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On-Demand Learning: Podcasting in an Introduction to Information Systems Course

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Abstract:

We live in an on-demand world where digital content can be consumed when and where we want. In this paper, we report on a project that used on-demand content consumption (i.e., podcasts) as supplemental material for higher education students. Each 5-10-minute podcast provides an overview of the assigned chapter readings. Our work makes several contributions. First, we discuss some implications of the current on-demand society on higher education. Second, we provide information regarding podcasting as a method for aligning learning with students' desires for on-demand media consumption. As part of this discussion, we demonstrate through a survey and download statistics how our low-cost initiative yielded sufficiently positive results to merit continuation. Finally, we detail the process of creating podcasts for our readers to replicate and adapt our initiative, including providing tips and discussing ways to adapt our process to other higher education courses.

Keywords: Podcast, On-Demand, Higher Education, Supplemental Learning Material.

1   Introduction

We live in an increasingly on-demand world. Do you need help changing your car tire? YouTube has video tutorials ready to go. Did you just decide to watch a late-night comedy movie? Plenty of options can be found on Netflix. Want to listen to a news podcast while you drive? Spotify has you covered. We now live in a world where content can be consumed when and where we want. With on-demand content consumption, users can consume the given content without regard to the location or time of the content provider. On-demand allows the user to consume at their own rate, with or without breaks, and multiple times. One might suppose the rise and success of these on-demand business models could be seen as an opportunity higher education would quickly pursue. However, academic institutions often suffer from institutional inertia and can be slow to break away from characteristics of the traditional educational model, such as synchronous, face-to-face (F2F) lectures as the main form of communicating the course material (Rowley and Sherman, 2001; Van Slyke et al., 2021; Kane & Dahlvig, 2022).

Many classes with a fully F2F (or in-person) modality might have online take-home assignments or projects; however, the subject content is still taught with live lectures. Supplemental material for such classes might include textbook chapters or distributing presentation slides. In this study, we focus on giving students supplemental, on-demand podcasts during a fully F2F course. Podcast episodes summarized key points from each textbook chapter and had the advantage of being available virtually any time and any place.

A podcast is a downloadable or streamed audio file that can be consumed at the convenience of the listener. Podcast channels typically post multiple episodes related to the theme of the channel. Their listeners usually access podcast episodes through podcast apps such as Apple Podcasts, Google Podcasts, and Podcast Addict, among others. Listens may also listen to the episodes through websites. Podcasts have been rapidly growing in today's culture (Sullivan, 2019). According to Edison Research (2022), there are 109 million regular podcast listeners in the United States in 2022.

Considering the rise in on-demand consumption[1] (particularly podcasts), higher education might be able to benefit by adapting to current consumption preferences. In this paper, we report on a project that used podcast episodes as supplemental material for college student learning. The podcasts, recorded by one of the professors of this project, summarize the main points of the student's textbook chapters – one 5 -10-minute podcast episode per chapter. Students in a junior-level information systems (IS) course were encouraged to listen, though not required. The results help shed light on student usage and opinions. Our implications are useful for instructors who seek to improve student learning.

Our goal with this paper is to demonstrate viability, not test specific theoretical claims, although our implementation of podcasting does align with some communication and learning theories. More specifically, the following question guided our activities:

Are podcasts viable learning activities in introductory information systems courses?

We do this through a multi-term trial of the use of brief podcast episodes as supplemental learning activities in introductory information systems courses and through a survey that captured students' perceptions of the learning and exam preparation of various learning activities, including the podcast. We also collected qualitative data through open-ended questions. Further, we seek to provide sufficient information to enable similarly interested information systems faculty to consider and perhaps implement podcasting in their own courses.

The rest of this paper is as follows. First, we provide a background on on-demand and podcasting. Then we provide information relevant to the case study's design, motivation, and workflow to give our readers guidance on replicating our efforts in their class. Then, we present our results from a questionnaire survey. Finally, we provide discussion and implication suggestions that result from our study.

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[1] Our use of "consumption" here should not be construed to mean that we consider students to be consumers in the marketing sense. Rather we use "consumption" to be limited to consuming content, which applies to students.

2   Background

2.1   An On-Demand World

"On-demand" refers to being able to have one's wants or needs met immediately (Taylor, 2018). People can consume a variety of products from an on-demand provider. For example, video-on-Demand (e.g., YouTube or Netflix) allows one to stream the available videos on the platform (Huang et al., 2007). Media on-demand is a more complex and updated generation of video-on-demand where consumers can not only watch videos but engage in interactive games and access data or other multimedia content. Even the workforce has on-demand options for employees. On-demand service providers (e.g., Uber or DoorDash) help consumers in need of a service to have their needs met by another individual agent (Taylor, 2018). That individual agent can log in or out of their work app at any time. On-demand learning platforms are also becoming popular, ranging from informal learning materials available on YouTube and other video platforms to more formal platforms such as Coursera, EDx, and Udemy.

On-demand digital content can be distributed and consumed without the need for synchronized time and location. While post-play delivery is not new (e.g., music has been stored on vinyl records since the 1950s, and books have been printed and distributed for centuries), instant access to content cuts down on the delay of content distribution significantly. The convergence of broadband Internet, highly capable mobile devices, mobile payment systems, and other technologies have led to a rapid rise in on-demand services ranging from media consumption to ride-sharing services. Unfortunately, higher education has not fully embraced this trend, although asynchronous courses do have elements of on-demand learning. Content-focused on-demand services models typically use a client-server-type network relationship where the content is saved on an accessible server, and the client requests the content through the Internet. Napster's Rhapsody was among the first to offer a file-sharing system where users could stream music from a large digital library on demand (Ghosemajumder, 2002; Rayna & Striukova, 2016). Since then, other competitors, such as Spotify and Apple Music, among others, have joined the movement.

