campuses. The purpose of this paper is to present an emerging M-learning tool, podcasting, used in a traditional didactic medical-surgical nursing course and students' satisfaction with the technology.

Background

The emergence of Third-generation learning technologies allow students to informally learn while being away from their computers and classrooms when it is convenient for them. Therefore changing the traditional landscape of learning and challenging educators to keep up with innovative technologies, effective learning designs, domains of learning, and today's learners. Today's generation of students have been coined *Millennial* learners or the *Net Generation*, because they have been raised in a media-rich environment and live in an information-centric world. Many of these students have surfed the Internet since early adolescence, purchase clothing and concert tickets on the Internet, and communicate with peers via multiple Instant Messaging windows (Windham, 2005). They are expert multi-taskers. Since they have been exposed to high amounts of technology during their lives they expect educators to appreciate their enthralment with technology and therefore provide innovative technological tools that parallel and echo their inherent technology skills and characteristics. Today's students demand the use of technology in the classroom in order to complete their learning and if educators do not provide it, they unfortunately are left behind in the archaic dust. Innovative technology is changing students' and healthcare providers' expectations of learning and work environments. Effective learning models,

domains of learning, and knowledge of students' characteristics is important in order to provide experiential and reflective learning experiences in higher education. Furthermore, healthcare educators would benefit from conducting research that will provide educational outcomes as a result of the implementation of technological applications and instructional design.

Podcasting: How does it work?

The term *podcasting* is a derivative of *broadcasting* and the trendy Apple Computer *iPod* (MP3 audio player) and it is a relatively new method of delivering educational material via a student's desktop computer or ubiquitous MP3 player. The word *podcast* was dubbed the word-of-the-year in 2005 by the New Oxford American Dictionary, because of its rise from an esoteric activity to one of great popularity (BBC News, 2005). This example of a dynamic Web 2.0 application is extremely simple to use and is supported by Real Simple Syndication (RSS)/Extensible Markup Language (XML) technology. A simple podcast is a digital audio event (MP3 file), such as a conversation, lecture, museum guide, song, or interview that is delivered to a newsreader, such as iPodder, and a content management software, such as iTunes, that is accessed via a subscription request by the user. A pictorial diagram of how a podcast is published and subscribed is provided in Figure 1. A user may create the MP3 file two ways. One way is to use the inherent recording capability of a computer or a open-source recording software like Audacity (2006). Another way is to use a MP3 player, such as Apple's iPod photo, a good microphone, such as iTalk that attaches to the MP3 player, and if a hands-free approach is desired, a lapel microphone like Griffin's may be attached to the iTalk. Now, how does one publish and subscribe to a podcast? The digital audio file is posted to a Web site, such as the free application Blogger (2006), in a RSS 2.0 feed. Downloading a RSS reader, such as the open-source program iPodder (2006) allows users to subscribe to a specific Web page (e.g. Blogger) that contains the RSS 2.0 tagged digital files. Once the subscription is set up, the audio files will be automatically downloaded or *pushed* to an audio management system like Apple iTunes or MusicMatch. Thereafter, the user may synchronize a MP3 player with a computer (Maag, 2006a; Meng, 2006). Whereas, an *enhanced* podcast (Maag, 2006b) is composed of multimedia, such as PowerPoint slides saved as JPEG files, audio files, short video clips, images, photographs, and chapters that help organize the media production on a mobile device. Educators interested in creating enhanced podcasts may use software packages, such as Podcast Maker (2006) or Apple iLife06.

