



Impact of podcasting on student motivation in the online learning environment

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ABSTRACT

Researchers investigated the impact of podcasting on student motivation in the online environment during fall 2008 and spring 2009. Data were collected from students enrolled in fourteen online courses at a research university in the United States. One hundred and ninety-one students completed a modified version of the Instructional Materials Motivation Survey (Keller, 2006); it has four subscales: attention, relevance, confidence, and satisfaction. Strong positive relationships between all subscales were detected. Results indicate students were moderately motivated by the use of podcasts in their online courses. Statistically significant differences in student motivation based on gender, class standing, and prior online learning experience were found. Benefits of using podcasts and recommendations for improvement of the multimedia files were offered by users.

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1. Introduction

The rapid growth of online distance education has implied the need to rethink delivery structures and pedagogical practices that were once appropriate (Beldarrain, 2006). Although several multimedia software programs have been utilized in the development of instructional material for online courses, each type of multimedia application may offer a unique benefit to a learner. According to (Kozma, 1994), each form of media can support learning based on the capability of the medium and the methods that employ it.

Historically, distance education has experienced high drop-out rates. And drop-out rates in online courses are no exception (DiRamio & Wolverton, 2006; Terry, 2001). This has been attributed to the fact that students feel the *distance* in distance education. The online learning environment can lack face-to-face interaction and social interaction (Carr, 2000). The fact that students feel isolated in online courses has been widely documented (Shaw & Polovina, 1999). Hanuka and Jugdev (2006) indicate that isolation and disconnectedness in the online environment may be to blame for student drop out, as well as the feeling of isolation that may lead to loss of motivation to learn (Inoue, 2007).

Podcasts are recorded audio files that can be integrated in educational and training settings in order to deliver personalized content to learners in a specific course during a given semester. For example, if the instructor creates podcasts in each unit to summarize major points made by students in threaded discussions or provides reminders about deadlines or communicates updates. Podcasting is increasingly used to deliver audio recordings of lectures to students in residential college courses (Copley, 2007). These audio files are made available online so that students may download and listen to them in order to review instructional materials (e.g., lectures) outside of class at a time and place convenient to them. The integration of podcasts in fully online courses is also becoming more common.

2. Theoretical framework

According to Beldarrain (2006), emerging technologies allow educators to “foster interaction and collaboration among learners” in online learning environments (p. 140). Interaction has long been considered as one of the most important factors in online student satisfaction (Bolliger & Martindale 2004). Student satisfaction is considered one of the five *pillars* of quality in online education (Moore, 2005). Furthermore, technologies allow educators to personalize and *humanize* e-Learning by including rich media components in online courses that endeavor to engage students in active, meaningful learning (Lee, Tan, & Goh, 2004).

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The combination and availability of different media provides learners with choices and accommodates individual differences such as personality traits, cognitive styles, preferences, and learning styles. Adult learners increasingly expect a personal or customized learning environment. Students want “learning options, choices, and personalization” (Ausburn, 2004, p. 335). By providing learners with the freedom of choice, instructors can set the stage for student success.

2.1. Podcasts

A podcast is an audio recording delivered via a static URL containing a Real Simple Syndication (RSS) feed (Mack & Ratcliffe, 2007). Podcasting has become a popular medium for accessing and assimilating information by users (Copley, 2007). Users can easily download and install the iTunes software program on their computers (Fose & Mehl, 2007) in order to access and download podcasts through RSS channels to computers or portable devices such as MP3 players or iPods.

Currently, there are three types of podcasts being produced and used: audio-podcast, enhanced podcasts, and video podcasts (Liu & McCombs, 2008). Audio-podcasts include audio only and require a relatively small storage space. Enhanced podcasts are a combination of audio and digital still images. Video podcasts or vodcasts include audio and video and require larger storage capabilities.

2.2. Integration of podcasts

Podcasts are appealing to learners because they have four unique attributes according to Donnelly and Berge (2006). First, they include the voice of the developer which makes information more personal than written words alone. Second, their inclusion can provide learners with control over their learning by providing them with options such as reading a book, listening to the podcasts, or using both. Third, it allows learners to listen to the portable files while engaging in other tasks. Fourth, it allows educators and learners to *time-shift* instructional or informational content. Learners can download the files and listen to them at a place and time convenient to them.