Several factors characterize what we mean by "on-demand" digital content. First, the content is consumed at the point in time the consumer wants to view or listen to the content. There is no need to download the content in advance as long as one has Internet access (although content can be downloaded for later consumption.) Second, the content may be accessed and consumed at any location that has proper Internet access. Taken together, on-demand content is largely free from temporal or spatial limitations. In addition, some on-demand content allows reuse; once the relevant file is downloaded, the file can be accessed locally, even without an Internet connection (although some on-demand services are streaming only and therefore require an Internet connection). Many on-demand services are multi-platform and allow access from virtually any device. Some even synch across devices so that a user can switch devices without having to restart content.

These characteristics are especially important with respect to podcasting in education. We discuss these and other aspects of podcasting in the next section.

2.2   Podcasting

Podcasts are downloadable audio files, often in an MP3 format, that are distributed through a really simple syndication (RSS) feed. To create a podcast, one must use a host that serves podcast episodes to apps and websites via the RSS feed (Cridland, 2022). Although podcasters can self-host, most use commercial hosts. Popular hosts include Anchor, Blubrry, Buzzsprout, and Libsyn, among many others. Once the podcast's file is created and edited, it is uploaded to the host and distributed through the RSS feed.

Podcasting's popularity has steadily grown since its introduction in 2003. As of January 2022, one-third of all Americans listen to podcasts regularly, with 41% having listened to a podcast within the last month (Brooke, 2022). An estimated 177 million Americans have listened to at least one podcast episode, and almost 226 million are familiar with podcasting (Edison Research, 2022). However, podcasting is still in its early stages. Currently, only 5% of the total time Americans spend listening to audio content is spent listening to podcasts (Edison Research, 2022). The number of podcasts has proliferated, with over 1 million new podcasts launching in 2020 (Listen Notes, 2022). However, less than 20% of the almost 2.5 million podcasts in existence have released an episode in the last ninety days (Podcast Industry Insights, 2022).

Podcast consumers are motivated to listen to podcasts primarily for entertainment or to seek information. Moreover, podcast consumption is done either by intentionally selecting and actively listening (to acquire information) or with habitual, ritualized consumption (multitasking or pastime) (Chan-Olmsted & Wang, 2022).

There are relatively low barriers to entry for podcast publishing, which might also support the rise of podcast episodes available today. It is possible to produce podcast episodes with little more than a smartphone or tablet. Even something as simple as a voice memo app can be used to create podcast episodes. Although one can produce substantially higher-quality audio with better equipment, such equipment is not required. Although audio quality may not be high, it is relatively easy to create a file that is of sufficient quality to be understood. Audio editing software, while not strictly required, can improve quality. There is a wide range of affordable audio editing software available. Some quality editing software is available for free (e.g., Audacity) or comes with popular operating systems, such as Garage Band for Apple devices. Knowledge of audio engineering may improve sound quality but is not necessary.

Podcast hosting services make setting up the necessary RSS feed and submitting that feed to popular podcast apps straightforward. However, these services are not strictly required. It is possible to set up your own RSS server. Most podcasters find it useful to use a specialized hosting service, however. Finally, creating course-related podcast episodes does not require a large time commitment, especially when one is already familiar with course content. In addition, many episodes are highly reusable, so investments in time and effort can yield ongoing returns.

Although there is relatively little information systems research regarding podcasting, there does seem to be a growing body of such research. For example, Anton et al. (2022) examined how podcasts are increasingly popular as a means of communicating information systems viewpoints and identity. In addition, some IS researchers have discussed the usefulness of podcasts for auditory learners (Gupta & Chen, 2022). There is also increasing interest in podcasting in the context of information systems education (Marx & Mirbabaie, 2021), although such research is still rare. Although not a theoretically-grounded research project, this paper is directed at adding to the body of research into podcasting in IS education.

Podcasts can offer several advantages if implemented in education. The on-demand nature of listening to a podcast allows students to consume podcast content at virtually any time or place they find convenient. So they can listen while commuting, exercising, or engaging in other activities. All they need to access the podcasts is a smartphone, so the barriers to entry for listeners are low. Further, many students already consume audio using online services. Even more, typically, students are already listening to audio files using their mobile devices, so listening to podcasts requires minimal effort or learning. (Time requirements are discussed in more detail later in the paper.)

2.3   Podcasting in Education

Universities are increasingly turning to instructional podcasts (Drew, 2017b), which is not surprising since podcasts appeal to younger, tech-savvy individuals (Wrather, 2016), such as college students. Prior research indicates that students primarily use podcasts for three main reasons, 1) to supplement their learning, 2) to have more control over when they engage in the material, and 3) to catch up on any missed classes (Kay, 2012). Students find it beneficial to listen to course-related podcasts when preparing for assessment activities (Lonn & Teasley, 2009; McKinney et al., 2009). Usage data support this thinking; students listen immediately before exams in order to prepare for tests (Copley, 2007). Such usage can improve performance and reduce text anxiety (Traphagan et al., 2010). Students also go back and relisten to discussion if they did not fully understand the first time (Hew, 2009), allowing them to take better notes (Copley, 2007; Traphagan et al., 2010) or self-check their understanding. There are also reports of students using podcasts to actively prepare for class prior to attending lecture sessions (Bennett & Glover, 2008). Further, the podcasts offer a different approach to studying, which might better fit one's preferred learning style (Fernandez et al., 2009); compatibility with learning styles is shown to be a significant predictor of student performance and satisfaction (Clary et al., 2022).

The asynchronous nature of podcasts gives users more flexibility as to when they can listen; podcasts allow individuals to control when, where, and how they consume the content (Prakash et al., 2017; Drew, 2017b; McNamara & Drew, 2019), which frees listeners from the "tyranny of the schedule" (Berry, 2015). This has been referred to this as time-shifting (Muppala & Kong, 2007) and is a primary motivation for using podcasts (McClung & Johnson, 2010; Prakash et al., 2017; Drew, 2017b; McNamara & Drew,

2019). The asynchronous nature of podcasts enables students to take notes at their own pace (Copley, 2007). Furthermore, podcasts provide important affordances that allow flexible and self-directed learning, such as the ability to regulate when and how students listen to the content (McNamara & Drew, 2019). Having more flexibility in how the material can be consumed can maximize cooperation among the learners (Faramarzi et al., 2019).