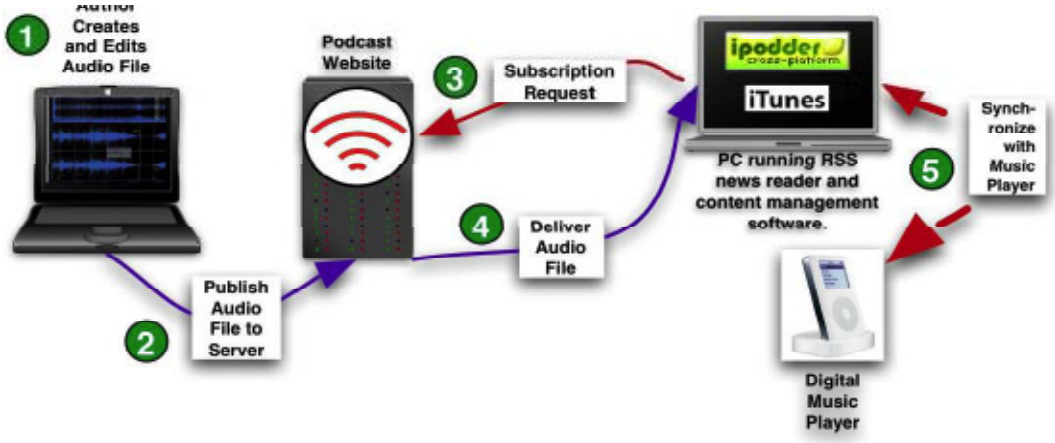

Figure 1: A model depicting the publication and subscription of a podcast
Note. Permission to reprint image obtained (Meng, 2005)

Pedagogical value

Innovative teachers and students alike have discovered an array of educational uses for podcasting (Lomas & Reeves, 2005). Lecture podcasts provide students opportunities to access traditional or distance education audio presentations or even instructor feedback in a convenient manner. Educators question the use of a lecture podcast, however, students continue to report great value in having the lecture recorded and pushed to their computers and subsequently their MP3 audio devices. And, if one conducts a simple Apple iTunes podcast search for nursing education, one will unearth many healthcare related topics, such

as Instant Anatomy, Nursing Spectrum Audio CE, Anesthesiology Grand Rounds, and eNeonatal Review for easy listening. Since simple podcasts consist of a MP3 audio file, learners that benefit most from audio presentations will be attracted to such an educational offering. Linguistic professors have used podcasts for the delivery of course materials in order to help students learn and review complex foreign language words. Furthermore, foreign language students may record reflective diaries while visiting a country and have the instructor evaluate their pronunciation of foreign words and phrases via e-mail communication. In addition, the instructor may record native speakers via the interview process and then provide the native speakers' voices for the students to hear while maintaining their busy schedules. Travelling to a foreign country and accessing a simple review of commonly used foreign words and phrases via a MP3 player while sitting on an airplane, train, or bus is an example of learner-centred education. Enhanced podcasts will attract the student who is more of a visual-based learner.

Within the realm of healthcare education, medical-related images that assist students with determining patients' conditions may be viewed via the OsiriX (2006) open-source system that is compatible with the iPod. OsiriX provides healthcare professionals the opportunity to view Digital Imaging and Communications in Medicine (DICOM) files in different dimensions, and may showcase anatomical images captured by magnetic resonance imaging (MRI), computer tomography (CT), and Positron Emission Tomography (PET) devices. The OsiriX program may be used during patient grand rounds in nursing or medical education. This creative use of a system on a mobile learning device is an example of providing a method to reach different styles of learning at the point-of-care. Dental schools are also tuning into digital media in order to give students meaningful learning opportunities. Currently, more mobile learning apparatuses are being supported by streaming capable servers, such as *Xserve,* that allow for learning to continue "anywhere, anyplace, anytime" (Apple Education, 2006). Nurses may provide their patients video iPods that have relaxing video and audio productions (e.g. nature scenes) that in turn will create a relaxed environment when the patient is anxious, or create a learning environment where the patient may review a medical procedure they need to learn in order to be discharged from the medical facility. Healthcare educators may create short and simple nursing skill related enhanced podcasts and load them on MP3 players that students may check out of the college's learning department, much like a library book, before practicing the skill on a patient in a clinical setting.