Many instructors have implemented podcasts in traditional courses by recording either lectures or providing supplemental materials to students for access outside of the classroom (Copley, 2007; Fose & Mehl, 2007). Podcast may be delivered via a course management system such as Blackboard or uploaded to a podcast-hosting site (e.g., iTunes University). It appears that podcasts may also have potential benefits for students in distance learning environments.

According to Copley (2007), the majority of students in traditional courses rated podcasts as very useful and reported very positive experiences. Podcasts were used by students in the preparation of assessments, note-taking, and review of missed lectures. Evans (2008) reports traditional learners found the use of podcasts satisfactory, effective, and engaging.

The integration of podcasts in an online learning environment is becoming more common in higher education (Caladine, 2008). Boulos, Maramba, and Wheeler (2006) suggest that podcasts can be used to offer instructional material in an online learning environment for students to learn at their own pace and time. Lee and Chan (2007) found that podcasts can be used in an online environment to help reduce learners' feelings of isolation and promote a sense of social presence. On the other hand, online students may feel overwhelmed by the number of materials when podcast use is a requirement in addition to other course responsibilities (Fose & Mehl, 2007).

2.3. Student motivation

An underlying theory base of good instruction generally involves instructional design considerations for motivation (Bohlin, Milheim, & Viechnicki, 1990). Motivation is one of the most important psychological concepts in education (Rodgers & Withrow-Thorton, 2005; Vallerand et al., 1992). It is a psychological attribute that entices students to learn as well as to complete learning activities (Green & Sulbaran, 2006). Motivation is an essential factor to sustain learners' satisfaction in an online learning environment. Lack of motivation can be a major obstacle that prevents learners from concentrating on an instruction (Jeamu, Kim, & Lee, 2008).

Keller (1987) developed the ARCS Model, a four factor theory that measures individuals' levels of motivation. The first factor, attention, is a strategy for arousing and sustaining a learner's interest (Green & Sulbaran, 2006). Mayer (2003) indicates that the appropriate design of instructional material can assist in gaining the attention of learners.

The second factor, relevance, is related to how well the instruction meets a learner's needs and goals. Course content not only must be current but needs to be aligned with course objectives. Learners need to perceive content as compatible with their learning preferences, consistent with personal learning goals, and connected to their prior experiences (Keller & Suzuki, 2004). Instructional strategies should build connections between the instructional environment (e.g., content, teaching strategies, social organization, learning goals, etc.) and past experiences (Keller, 2008).

Confidence, the third factor, refers to the learner's attitude toward success or failure (Bohlin et al., 1990). Keller (2008) points out that the confidence factor incorporates variables that relate to students' feelings of personal control and expectancy for success. In general, the attitude toward success can influence learners' learning efforts and performance.

The last factor of the ARCS model is learner satisfaction. Satisfaction can be defined as positive feelings about students' learning experiences. Rodgers and Withrow-Thorton (2005) believe learners need to be satisfied with the learning experience in order to maintain appropriate levels of motivation.

There are several factors that can influence satisfaction. Keller and Suzuki (1998) point out that reinforcement, feedback, consistency, and intrinsic rewards are important. Sun, Tsai, Finger, Chen, and Yeh (2008) found that learners' perceived ease of use significantly influenced their online learning satisfaction. Learners may perceive their satisfaction differently based on prior experiences in the online environment, competence with technology, and preferences. Experienced online learners may feel more comfortable with the use of different types of instructional technologies, than those with less experience. Learners with less online learning experience may feel uncomfortable, creating a sense of anxiety. High levels of anxiety can negatively influence the levels of satisfaction of the online learner (Sun et al.).

It has been suggested that gender may be one of many factors that affect learners' satisfaction with the use of podcasts. Wehrwein, Lujan, and DiCarlo (2007) indicate that males and females have different preferences in learning which may affect their perceptions and

satisfaction. Others (Kraetzig & Arbuthnott, 2006) argue that gender may not influence individual preferences. Therefore, it is inconclusive whether or not gender has any influence on an individual's perceptions and preferences.