Having teaching learning materials available at home allows students to catch up if they miss class (Lonn & Teasley, 2009; Lewis & Francis, 2020) and can also be used to review material (Lewis & Francis, 2020). Podcasts can also serve as primers for upcoming lectures (Popova et al., 2014). Students find podcasts useful for making up missed coursework (Dupagne et al., 2009; Lonn & Teasley, 2009; Pilarski et al., 2008; Traphagan et al., 2010; Chung & Kim, 2015; Marunevich et al., 2021), although instructor fears over students using the existence of a course-related podcast as an excuse to skip lectures seem unfounded (Lewis & Francis, 2020). Using podcasts to acquire course material in lieu of attending class may increase class absences, so podcasts may be best utilized as an extracurricular, complementary tool – not a replacement tool (Fernandez et al., 2009; Ljubojevic et al., 2014). Of course, as is the nature of optional learning activities, some students will opt out of using the podcast, but some will take advantage of the additional learning opportunities offered by a course-related podcast (Hew, 2009). When podcasts are viewed as overly long, or when students are already experiencing work overload or face significant distractions in their home learning environments, they are less likely to utilize course-related podcasts (Chin et al., 2017; Fernandez et al., 2009; Matava et al., 2013). Further, students will not listen if they think the content of a podcast is irrelevant (Dupagne et al., 2009; O'Bannon et al., 2011) or if students feel disengaged with the material (Van Bergen, 2014). Students who do engage with course-related podcasts have experienced positive learning effects (Chin et al., 2017), especially when the material is broken into smaller chunks conveyed in relatively short podcasts (Ljubojevic et al., 2014).

The format of learning-oriented podcasts varies from short, "quick-burst" podcasts to long, "narrative" podcasts and conversational, "chat show" podcasts (Drew, 2017a). Short, focused podcasts are particularly effective as learning aids (Tam, 2012; Drew, 2017a; Drew, 2017b; Prakash et al., 2017; Ridell et al., 2017; De Gagne et al., 2019). The shorter duration appeal to busy learners and are ideal for learning warm-ups, summaries of key material, and allowing students to re-engage with course material (Drew, 2017b).

Some faculty have employed student-led podcasts to help students engage in self-reflection or improve their communication skills (Armstrong et al., 2009; Rajpal & Devi, 2011). Further, podcasts can serve as a means of engaging students (Drew 2017b) and can help students improve their understanding of course material (McKinney et al., 2009; Prakash et al., 2017; Ridell, 2017; De Genge et al., 2019). Empirical evidence indicates that educational podcasts even affect clinical practice among medical residents (Ridell et al., 2017). Online videos are sometimes used to supplement learning activities in much the same way podcasts are employed (Sadeghi & Ghorbani, 2017). Overall, the existing literature suggests that podcasts can provide an innovative, convenient, and effective learning tool (Kazlauskas & Robinson, 2012).

These findings align with theoretical expectations. For example, media synchronicity theory (MST) (Dennis et al., 2008) posits that the extent to which the information transmission and processing requirements of a communication medium matches the needs of the communication task influences the use of the medium and the performance of the communication task. There are two fundamental communication tasks: 1) conveyance, which involves the transmission of new information that allows the receiver to create or revise mental models, and 2) convergence is communication to reach agreement on the meaning of information. Conveyance is focused on individual understanding, while convergence is a process of shared sensemaking (Dennis et al., 2008). Class lectures and textbooks are largely concerned with conveyance; lecturers or textbook authors are trying to convey information to students. (Convergence can also occur in class discussions.)

Convergence benefits from rapid communication, as is possible with synchronous media. In contrast, synchronous communication may be a detriment to conveyance because the rapid nature of synchronous communication does not allow for deeper information processing, which is essential to conveyance (Dennis et al., 2008).

Asynchronous media is better suited to conveyance tasks because asynchronous communication facilitates information processing and reprocessing (Dennis et al., 2008). When an individual receives information, they must process that new information by creating new mental models or adjusting extant

models in order to create relevant meaning from the information. Such deep information processing is more challenging with synchronous media due to its typical rapid back-and-forth. Further, asynchronous media allow for greater reprocessability, which occurs when one reexamines a message. Reprocessability impacts information processing by allowing more time to make sense of information conveyed in a particular message and by enabling an individual to revisit prior information. This is especially important when the information being processed is novel, complex, or large in volume (Dennis et al., 2008), as is often the case with class material. Effective instruction requires allowing cognitive processing directed at making sense of information received through instruction and also requires integrating incoming knowledge with existing knowledge (Mayer, 2008).

As an asynchronous medium, podcasting is well suited to conveyance tasks. Students have the ability to pause the audio if they need more time to process the information being conveyed. Podcasting also facilitates reprocessability since it is easy for a student to rewind the audio to relisten to a portion of an episode or even to replay entire episodes. Although we are not testing MST in this paper, the theory supports our contention that podcasting can enhance understanding.

The cognitive theory of multimedia learning (CTML) (Mayer & Moreno, 1998; Mayer, 2008; McNamara & Drew, 2019) also provides theory-based support for using podcasts to convey course material. Although CTML was developed to better understand multimedia learning, it has been applied to educational podcasting (McNamara & Drew, 2019). Our approach to course podcasting aligns well with the relevant aspects of CTML. CTML emphasizes reducing extraneous information, highlighting essential material, and segmenting material into manageable segments (McNamara & Drew, 2019). As discussed below, our podcast episodes align with these principles. The episodes are short (less than 10 minutes) and focus on essential elements of each chapter. They also are organized into manageable segments through the organization by chapter. In summary, the design of our approach to using podcasts aligns with guidance derived from these theories.

3   Case Study – Podcasting as a Learning Supplement

3.1   Motivation

Widespread anecdotal reports indicate that many students are not inclined to read assigned textbook chapters. There is some empirical evidence to support this thinking. Gammerdinger and Kocher (2018) found that, on average, approximately 12% of students reported reading all assigned chapters prior to lectures, and only 54% indicated that they read none of the assigned readings prior to the associated class session. Another study found that only approximately 25% of students read assigned materials prior to class, and 62% of the students surveyed spent one hour or less on assigned readings (Baier et al., 2011).