It is a misconception that a MP3 player is necessary to listen to a podcast, actually the audio file may be accessed from a computer's desktop, therefore reducing costs to the user. And, according to Oakley (2006) short podcasts may be telephoned via a cell phone while using Audioblogger (2006) and then shared among students taking an online course. Other examples of podcasts used in academia include interviews of educators and their sharing of their personal knowledge and advice (Educators' Voices: An ePod Experiment, 2006). Podcasts and *vodcasts* (video-on-demand casts) may be created in order to share information about professional conferences (NI2006 Congress Podcast, 2006; hi-blogs.info, 2006). Moreover, educators may share their academic podcasts with other faculty members, students, and life-long learners worldwide by submitting their work to an online education podcast repository, such as *Ed-Cast* (2006). *Ed-Cast* is an international podcast clearinghouse, fashioned after the Massachusetts Institute of Technology OpenCourseWare (MIT OCW) initiative, that is an Internet-based service that provides free, searchable, access to peer-reviewed academic podcasts for people around the globe.

Theoretical underpinnings

As with any novel technological tool, or perhaps critics would challenge by saying *toy*, the educator needs to evaluate the reasoning behind the utilization and bridge instructional design with the learners' needs. The theoretical tenets that initially have been identified as being supportive of these learner-in-control and collaborative tools are Paivio's (1986) Mental Representations, Mayer's (2001) Multimedia Learning Theory, Siemen's (2005a) Connectivism Theory and the Learning Development Cycle (Siemens, 2005b), as well as Gardner's (1999) work on multiple intelligences (MI). With the advent of enhanced podcasts, the educator is designing a tool that taps the learner's auditory and visual channels for dual cognitive coding. Paivio highlights the importance of dual coding for effective learning to take place. Following on Paivio's heels is Mayer's theory of multimedia learning and the three assumptions underpinning Mayer's theory are dual channels, limited capacity, and active processing. The dual channel assumption is based upon the idea that animation or on-screen text is processed in the visual/pictorial channel, whereas the spoken word or a non-verbal sound is processed by the auditory/verbal channel. The limited capacity assumption is that people do not have unlimited capacity to

process information in the auditory/verbal or visual/pictorial channels of working memory. Therefore, educators would assist students by not overloading them with information and give the learner shorter clips of material. Hence, when creating audio files this idea should be considered. Mayer's third assumption of active processing involves the idea that students are active participants in their individual learning and this fact is important in order to make meaningful experiences. The learner makes an effort to make sense of multimedia presentations by paying attention, organizing information, and combining new information with previous knowledge from their long-term memories (Maag, 2002). Siemens (2005b) tells us that *connectivism* as a learning theory illuminates the idea that "nurturing and maintaining connections is needed to facilitate continual learning and the ability to know where takes the place of know what and know how" (p.20). His ideas reach into the fact that technology is a critical aspect of our current social repertoire. Furthermore, Siemens (2005b) provides us with a novel meta-learning design model, the Learning Development Cycle (LDC), and this model consists of five stages: scope and object of learning design, creation of learning resources, user experience, meta-evaluation to determine effectiveness, and formative and summative evaluation of the project/learner experience. The Learning Development Cycle Considerations are provided in Figure 2. The scope of this M-learning project included a needs analysis (e.g. knowledge management and feasibility) and mobile learning is shown in the model under the heading of *create* and the user experience (e.g. learner feedback) is provided in this paper.