Podcasting has recently received much attention in the literature. Several articles for practitioners have been published, and research on the use of podcasts, their effectiveness, effects of isolation and inclusiveness has been conducted (Copley, 2007; Evans, 2008; Lee & Chan, 2007); however, research studies investigating student motivation with the use of podcasts in online courses are limited.

3. Methods

3.1. Purpose and research questions

The primary purpose of the research study was to investigate students' levels of motivation with the use of podcasts in the online environment. Other inquiries included student perceptions about the use and improvements of podcasts. Additionally, researchers investigated relationships between the attention, relevance, confidence, and satisfaction subscales. The research questions were:

1. How motivated are students by the use of podcasts in online courses?
2. Are there differences in the four factors that measure student motivation based on gender, class standing, and prior experience with online courses and/or podcasts?
3. What do users like about the podcasts?
4. What suggestions for improvement do users have?
5. Are there relationships between the four factors measured by the Instructional Materials Motivation Survey (IMMS)?

3.2. Procedure

The data were collected in fall 2008 and spring 2009 at a public research university in the western United States. The institution has an annual enrollment of approximately 13,000 students. The sample included 302 undergraduate and graduate students enrolled in 14 online courses in nine program areas that utilized podcasts accessible in iTunes University. Courses were taught by different instructors who included podcasts to share introductions, lectures, and other supplemental material.

Researchers administered a questionnaire using the integrated survey tool of the course management system to collect the data. The questionnaire was available during the last third of the semester to give learners the opportunity to utilize several podcasts before responding to the survey questions. Learners were prompted to complete the questionnaire once they logged into the course management system. The first page included an explanation of the study and information that participation was voluntary and responses anonymous. The final response rate was 63%.

3.2.1. Instrument

The Instructional Materials Motivation Survey (IMMS) has been administered in several research studies (Green & Sulbaran, 2006). The survey was designed to assess how instructional material affects learner motivation (Rodgers & Withrow-Thorton, 2005) or how motivated learners are by engaging in a particular type of lesson. It contains 36 questions with 5-point Likert-scale items that measure learners' motivational reactions to self-directed instructional material. Each question on the IMMS corresponds to one of the factors of the ARCS model. The IMMS is considered a valid instrument and has a documented reliability coefficient of .96 (Keller, 2006). Huang, Huang, Diefes-Dux, and Imbrie (2006) sought to validate the instrument in a computer-based tutorial setting. The authors suggest the modification of survey items "to accommodate the context" (p. 250) and characteristics of learners.

After obtaining permission from the author to use and modify the instrument, the instrument was slightly modified to assess how the use of podcasts affects learner motivation. The modified instrument includes 45 questions; it consists of 36 Likert-scale items ranging from 1 (*not true*) to 5 (*very true*), demographic, and open-ended questions.

3.3. Data analysis

After the data collection phase, Cronbach alpha coefficients were calculated to determine the instrument's internal reliability. The instrument had a reliability coefficient of .97. Reliability estimates for each category were satisfactory: (a) attention ($a = .94$), (b) relevance ($a = .91$), (c) confidence ($a = .82$), and (d) satisfaction ($a = .92$).

Descriptive statistics were calculated before 10 negative items were recoded by reversing the Likert-scale responses, 5 now being *not true*. An independent *t* test was conducted to measure differences in mean scores between males and females on all four factors. A series of analyses of variance (ANOVAs) was performed to assess any differences in motivation among students based on age, class standing, prior experience with podcasts, and the number of podcasts used in the course.

4. Research results

4.1. Demographics

One hundred and ninety-one (63%) students completed the survey. Because 29 cases had one third of data missing, they were deleted from the data set. In order to detect outliers, *z*-scores were generated. The examination of the data revealed seven outliers ($z = \pm 3.0$) that were deleted.