This largely matches our experiences when teaching introduction to information systems classes. So, we created the podcast to provide a convenient way for students to supplement the material covered in the textbook. Although the textbook we use was designed in a way that encouraged student reading (e.g., short chapters with numerous visuals and activities to break up the text) and generally received positive reviews from students, we tend to believe the common thinking that college students are generally averse to reading textbooks (Clump et al., 2004; Hoeft, 2012; Russell et al., 2023; Ryan, 2006). So, in an effort to encourage a more convenient way for students to consume the most important elements of each chapter, we decided to create a podcast. We repeatedly emphasized that the podcast episodes were supplements to the reading and lectures, not replacements. Our thinking was that something was better than nothing, so even if students listened to the podcast rather than reading the text, they at least got some exposure to the material beyond the lectures.

4   Viability of Podcasting in IS Education

In this section, we provide statistics related to the podcast. We initially tested the podcast concept in a single section of the 300-level introduction to information systems course at an AACSB-accredited business school at a mid-sized university in the southern United States. The course is a part of the business core and thus is a required class for all business majors, although a small number of non-business majors also take the course. The podcast was well received, so we rolled it out to other sections of this course and to sections of a 100-level course that uses selected chapters of the same textbook as that used in the 300-level course. Unless otherwise noted, the data presented here encompasses the

entire academic year in which the podcast was launched and utilized. We include download statistics and results from a survey.

4.1 Overview

As an initial test of the viability of podcasting in IS courses, we conducted a small pilot test. The pilot test occurred in one section of the 300-level introduction to information systems course. Fifty-three students were enrolled. The course was taught face-to-face. Most students (37) were business majors. There were twenty-one class sessions, each lasting an hour and 50 minutes. Fourteen of the class sessions consist of lectures, with the remaining sessions being intermediate-level hands-on Excel labs or exams (a midterm and a final exam). The course applications-focused 100-level course mentioned earlier was a prerequisite for the 300-level course. See Table 1 for an overview of the conceptual topics covered in the pilot test class. Podcast episodes were created for all conceptual topics resulting in 16 episodes. Grades were made up of quizzes (14%), online assignments (14%), labs (14%), two Excel projects (29% total), and two exams (29% total). Listening to the podcast was encouraged but not required and therefore was not included as a graded component of the course. Given prior research, we implemented short episodes (between five and ten minutes long) since shorter podcast episodes seem to be effective learning aids (Prakash et al., 2017; De Gegne et al., 2019) and are generally preferred by students (Tam, 2012; Drew, 2017a; Drew, 2017b).

Feedback from the pilot test indicated that students found the podcast useful both in learning course material and preparing for classes. (We discuss the results in more detail later.) Because of the initial success, coupled with the minimal effort required to the podcast episodes to other classes, we decided to expand the project by providing the podcast to instructors of subsequent sections of the introductory course and of the application-focused course. The only effort involved in doing this was for the faculty members to put information about the podcast on their learning management system sites and to encourage students to listen. The episodes already existed, so there were no additional costs related to production.

We intended the podcast to provide a convenient way to reinforce important points from each textbook chapter. (Two appendices were also covered.) Episodes ranged from 5 minutes and 10 seconds to 9 minutes and 42 seconds. Length generally followed the complexity of the material contained in the corresponding chapter.

The instructor did not track whether individual students listened. This lack of tracking was purposeful; it emphasized the voluntary, supplemental nature of the podcast. To ensure that no individual tracking was possible, we decided not to post links to episodes on the learning management system course site. We suggested that students listen to the relevant podcast episode prior to each lecture and then again when preparing for exams. Brief, casual reminders of the podcast were given approximately weekly.

4.2 Download Statistics

The hosting platform provides comprehensive statistics regarding downloads. In this section, we report and comment on some of these statistics. With the exception of Figure 1, statistics and comments mentioned in the paper came from all sections and terms.

As shown in Table 1, sixteen episodes were created. The multi-line border shows the breakdown of material covered before and after the midterm exam. The final exam was not comprehensive. The mean number of downloads per episode was approximately 181, although there was considerable variation across episodes. The podcast is available to the public. As a result, we cannot be sure that all downloads were from students in the course, but it seems reasonable that the great majority of the downloads were from students. If a student listened to an episode multiple times from the same device, it was only counted as one listen. However, if the student used multiple devices to relisten to an episode, it would count as an additional listen.

As Table 1 indicates, the downloads varied considerably across episodes during the time of the study. One episode (Chapter 2) has more than twice the number of downloads of any other episode. This chapter provides foundational knowledge, so it is possible that many students found it valuable to make sure that they understood this material well.

Table 1. Episode Topics and Downloads

Chapter	Topic	Plays
Ch. 1	Value of Information	215
Ch. 2	Introduction to Information Systems	550
Ch. 3	Evaluating Information	121
Apx. A	Computer Hardware	190
Apx. B	Computer Software	141
Ch. 4	Gaining Strategic Value from Information	252
Ch. 5	Storing and Organizing Information	214
Ch. 6	Analyzing Information for Business Decision Making	183
Ch. 7	Transmitting Information	138
Ch. 8	Securing Information	132
Ch. 9	Protecting Information Privacy and Confidentiality	110
Ch. 10	Developing Information Systems	132
Ch. 11	Information-Based Processes	92
Ch. 12	Enterprise Information Systems	104
Ch. 13	E-Business	91
Ch. 14	Knowledge Management and Decision Support Systems	226
	Total Plays	3,098

We were surprised to find that only 43% of downloads came from the United States. Upon reflection, however, it is possible that the use of VPNs distorted this figure. The state in which the university is located accounted for 19% of downloads. Listeners overwhelmingly preferred listening on mobile devices. iOS accounted for 67% of downloads, and 24% came from Android devices. Only 9% of downloads came from computers and other devices (such as smart speakers).