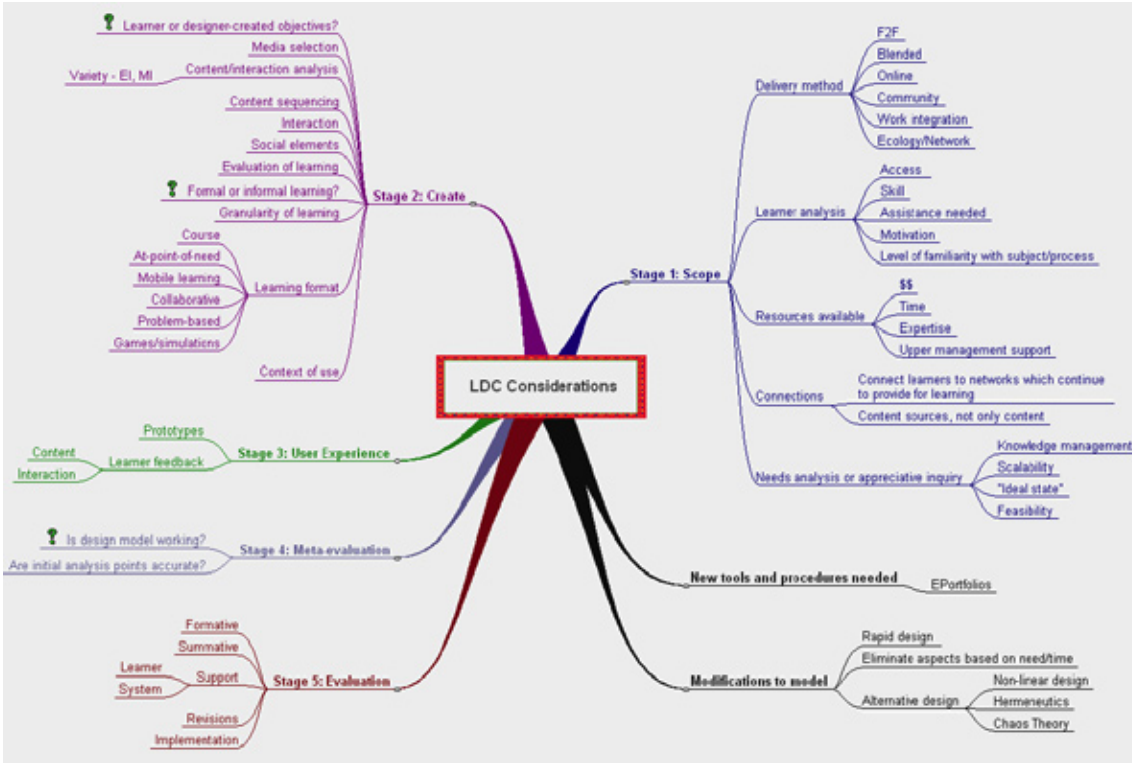

Figure 2: A model showing the Learning Development Cycle considerations
Note. Permission to reprint image obtained (Siemens, 2005)

Gardner's (1999) initial work on "seven intelligences" may support the use of technology as a tool because it involves the bodily-kinesthetics, as well as the tenet of "linguistic intelligence." According to Gardner, "My intelligence does not stop at my skin" (Goleman, 1999). Therefore, one can see how the use of podcasting is supported by the tenet of listening and learning, as well as interacting with the computer to learn and collaborate with peers. And, perhaps the use of podcasts, that allows the learner to listen to a variety of subject matters, such as the MoMAudio (2006), will be viewed as a practice that attends to MI theory.

Procedure

The author of this paper teaches a Principles and Methods of medical-surgical nursing skills course at a West Coast University in the United States. Following the attendance of an *Educause* webinar during the spring of 2005 on the new use of MP3 technology in institutions of higher education, the author purchased the necessary technology equipment and started to record, save, and upload traditional face-to-face didactic nursing lectures to a personal website (Maag, 2006c) during a 15-week academic semester. The age of the students range from approximately 19 to 30 years, the majority of the students are female (90%), and for the most part the students are comfortable using computer technology. During the subsequent two academic semesters, the lecture podcasts were offered via a server and a RSS 2.0 feed for Apple iTunes. The students accessed the traditional lectures following class. Instructor-student connection, social elements, and at-point-of-need were LDC considerations taken into account while creating the instructional design. Also, during each of the three academic semesters the instructor provided constructive feedback via a five-minute MP3 audio file to student groups regarding their group presentations presented in the classroom setting. The small audio files were emailed to the student groups via the BlackBoard e-learning platform. The students were provided survey questions regarding the use of the academic podcasts via an electronic survey program (SurveyMonkey, 2006) during week 14 of the spring 2005 and fall 2005 semesters. However, during the spring 2006 semester the students were requested to provide feedback during weeks 7 and 14. The survey results were analysed at the end of each semester and some other questions were added each semester in order to learn more about the students' satisfaction with the technology being piloted.