The majority of respondents was female (67.8%). Participants' ages ranged from 20 to 62 with 53.4% falling in the 20–30 year category. Participants were enrolled in courses offered in the following program areas: adult learning (12.3%), agriculture (15.5%), curriculum and instruction (9.0%), English (22.6%), instructional technology (18.1%), political science (5.8%), nursing (10.3%), social work (5.8%), and women's

studies (.6%). The sample did not represent freshmen and sophomores but included juniors (17.2%), seniors (33.8%), and graduate (42.4%) and post bachelor (4.6%) students. Respondents had declared the following majors: education (39.8%), health science (19.9%), science (15.9%), business (15.8%), and social science (6.9%).

The online experience of participants varied. For 23 respondents (15.2%), it was their first online learning experience. Several students had completed one to five online courses (40.3%), others had taken six to ten courses (29.1%), and 15.3% had finished more than 10 online courses. The majority of respondents (73.9%) had not taken an online course that included podcasts.

4.2. Research question 1

Because the response scale ranges from 1 to 5, the minimum and maximum scores on the instrument are 36 and 180, respectively. The total scores of participants ranged from 54 to 179 ($M = 127.5$). These results indicate that overall podcast users were motivated by the use of podcasts.

Table 1 lists descriptive statistics for the four subscales. The highest and lowest mean scores were yielded by the confidence subscale ($M = 3.76$) and the satisfaction subscale ($M = 3.13$).

Five items on the attention subscale had a mean score above 4.0. Over 80% of individuals responded it was not true or slightly true that the material in the podcasts was so abstract that it was hard to keep their attention. More than 70% of participants thought it was not true or slightly true that the podcasts contained too much content (79.8%), or were unappealing (78.1%), boring (75.9%), and repetitive (71.0%). Table 2 displays the means and standard deviations for items on the attention subscale.

Table 3 displays the mean scores and standard deviations for items on the relevance subscale. Only one item has a mean score above 4.0 with 74.7% of individuals disagreeing that the content was not relevant.

Table 4 displays the means and standard deviations for items on the confidence subscale. The confidence subscale yielded some of the highest mean scores. The majority of users responded that some statements were not true or slightly true. Over 90% disagreed the material was too difficult. Over 80% disagreed with items 3 and 34, and 74.1% disagreed with item 7. However, item 1 had the lowest mean score of all survey questions with only 25.9% thinking that the statement was mostly true or very true.

Table 5 displays the means and standard deviations for items on the satisfaction subscale. Answers on the last subscale varied more widely, and none of the items yielded a mean score at or above 4.0.

4.3. Research question 2

4.3.1. Gender

An independent t test was conducted to measure the differences in mean scores of males and females. Results showed that the difference between males and females was significant on attention ($t(149) = -2.83, p = .01$) and relevance ($t(149) = -2.94, p = .01$). Female participants had higher means ($M = 3.76, SD = .78; M = 3.65, SD = .80$) on both scales when compared to males ($M = 3.32, SD = .93; M = 3.22, SD = .84$). The 95% confidence intervals for the difference in mean was small for both scales, ranging from $-.74$ to $-.13$ (attention) and $-.71$ to $-.14$ (relevance). Due to performing multiple tests of significance, the Bonferroni adjustment procedure was applied to prevent a chance of making a type I error. The level of significance was confirmed on both subscales.

4.3.2. Class standing

The highest mean scores on all four subscales were scored by nonclassified and graduate students. A series of one-way analyses of variance (ANOVAs) was conducted to evaluate different effects of learners' class standings on each subscale. Results indicated that there were significant differences on four subscales: attention, $F(4, 145) = 5.82, p = .001$; relevance, $F(4, 145) = 5.55, p < .001$; confidence, $F(4, 145) = 5.57, p < .001$; and satisfaction, $F(4, 145) = 2.970, p = .02$. Because equality of population variances was not assumed, the Brown-Forsythe statistics were applied and the Dunnett's C procedure was chosen. The results showed there was a significant difference in the means at the .05 level between senior students (attention: $M = 3.24, SD = .94$; relevance: $M = 3.16, SD = .94$; confidence: $M = 3.50, SD = .74$; satisfaction: $M = 2.8, SD = 1.12$) and graduate students (attention: $M = 3.92, SD = .73$; relevance: $M = 3.84, SD = .71$; confidence: $M = 4.03, SD = .50$; satisfaction: $M = 3.40, SD = .93$) on all subscales.