Figure 1 shows the number of plays for each week of the academic term included in the initial test[2]. Unsurprisingly, there was a notable increase in the weeks of the midterm and final exams. This pattern leads us to believe that most downloads came from students.
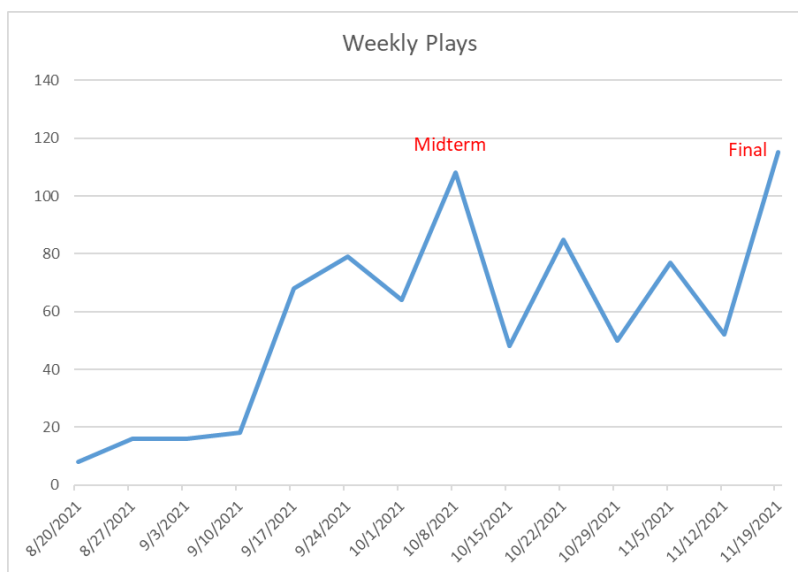
Figure 1. Episode Play Statistics for Pilot Test Term (Fall 2021)

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[2] We focus on only one term to better isolate the effects of the exams. In subsequent terms, multiple sections with different exam schedules used the podcast.

Overall, we were pleased with the podcast pilot test. Although there was a non-trivial amount of effort in creating each episode, the episodes can be reused, at least until a new textbook edition is released. So, deploying the podcast in later academic terms requires minimal effort. So, we concluded that the utilization by students was sufficiently high to justify continuing the project. Because of this, we decided to expand the project to other sections of the introductory course and to make the podcast episodes available through the textbook publisher's website. In the remainder of the paper, "extended" refers to the terms that followed the pilot study. The extended rollout included sections taught by additional instructors. The survey discussed in the next section allowed us to evaluate the podcast project across academic terms.

5   Survey

To assess the podcast project, we conducted a survey during the 2021-2022 academic year. The survey was limited to students enrolled in introductory IS sections at our university. The survey asked students their perceptions of the extent to which learning resources (including the podcast) were helpful in learning the course materials and preparing for exams. We also asked students whether they listened to one or more podcast episodes. We identified the term in which the student took the survey through the survey completion date. Survey completion was optional. Students received a small amount of extra credit for completing the survey. The survey was approved by the university's human use committee. Of the 106 students who completed the survey, 74 (71.7%) listened to at least one podcast episode. Demographic data are provided in Table 2. The gender of the respondents was skewed towards men (70.7%). The distribution of class status was as to be expected, with the vast majority of the students being sophomores, juniors, or seniors. Only 0.94% of the respondents were computer information systems majors, and 25.59% held majors outside of the business school.

Table 2. Demographic Information

Characteristic	Count	Percentage
Gender		
Female	30	28.30
Male	75	70.76
Not reported	1	0.94
Class		
Freshman	12	11.32
Sophomore	26	24.53
Junior	37	34.91
Senior	30	28.30
Graduate	1	0.94
Major		
CIS	10	9.43
Other business	71	66.98
Non-business	25	23.59

Tables 3 and 4 show the extent to which students found each learning resource useful for learning course material (Table 3) and preparing for exams. These results include data from all 106 participants and are also provided by academic term. Data are provided for the pilot term, the extended rollout, and the full survey. Items used a five-point ranging from "not useful at all" to "extremely useful."

Table 3. Perceived Value for Learning Course Material

Value - Learning	Pilot	Extended	Overall
Podcast	4.022	2.754	3.292
Lectures	4.133	4.311	4.236
Labs	4.756	4.328	4.509
Textbook	3.689	3.295	3.462

Table 4. Perceived Value for Exam Preparation

Value - Exams	Pilot	Extended	Overall
Podcast	3.956	2.590	3.170
Lectures	4.089	4.295	4.208
Labs[3]	3.200	3.525	3.387
Textbook	4.067	3.590	3.792

These statistics indicate that students generally found traditional learning materials more useful than the podcast, although the mean of the responses for both podcast items was slightly above the scale midpoint. Students in the pilot test viewed the usefulness of the podcasts more favorably than students in the extended rollout. We provide some potential explanations for these differences in the discussion section.

Tables 2 through 4 present data from all students, regardless of whether they listened to one or more podcast episodes. Students who never listened to the podcast based their responses on previously held notions of learning through podcasts. So, we analyzed data from those who did listen to at least one episode separately. These students had first-hand experience with the podcast and its learning benefits. These results are shown in Tables 5 and 6.

Table 5. Perceived Value for Learning Course Material (Listeners only)

Value - Learning	Pilot	Extended	Overall
Podcast	4.256	3.286	3.797
Lectures	4.231	4.429	4.324
Labs	4.744	4.343	4.554
Textbook	3.795	3.486	3.649

Table 6. Perceived Value for Exam Preparation (Listeners only)

Value - Exams	Pilot	Extended	Overall
Podcast	4.256	3.114	3.635
Lectures	4.128	4.486	4.297
Labs	3.103	3.514	3.297
Textbook	4.154	3.829	4.000

Once again, the value of the podcast was reported to be similar for learning course material and exam preparation. However, students who had first-hand experience with the podcast found it considerably

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[3] Questions specific to the labs were not included on exams, although the lab activities did help reinforce some material that was covered by the exams.

more useful for learning and exam preparation than those who had never listened. Students in the pilot test were more favorable toward the podcast than the students in the extended rollout.