Results

Undergraduate and graduate students (n=34) responded to questions highlighting the availability and use of educational podcasts on an end-of-semester (spring 2005) electronic course evaluation tool. When asked, "How valuable did you find the podcast lectures posted on the instructor's website?" 32.4% of student participants stated "very valuable," 14.7% replied "somewhat valuable," and 52.9% responded "not accessing" the podcast lectures. Student participants responded to the question, "How valuable was it to receive a timely audio file regarding group project feedback from the instructor?" and 35.3% responded "very valuable," 35.3% replied "valuable," 2.9% stated "not at all valuable," and 5.9% reported not receiving the audio file. Overall, student satisfaction was very favourable and qualitative comments at the end of the course encouraged the instructor to use podcast technology during the subsequent semesters.

During the fall 2005 semester, undergraduate students (n=33) responded to the provided survey questions and 79% reported accessing the lecture podcasts, 82% of the students stated they encountered no technical problems while accessing the podcasts, 20% of the students reported accessing the lecture podcasts on both their computer desktops and MP3 player, 69% of the students requested enhanced podcasts (text and audio), and 51% requested video to be added to the lecture podcasts.

The results garnered during the spring 2006 semester were collected at midterm (week 7) and 86% of the undergraduate and graduate students (n=43) reported accessing the lecture podcasts, 80% of the students reported owning a MP3 player, 79% reported they thought listening to podcasts assisted their learning, 55% reported the podcasts provided very valuable learning experiences and 29% of the participants reported the podcasts provided valuable learning experiences, and 81% of the participants requested enhanced podcasts in the future. Students' reported they learn better if they hear the learning material more than once, and the lecture podcasts assisted them in retaining information. One student remarked how the availability of the lecture podcasts gave her the opportunity to "listen and learn" while exercising on the treadmill at the gym, therefore allowing her to return to her exercise routine, and another student stated "it was nice knowing they were available, if I needed them." Some of the other students' statements included: "They are helpful while reviewing lecture notes before an exam;" "It helps me a lot because I can't always write as fast as you talk;" "It is helpful to be able to listen to it again to refresh ideas in your mind. This way little details that you might have missed the first time through are recognized and stay in your memory longer;" "I think they are really helpful, it's something we can actually take out of the classroom to enhance our learning. If we have questions about something or we need clarification we can just re-listen to our entire lecture and make sure we understand;" "Well, for the first exam, I listened to it before I started studying with your notes. Then I would listen to it in my car.

Then I would listen to it a third time along with my notes. After all that, I would have already known the materials really well by then. I love it;" "I learn better if I hear it more than once." There are some overarching themes from these qualitative data, such as "listening and learning," "convenience," "review," "repetition," and the provision for "increased time-on-learning." These results point to how Gardner's theory of MI may support the use of lecture podcasts as a method to enhance learning.

Extra survey questions (see Figures 3-7) were added at the end of the semester due to a networking opportunity with another instructor teaching at a University in the Pacific Northwest. The other instructor is trying the new technology in her classroom too and is collecting data from her students, as well. The professor granted permission to use her student satisfaction questions and the participants in this pilot study gave their responses (n=26). The students' responses are provided in Figures 3-7.

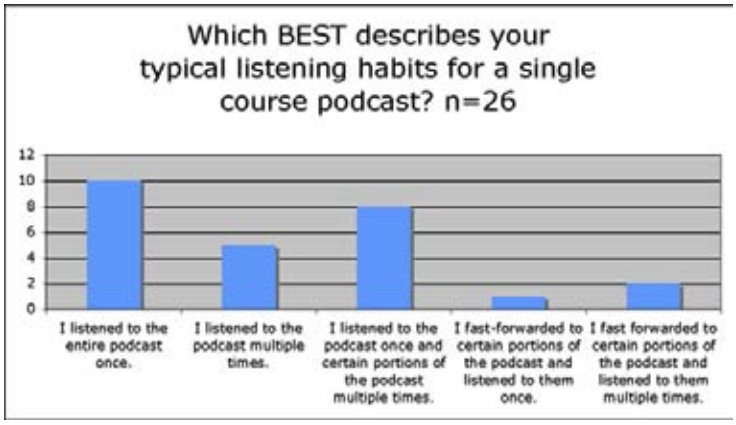

Figure 3: Nursing students' responses (spring 2006)