4.3.3. Prior experience with online courses or podcasts

Students were grouped into four categories (no, low, medium, and high levels of prior experiences with online courses) based on how many online courses they had successfully completed. Results of the one-way ANOVA indicated that there were significant differences among two groups on the confidence subscale, $F(3, 147) = 4.58, p = .01$. Results of post hoc comparisons confirmed a significant difference in the mean scores of students with medium ($M = 4.01, SD = .52$) and high levels ($M = 3.41, SD = .82$) of experience. Students who had successfully completed 6–10 online courses were more confident than students who had completed 11 or more online courses. An independent t test was performed to assess the differences in mean scores between students with and without prior podcast experience on all subscales, but results indicated no significant difference between the two groups.

Table 1
Descriptive statistics for all subscales.

Scales	<i>M</i>	<i>SD</i>
Attention	3.61	.85
Relevance	3.51	.83
Confidence	3.76	.66
Satisfaction	3.13	1.02

Table 2
Mean scores and standard deviations of the attention subscale.

No.	Item	M	SD
2	There was something interesting at the beginning of the podcasts that got my attention.	3.01	1.12
8	The podcasts are attention-grabbing.	3.03	1.12
11	The quality of the podcasts helped to hold my attention.	3.49	1.16
12	The material in the podcasts is so abstract that it was hard to keep my attention on them. (recoded)	4.49	.85
15	The podcasts are dry and unappealing. (recoded)	4.26	1.16
17	The way the information is arranged in the podcasts helped keep my attention.	3.47	1.07
20	The podcasts include information that stimulated my curiosity.	3.14	1.13
22	The amount of repetition of the material in the podcasts caused me to get bored sometimes. (recoded)	4.03	1.10
24	I learned some things from the podcasts that were surprising or unexpected.	3.15	1.16
28	The variety of the podcasts helped keep my attention on the lessons.	3.10	1.11
29	The presentation style of the podcasts is boring. (recoded)	4.14	1.16
31	There is so much content in the podcasts that it is irritating. (recoded)	4.34	1.05

4.3.4. Prior experience with online learning courses and podcasts

A 4×2 [(prior online learning experience) \times (prior experience with podcasts)] factorial analysis was conducted to evaluate different effects of learners' prior online learning experience and podcast use on each subscale. The ANOVA for the confidence subscale was significant, $F(6, 143) = 4.10$, $p < .01$, partial $\eta^2 = .08$. Follow-up tests were conducted to evaluate pairwise differences among the means. There was a significant difference ($\alpha = .05$) in the means between groups with medium ($M = 4.02$) and high levels ($M = 3.29$) of experience who had not previously used podcasts.

4.4. Research question 3

The survey included two open-ended questions. The first open-ended question solicited responses from 107 persons pertaining to what they liked about the podcasts. The comments revealed three major themes: task-oriented (80), social-oriented (46), and media-related (26) issues.

Twenty-four respondents commented on the variety of media integrated in their courses. They appreciated having audio and/or video files available which provided them with options in addition to reading and discussing materials. Fifteen individuals enjoyed receiving additional information that was good, helpful, precise, or consistent. The podcasts assisted 14 students in their learning process. The files were helpful in learning content and retention, made difficult concepts easier to understand, added clarity, and addressed different learning styles. Additionally, students were able to stay on track after using the podcasts to confirm on what to focus. Some individuals enjoyed the various uses of the podcasts such as lectures, introductions, or summaries. Others liked the added form of communication, feedback, and the ability to learn how to use the technology.

Examples of task-oriented responses:

"It is nice to have materials presented in an alternative format from the reading materials that are the most prevalent way students interface with information in these online courses."

"The quick concise presentation of the information."

"They provide clarity for difficult to grasp concepts."

"I also think the weekly podcasts help students stay focused on the most important concepts of the course or to more easily understand directions for assignments."

"It is a great way to summarize what happened the week before and give closure ... to communicate what is going on in the class such as upcoming assignments and things to check out ..."

"I like the feedback from the instructor the best."