We also computed t-statistics, comparing listener and non-listener mean values for perceived value for learning course material and for exam preparation. (See Table 7.) Unsurprisingly, there were significant differences with respect to the podcast (p < 0.001), but listeners also found the textbook to be more valuable for learning course material (p = 0.020) and exam preparation (p = 0.012) than non-listeners. Interestingly, listeners were also more favorable towards the textbook, although listeners and non-listeners did not vary in their perceptions of lectures or labs.

Table 7. Differences Between Listeners and Non-Listeners

	Mean – Listened	Mean – Didn't listen	t-value	p-value*
Learning				
Podcast	**3.80**	**2.13**	**6.977**	**< 0.001**
Lectures	4.32	4.03	1.836	0.069
Labs	4.55	4.41	1.028	0.306
Textbook	3.65	3.03	2.369	0.020
Exams				
Podcast	**3.64**	**2.09**	**5.540**	**< 0.001**
Lectures	4.30	4.00	1.437	0.154
Labs	3.30	3.59	-1.099	0.274
Textbook	4.00	3.31	2.550	0.012
*Note: - 2-tailed				

Overall, we are satisfied with these results. As we will discuss later, the time and effort required to create the podcast are relatively low, given that the same episodes can be used across sections and terms. So, even if some students do not find the podcast useful, we found the benefits to other students to more than justify the costs of creating the podcast.

The survey also included two open-ended questions, one asking students who listened to one or more episodes how they used the podcast to learn course material or prepare for exams, and one asking those who did not listen why they chose not to listen. Survey branching was used to ensure that students could only answer the appropriate question. We present our analysis of the open-ended responses in the following subsection.

5.1 Open-ended Response Analysis

The end of the survey had open-ended questions asking how the podcasts were used, why they did or did not listen to the podcasts, and compared the learning value of the podcast to other learning materials and activities. The student responses to these questions shed light on the diversity of student preferences and learning styles. Some comments suggested a time change for the course offerings. While the course offering times are often out of the control of the professor due to the college's scheduling of classes, on-demand learning supplements can be consumed at any time. Podcasts are accessible at any time the student prefers to prepare for class or study for their exam.

We noticed a consistent preference for diversity in learning modalities. Student suggestions for improving the course included more labs and activities instead of "just lectures every day." Students mentioned too long lectures made it hard to stay focused on the materials. Even some comments jokingly mentioned more personal finance advice (as one professor would offer personal finance tips for a cognitive break during class) and appreciation of the mid-lecture pet pictures (another professor's use of cognitive breaks). Offering supplemental podcasts that the students can access outside of class might meet their preference of too long lectures, taking a cognitive break when needed, or even continuing through without a break if not needed.

These comments about more assignments and labs might also be due to a difference in learning styles. For students that did not listen to the podcasts, there seemed to be two main reasons: unmotivated (e.g., claiming they did not know about them despite frequent reminders, would simply forget, or technology barriers) or they simply preferred not to. Those that preferred not to would mention they would prefer to read the slides or textbook or watch the lecture. This audio-only method simply did not match their preferred learning style. In addition, it was clear that the podcast was intended as a supplement to the other learning materials. So, these students simply may feel that listening to the podcast would not be

necessary. Interestingly, only two students mentioned a lack of time as the reason for not listening to the podcast.

Interestingly, several students provided suggestions about the pace of the class. For example, one student's response read, "…covering the slides faster because is not information difficult to understand." Others offered similar advice about speeding up the pace of the course. Conversely, some students recommended slowing the pace of the class down. One comment read, "…not everyone understands as quickly as you teach." These diverse suggestions highlight the different learning paces of students in the same classroom. Having on-demand complementary resources would be able to assist students who learn at a slower pace. A podcast would allow a student to pause or even rewind and relisten (which we also saw in the comments) to certain aspects they have difficulty understanding.

The responses to how the podcasts were used show diversity. Students sometimes chose to listen to the podcast in the background while they were multitasking. Others listened to the podcasts with their full attention and would take notes or create an outline for the chapter. Some would use the podcast before attending the lecture, while others might choose to listen before the exam.

6   Discussion and Lessons Learned

Overall, we are satisfied with our results, although we wish more students had taken advantage of the podcast. In this section, we discuss the implications of our project and present some lessons we learned along the way.

6.1   Discussion

The overarching finding from our project is that class-oriented podcasts can serve as a useful supplement to traditional learning activities, but only for students who actually listened to the podcast (unsurprisingly). So, it seems that encouraging students to listen is important to helping them leverage the learning value of the podcast.

We saw noticeable differences in the extent of listenership across the different academic terms. We suspect that this may have been because the individual who recorded the podcast was the instructor for the pilot study, but others were the instructors for subsequent courses that used the podcast. It may be that for some students hearing the voice of their professor on the podcast was conducive to perceiving the podcast as an important aspect of the course. It is also possible that the students were simply being nice and decided to listen as a perceived favor to their professor. There is some evidence that students are more motivated when an instructional podcast comes from their own instructor (Lewis & Francis, 2020). In addition, it may be that the initial instructor, as the creator of the podcast, emphasized the value of listening more than the instructors of later courses.

The value of the on-demand, highly accessible nature of the podcast was clearly indicated in responses to our survey's open-ended questions. We can also surmise that the low-effort, relatively passive nature of podcast listening was important for some students. This is an interesting finding. There is considerable interest in active learning, with good reason. Active learning has consistently been shown to be effective in helping students achieve learning outcomes. However, our experience indicates that there is also value in more passive learning activities that act as a supplement to core learning activities. We do not have objective data on whether listening to the podcast improves learning, but we believe that even if the gains are modest because the effort required to listen is low, even a small learning gain may be worth the effort.

It is possible, however, that listening to the podcast is a bit of a "rich-get-richer" phenomenon with respect to learning. It is certainly possible that students who listened were highly motivated to begin with and thus were willing to engage in optional learning activities. Regardless, given the relatively low cost of producing podcast episodes, we believe that some faculty may find producing their own podcasts worthwhile, even if the content is only consumed by already-motivated students.