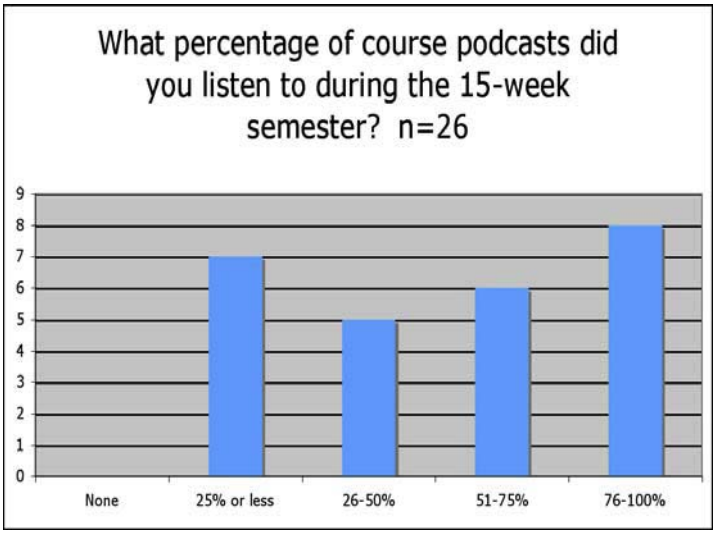

Figure 4: Nursing students' responses (spring 2006)

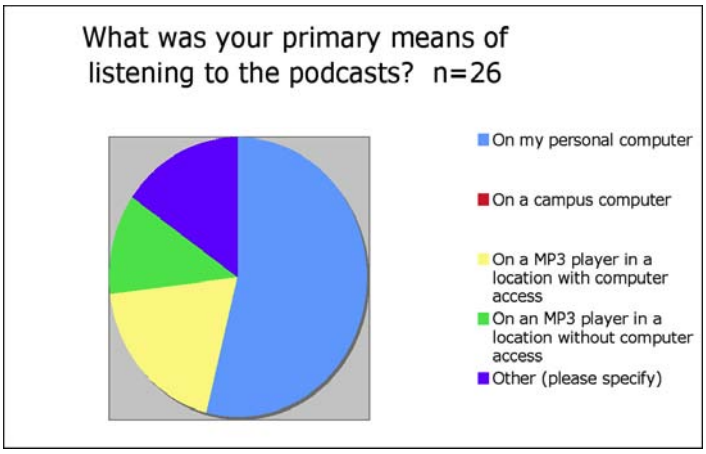

Figure 5: Nursing students' responses (spring 2006)

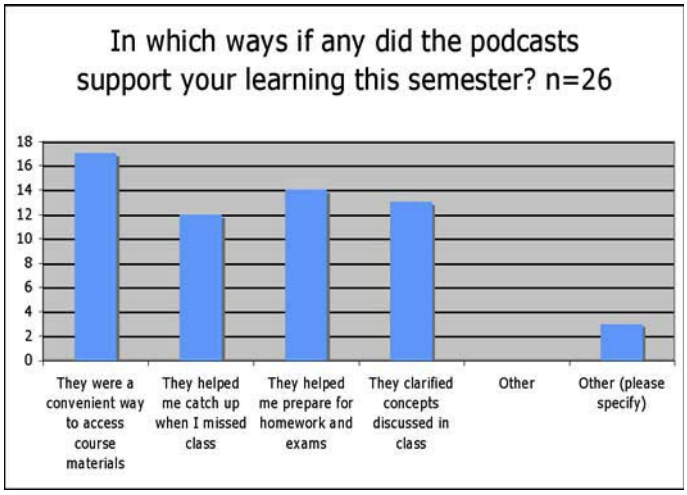

Figure 6: Nursing students' responses (spring 2006)