The majority of social-oriented comments pertained to feeling connected to their instructors after listening to the podcasts. Students enjoyed hearing the professor's voice, felt connected to their professors or felt like they were in the classroom with the teacher. Respondents felt there was someone at the other end, and the files allowed for interaction between instructors and students. Ten individuals indicated the podcasts humanized their online learning experience. It gave the course a human-touch and personalized their learning environment. A few students mentioned the use of podcasts signaled a high level of instructor involvement, and one student felt a sense of belonging.

Examples of social-oriented responses:

Table 3
Mean scores and standard deviations of the relevance subscale.

No.	Item	M	SD
6	It is clear to me how the content in the podcasts is related to things I already know.	3.40	1.07
9	There were stories or examples in the podcasts that showed me how this material could be important to some people.	3.52	1.09
10	Completing the lessons successfully after using the podcasts was important to me.	3.75	1.28
16	The content in the podcasts is relevant to my interests.	3.35	1.16
18	There are explanations or examples of how people use the material in the podcasts.	3.28	1.17
23	The content and style of presentation in the podcasts convey the impression that the content is worth knowing.	3.63	1.05
26	The content in the podcasts was not relevant to my needs because I already knew most of it. (recoded)	4.27	.97
30	I could relate the content of the podcasts to things I have seen, done, or thought about in my own life.	3.06	1.16
33	The content in the podcasts is useful to me.	3.56	1.14

Table 4

Mean scores and standard deviations of the confidence subscale.

No.	Item	M	SD
1	When I first listen to the podcasts, I had the impression that the lessons would be easy for me.	2.69	1.12
3	The material in the podcasts was more difficult to understand than I would like for it to be. (recoded)	4.53	.82
4	After using the podcasts, I felt confident that I knew what I was supposed to learn from the lessons.	3.59	1.03
7	Many of the podcasts had so much information that it was hard to pick out and remember the important points. (recoded)	4.12	1.06
13	As I used the podcasts, I was confident that I could learn the content.	3.58	1.15
19	The material in the podcasts was too difficult. (recoded)	4.69	.62
25	After using the podcasts for a while, I was confident that I would be able to pass a test on the material.	3.08	1.21
34	I could not really understand quite a bit of the material in the podcasts. (recoded)	4.47	.87
35	The good organization of the content in the podcasts helped me be confident that I would learn the material.	3.36	1.11

“I like the connection of hearing the instructor’s voice.”

“They feel like you are in the classroom with the professor.”

“Being online for all my courses, it was nice to actually hear a voice to go with the instructors’ names. It made the class feel like there really was someone else at the other end, not just a computer.”

“I appreciate being able to interact with my professor in this format. It’s a great way to ‘humanize’ them and make the online environment feel more like a regular classroom.”

“It adds a human-touch aspect to what might remain voiceless and faceless in this delivery medium.”

“Podcasts personalize the instruction.”

“Makes me, as a student, feel that the instructor is actively involved in the class.”

“The podcast gave me a sense of belonging to the class.”

Most media-related comments pertained to the convenience and flexibility of podcast files, and their ease of access and use. Others commented they were brief and had good sound quality. However, two users felt that the files were difficult to download, and one person had difficulties with paying attention while listening.

Examples of media-related responses:

“Easy access. You could use podcast any time and anywhere.”

“Easy to use ... can be reviewed if/when the student wants to.”

“The length of the podcasts – in the range of 4–6 min, allows them to be easy to listen to.”

Other comments were categorized as *not helpful* or *general*. There were seven responses that indicated the podcasts had not been helpful and four general comments.

Not helpful:

“Nothing. They did not help me.”

“Sorry but I really didn’t have any time for the podcasts.”

General:

“I really liked the podcasts.”

“More podcasts please!”

4.5. Research question 4

Participants were also asked to provide suggestions for the improvement of podcasts, and 82 students responded. Twenty-one individuals did not have any suggestions for improvements. Remaining responses were categorized into seven themes: content selection, length of files, inclusion of additional podcasts, use of video, access and development of files, or requests not to integrate them.