The larger point, however, is that there seems to be a place for on-demand learning content beyond asynchronous online courses and video tutorials. The chapter summary podcast is a relatively high-return endeavor for students who listened and is a relatively low-cost project for interested faculty. Our results indicate that students who listened found the podcast more useful than the textbook for learning course material and more useful than any other learning activity studied for exam preparation. The on-demand, any-time, any-place, low-effort features of podcasts make them well-suited as a supplement to more traditional learning resources that takes advantage of students' existing content consumption practices.

That being said, we recognize that some faculty may want to "test the waters" by producing a small number of audio files and making them available via a learning management system. This can be as simple as using a smartphone voice recorder app to explain a confusing concept or topic. Although this may not fit the strict definition of a podcast, such resources may enhance student learning with minimal instructor effort.

Although we found instructional podcasting to be well worthwhile, we acknowledge that this may not be the case for everyone. A variety of factors affect the suitability of instructional podcasting, including characteristics of the instructor, the course, and the institution. We were fortunate in that our university and college were supportive of our efforts to innovate through instructional podcasting. In addition, the lead author (who created the podcast) already had basic knowledge of podcast production, which reduced the learning curve. Further, the course contained substantial conceptual material, which was compatible with conveying information via an audio-only medium. Finally, the COVID-19 pandemic not only increased awareness of podcasting but also caused students and faculty to be more experienced with digital, asynchronous learning materials. We urge faculty who are interested in instructional podcasting to consider how their particular context may affect the suitability of the medium.

6.2 Study Limitations

Our intent in this paper was to demonstrate the viability of using an instructional podcast as a supplemental learning activity in introductory information systems courses. While we do draw on two theories, we do not make any theoretical claims, nor do we attempt to test any conceptual relationships. We acknowledge that this is a limitation of our research and an opportunity for future research. In addition, we demonstrated viability through implementation in a single university and within a business school. There may be institutional differences in how instructional podcasting is viewed, and future research should consider this possibility. In addition, it is possible that some university students are less technologically savvy than the students in our study. Although prior research indicates that podcasting is a useful learning tool across a variety of disciplines, ranging from music (Tam et al., 2012) to health professions (De Gagne et al., 2019), future research should compare perceptions of podcasts and their effectiveness across disciplines.

7 Tutorial: Creating a Course-Related Podcast

Creating a true podcast requires creating an RSS feed and securing an accessible storage location for the episodes. The podcast is typically submitted to numerous podcast apps, such as Apple Podcasts, Google Podcasts, and Spotify, among others. Fortunately, podcast hosting services make most of this simple by creating the RSS feed and facilitating the submission to the most popular apps. Many podcast apps draw their listings from Apple Podcast, so it is relatively easy to make a podcast available on a wide array of apps.

Although a strict definition of the term "podcast" includes distribution via an RSS feed, the audio file is simply a standard format file (MP3) that can be stored and distributed in any manner that an instructor finds appropriate. For example, an instructor may decide to restrict access to the audio files by storing them within a learning management system or other restricted environment. Although such an approach would still bring the bulk of podcasting's educational benefits, access would be less convenient for students as it would be more difficult for them to access and play the files through their normal podcast apps. However, distributing via a restricted environment avoids having to locate and learn how to use a hosting service. Ultimately, individual instructors must weigh the relative costs and benefits of either approach. In the description that follows, we follow the RSS approach, but our approach can easily be adapted to a more restricted distribution environment.

The actual process of setting up a podcast is typically made straightforward by podcast hosting services. Essentially, an account is created with the hosting service, a name is chosen, and a description of the podcast is entered. Cover art also needs to be created. This is not complicated using freely available tools such as Canva.

Each episode consists of an audio file (MP3 format), which is created in an audio recording application. Even a voice memo smartphone app can be used to create a suitable file. After creating and editing[4] the

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[4] Editing is not required but is often done to improve quality.

episode, the MP3 file for the episode is uploaded to the host along with a title, cover art, and description, although the description is not required. An episode can either be released immediately or scheduled for later release. Once released, the RSS feed distributes the episode to the podcast listening apps, and the episode appears in the apps.

A wide range of podcast hosting services exist. Although the MP3 files can be hosted on any appropriate server, podcast hosts provide other services, such as distributing the RSS feed to various podcast player apps. Some podcast hosts have limited free tiers, and at least one (Spotify for Podcasters, formerly Anchor.fm) is completely free regardless of the volume of episodes. Paid hosts often limit the length of episodes that can be uploaded each month, with free tiers being rather limited. However, even paid tiers are not particularly expensive. For example, Libsyn, which was the first commercial podcast host, charges $5 (USD) per month for up to three hours of uploaded audio each month.

Only minimal equipment is required to record a podcast. In fact, the entire process can be completed using a smartphone. Today's modern smartphones often have surprisingly high-quality microphones, so there is no need to purchase expensive equipment. Of course, better equipment can lead to better quality audio, but even something as simple as a gaming headset can produce adequate quality. Free software such as Audacity and Garage Band (for Apple devices) can be used to create and edit the audio files. While there is a learning curve associated with editing audio, basic editing is not especially difficult to learn.

The setup for the course podcast is more elaborate than the minimum requirements noted above. However, we spent less than $200 (USD) on dedicated hardware (a microphone and quality headphones) to produce excellent sound quality. We recorded each episode on a Windows 10 P.C., but we could have used a Mac, Linux machine, or even a smartphone. We also invested in paid audio editing software (Hindenburg Pro), which currently costs $10 (USD) per month.

We used Anchor.fm (now called Spotify for Podcasters) as our podcast host – primarily because it is free and facilitates distribution to popular podcast apps. Episodes can be recorded using the Anchor.fm website or smartphone app, but we recorded and edited in Hindenburg Pro instead, primarily because it provides a greater degree of control. We also used Anchor.fm to create the podcast's cover art.

In the following sections, we provide an overview of the workflow for creating and distributing a course-related podcast. We also provide more details for each step in the workflow, including some suggestions for suitable tools.