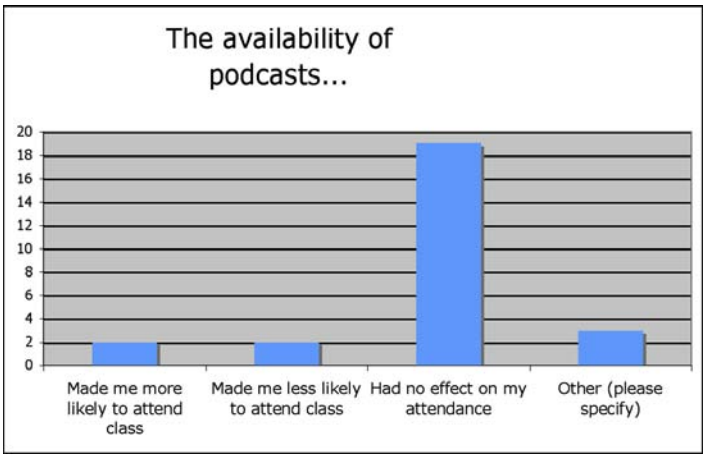

Figure 7: Nursing students' responses (spring 20006)

Discussion

Today's Net Generation is accustomed to multimedia and their everyday life is a concoction of digital, audio, video, and text information. The results of this pilot study support this fact, because the majority of

the students reported owning a MP3 player and requested enhanced podcasts during the course of the academic semesters. At the conclusion of the spring 2006 semester, 50% of the students reported listening to 51 to 100% of the lecture podcasts, therefore indicating half the students were motivated to listen on a consistent basis. During the spring 2006 semester, it does not appear the students extensively listened to the lecture podcasts, however 30% of the students reported listening to the lecture podcast once and then going back to certain parts of the lecture several times. These results indicate students' needs to review specific concepts not captured in the traditional classroom setting. Over the course of the three semesters students increased their listening of the lecture podcasts on their MP3 players. However, interestingly approximately 55% reported the primary means of listening to the podcasts was via their computer desktops. It will be interesting to watch if this trend changes significantly during the next academic semester as the popularity of the MP3 players increase. The majority of the students reported the podcasts provided an opportune way to access course materials. More than half of the students reported the podcasts assisted them in preparing for exams and homework assignments. And, much to a critic's chagrin, the majority of the students reported the availability of the podcasts had no significant effect on class attendance. This was evidenced over the course of the semester by attendance lists, but perhaps educators would benefit from examining the outcomes of informal learning that is supported by mobile learning modalities. Therefore, dispelling the common educator's worry that the provision of online audio presentations will decrease students' attendance in the traditional lecture hall. Today, learning has moved beyond formal courses that provide fixed knowledge (Siemens, 2005b). Furthermore, it was apparent the students wanted to contribute more during class time when the lectures were podcasted. Conceivably their desire for interaction in the classroom was stimulated by the lecture being recorded and uploaded to the Internet, because they wanted their voices to be heard. In addition, the instructor found a desire to interact more with the students during the lecture podcast and this was evidenced when she would move into the sea of students in order to have their questions and answers casted on the Web.

Conclusion

Open-source broadcast technologies support the busy lifestyles of today's learners, allow for the reinforcement of learning material for all learners, and illuminate Chickering's and Gamson's (2006) research on excellent higher education practices. Furthermore, podcast lectures and digitized audio comments provide an opportunity for students and educators to interact or connect online in a timely manner (Siemens, 2005a). M-learning is supported by Siemens (2005b) Connectivism and Learning Development Cycle and other aforementioned theoretical tenets/learning designs. The domains of learning, especially *acquisition*, where the learner chooses to learn, and *emergence*, that includes tacit learning and promotes creativity and innovation, need to be recognized when considering the design of courses for today's avid technology-driven learners. Researchers (Mindlin, 2005) forecast between 30 and 57 million people living in the United States will access and use podcasting technology by the year 2010. Perhaps podcasting, a method to deliver user-generated content, is a tool that learners and educators may use to interact during this era of rapid technological change. An ongoing evaluation of lecture and enhanced podcasts will provide data regarding the technology and will guide plans for the development of a distance education nursing program and future research projects.

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