Thirteen individuals commented on content-related issues or instructional approaches such as including actual lectures, anecdotes or examples; making the files available before assignments are due; including a preview and review of materials presented; focusing on coursework; or allowing students to create them. Eleven students suggested shortening the files—to keep the files between 10 and 15 min, or under 10 min. Nine persons would prefer to have more videos or visuals included. The same number of participants demanded more podcasts; some individuals requested podcasts for every online course or each unit. Some learners were not sure how to access or use the podcasts; they would have appreciated better instructions. Others did not like to use iTunesU or would have preferred to have the files embedded in the course management system. Five participants made development-specific suggestions such as increasing the volume, planning or scripting the audio files, slowing down, or using the same file format for all files. The elimination of podcasts was suggested by five students.

Table 5

Mean scores and standard deviations of the satisfaction subscale.

No.	Item	M	SD
5	Completing the exercises in the lessons after using the podcasts gave me a satisfying feeling of accomplishment.	3.16	1.11
14	I enjoyed the podcasts so much that I would like to know more about this topic.	2.86	1.26
21	I really enjoyed studying the material in the podcasts.	3.11	1.18
27	The feedback from my instructor helped me feel rewarded for my efforts in using the podcasts.	3.06	1.24
32	It felt good to successfully use the podcasts.	3.45	1.31
36	It was a pleasure to use such well-designed podcasts.	3.33	1.22

4.6. Research question 5

Pearson correlation coefficients were generated to measure relationships between the four factors measured by the IMMS. Table 6 shows intercorrelation coefficients between all four subscales; all are statistically significant at the .01 level. Results indicate that the correlation between the attention and relevance subscales was the highest ($r = .860$) and the correlation between the confidence and satisfaction subscales ($r = .762$) was the lowest.

5. Discussion

5.1. Learner motivation and satisfaction

Based on the results, it can be determined that overall participants were motivated by the use of the podcasts that were integrated into their online courses. The confidence ($M = 3.76$) and attention ($M = 3.61$) subscale received the highest ratings of the four subscales which indicates that podcast users felt comfortable using the podcasts and believed they could learn the content provided by their instructors. Six questions on the confidence subscale had a mean that was greater than 3.5. Students, in general, were confident that they were able to understand the instructional content. It is important to note that five questions on the attention subscale exceeded a mean score of 3.5. Many students thought that the quality and structure of podcast files assisted them in gaining and holding their attention. However, because many of the students were relatively new to online courses and podcasting, these results could be attributed to a *newness* effect.

Five of the questions on the relevance subscale exceeded a mean of 3.5. Students agreed that the material delivered with podcasts was important and relevant. They liked the organization and presentation of information, and they took the use of the podcasts seriously. Many instructors used the podcast files as a supplement, perhaps to appeal to students with different perception modalities. One recommendation is to investigate how the podcast files were utilized by instructors in the online learning environment. Did they use them to introduce a unit or subject, present lectures, review content, conclude a unit, or provided assignment information? Did they present information with various media?

The satisfaction subscale received the lowest mean ($M = 3.13$). Even though none of the questions had a mean higher than 3.5, the conclusion is that students were moderately satisfied with the use of podcasts. However, the mean score on this subscale causes concern as student satisfaction can have an impact on motivation. Satisfaction may be influenced by how podcasts are developed and implemented in each course. Additionally, the length of files can impact a learner's level of satisfaction. One student, for example, mentioned the files were up to 1 hour long, and several participants commented that some of the podcast files were simply too long. Long files may require too much time to download, and may cause students to lose focus. Some suggestions for instructors are to remind and encourage students to utilize the podcasts (Keller & Suzuki, 1998), to create relatively short files, and to refer to information included in the files throughout the semester.

5.2. Effects of individual differences

Gender differences had an effect on attention and relevance factors. Females reported a higher level of attention and felt that the content presented in the podcasts were more relevant than males. These results are not surprising because males and females are inclined to have different preferences in learning (Wehrwein, Lujan, & DiCarlo, 2007).

The level of class standing can influence learners' motivation in all aspects based on the ARCS model. Seniors' motivational levels were significantly lower than that of graduate students. The relevance of the content in the podcasts appeared to be more important to graduate students. Not only did the podcasts gain their attention and make them feel confident in their learning process, but they were more satisfied with the use of podcasts in an online environment.

Learners' prior experience in the online learning environment influenced their levels of motivation. Learners who had a medium level of online experience, defined as 6–10 successfully completed online courses, felt more confident than students who had completed 11 or more courses. This result is surprising and warrants further investigation. Prior experience with podcast use alone had no effect on participants' levels of motivation as measured by the four subscales in this study.

When interaction effects of prior experiences with online courses and podcasts were evaluated, learners with a medium level of experience with online courses who had not previously used podcasts had a significantly higher level of confidence than learners who had a high level of experience with online courses and no experience with podcasts. Perhaps learners who have completed 11 or more online courses are not yet comfortable in using the podcasts because they may be used to more traditional methods; however, further research could provide answers as to why more experienced online learners were less confident.

5.3. Benefits and suggestions

The use of podcasts clearly assisted many respondents with their learning process. They appreciated the additional information provided in the podcasts, and it helped many of them to understand instructional content better or more quickly. For many, being able to listen to their

Table 6
Intercorrelations between the four subscales.

Subscales	Attention	Relevance	Confidence	Satisfaction
Attention	–	–	–	–
Relevance	.860*	–	–	–
Confidence	.796*	.815*	–	–
Satisfaction	.848*	.857*	.762*	–

Note. *Correlation is significant at the .01 level (1-tailed).

professor's explanation translated into more meaningful learning compared to only reading a textbook or discussing the material in discussion boards. These results communicate a powerful message to online instructors who may consider adding additional podcasts or implementing them in their courses.

Many participants indicated that the ability to hear their professor's voice made them feel more connected to him or her. They thought that this approach translated into a more *humanized* online learning environment. According to Inoue (2007) and many other researchers, learners who partake in online courses may experience feelings of isolation. In order for online students to connect with peers, instructors may consider providing an option for students to communicate with peers by creating and sharing their own podcasts with groups of students or the entire class. Lee, McLoughlin, and Chan (2008) who implemented group-based, student-generated podcasts in a campus-based course found that the process allowed for "the production of knowledge-creation discourse" (p. 513).

Podcasts can be used to deliver online instructional material for students to learn at their own pace and time (Boulos, Maramba, & Wheeler, 2006). Respondents specifically mentioned the convenience or flexibility that the use of podcasts provided. Learners enjoyed the podcasts' portability; they were able to download them to portable devices and listen to them while driving or completing day-to-day nonacademic activities. Of course, students who chose to learn online have mentioned convenience and flexibility as one of the major advantages of online learning (Bolliger, 2003). Not only do portable files add another level of convenience but it can provide online students with meaningful learning and add a human, social connection to their learning environment.

Based on students' recommendations, podcast files should be kept short in order to keep learners' attention and interests. Podcasts with visuals or video podcasts may assist students with understanding more complex concepts in addition to accommodate learners who have a preference for learning visually.

6. Conclusion

Some limitations to the study need to be pointed out. First, the study was conducted at one educational institution and the geographical area was limited. Second, students who were surveyed were enrolled in courses taught by different instructors. Therefore, researchers did not have control over the design, implementation, and utilization of the podcast files. Third, data collected with the survey instrument were self reported.

The total mean score of 127.5 indicates that participants were moderately motivated by the use of podcasts in their online courses. Results further indicate that students were mostly confident about grasping the material in the podcasts ($M = 3.76$), the podcasts gained their attention ($M = 3.61$), and instructional material was relevant ($M = 3.51$). Learners were moderately satisfied with the use of podcasts ($M = 3.13$). Therefore, the integration of podcasts in the online environment appears to be an appropriate instructional approach.

Learners perceived a number of benefits and offered recommendations to improve podcast files. These issues can assist practitioners in the design, implementation, and utilization of podcasts. Individual differences such as gender, class standing, and prior experience with online courses can affect student motivation. It would be beneficial for novices to either receive prior training in accessing podcasts or to provide them with good instructional resources in order to increase their levels of motivation. Further research is necessary to investigate how instructors implement and utilize podcasts in online courses. Researchers may include more than one survey site, courses that are delivered within different course management systems, and instructors who use different software programs to deliver podcasts.

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