7.1   Workflow Overview

We used the same process to create each episode. We started by creating a script for the focal chapter. The script included the important concepts in each chapter. Then, we reviewed the script to get a sense of how long the episode would be using a factor of approximately 7.5 minutes per thousand words. This, of course, is only a rough estimate but proved to be adequate for our purposes. Our goal was to limit each episode to ten minutes or less.

After the script was written and reviewed for errors, the episode was recorded and edited using Hindenburg Pro. Editing was limited to cutting errors. For example, if the host stumbled over a sentence, the sentence was repeated, and the poor-quality sentence was cut. Once the content of the audio was of sufficient quality, the file was exported to an MP3 format file and uploaded to Anchor.fm. Show notes, which consist of a brief text description of the episode and a note indicating that a transcript is available upon request, were added. (The transcripts are simply the episode script.) We scheduled each episode for immediate release, but a future release date and time can be used. Once released, the episode is usually available in major podcast apps in less than an hour.

Scripting is not required; someone familiar with the content could easily work from a set of bullet points. We find scripting useful for staying on point and keeping to our self-imposed ten-minute length limit. We strongly recommend investing in creating a script or a well-thought-out plan prior to recording. This investment is likely to pay off in terms of editing time and quality. Also, the investment in quality will provide ongoing benefits because the episodes will be reusable. If updates are required, a well-structured script or plan provides a solid foundation for instances in which episodes need to be revised due to new content. (This process is straightforward. Once the revised episode is recorded, the file is simply uploaded to the host as a replacement for the original MP3 file.)

Figure 2 shows the workflow for creating an episode. Each episode took approximately two hours to create (including writing and refining the script), although this varied according to the complexity of the material. Podcast episodes are available at https://anchor.fm/informationsystems.
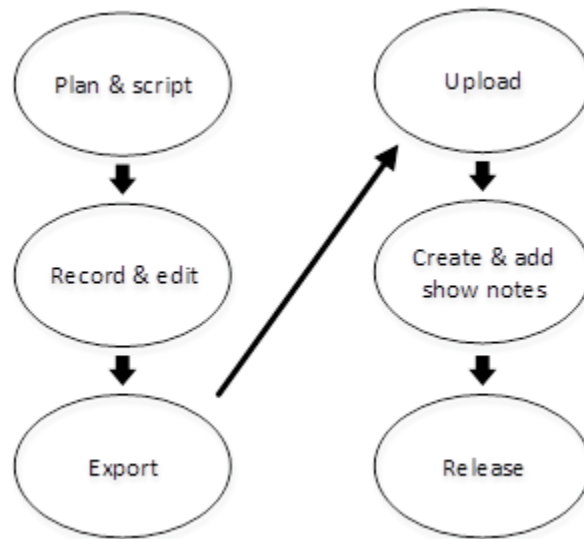
Figure 2. Episode Workflow

7.2   Planning and Scripting

Macro-level planning should be done before working on individual episodes. At a minimum, three issues should be considered. First, the overarching purpose of the podcast should be determined. The purpose of our podcast was to help students learn basic course material, focusing on the material in the textbook. A course-related podcast could also be intended to enhance course material, perhaps by covering current events, interesting technology applications, or interviews with industry experts. The overall purpose should guide subsequent decisions. Second, the basic format of the podcast should be decided upon. Will there only be one host, with no guests, or will there be co-hosts and/or guest interviews? There is no universally superior format, so it is critical to weigh the format options against the purpose. Third, potential podcasters must decide on the desired balance of effort and quality. Generally, higher quality requires higher time and financial investments. For example, one could decide to go with a "good enough" approach to quality with the goal of ensuring that quality does not preclude listening but going no further. This approach would require minimal investments in equipment and in production time (and in time to learn audio production) but would not sound polished. We also note episodes that have multiple people speaking make recording and editing more complex, especially when guests are involved. So, the benefits of having co-hosts are guests should be weighed against the increased complexity.

It is also worthwhile to consider the frequency of episodes and how episodes will be released. In the first term, we recorded episodes as we had time but ensured that each episode was released prior to the date on which the corresponding topic would be covered in class. We left the episodes in place for subsequent terms, so each episode was available at the beginning of the term.

Regardless of the format, we recommend carefully planning each episode with respect to format, length, and content. Having each episode follow a standard format makes planning easier, but more importantly, it makes the podcast easier to listen to due to the familiarity of the format. Our podcast follows the basic outline shown in Figure 3. Each episode begins with a standard opening, in which only the corresponding chapter number and description vary. A standard closing is also used. Figure 3 provides the standard format used in our podcast, including redacted versions of the standard opening and closing. Theme music is inserted before the opening and after the closing, but this is not necessary. If the opening and closing are exactly the same for each episode, they can be pre-recorded and inserted into the audio file during editing. These are typically referred to as the pre-roll and post-roll, respectively.

*** Standard Opening ***
*Welcome to the [redacted] podcast. The main purpose of the podcast is to **augment** the book [redacted] by [redacted]. The book is published by [redacted]. I'm your host, [redacted].*

Before we get started, I want to give a couple of disclaimers:
- *The podcasts purposely omit many details to get to the high points of each chapter. So, listening to the podcast is NOT a substitute for reading the book.*
- *Each episode contains my view of the most important points of each chapter. Your professor may have a different view.*
- *The podcast is solely my responsibility, so any errors are on me, not my co-authors, your professors, [redacted], or my employer.*

Enough with the disclaimers; let's get to the good stuff!

*** Main Content ***
[Chapter summary goes here.]

*** Standard Closing ***
OK, that's it for this episode. Remember that you still need to read the chapter since the book has much more detail. Fortunately, we (the co-authors) worked really hard to keep the chapters short and to the point, so the reading shouldn't be too bad! Talk to you next time.

Figure 3 - Podcast Format, Standard Opening, and Closing

In addition, we recommend focusing on core concepts that will remain consistent across terms. Information systems is a dynamic field, so it would be easy to fall into the trap of having to update content on a continual basis, which is inefficient. Focusing on "evergreen" concepts, such as the components of information systems or foundational network architectures, will reduce the need for frequent updates.

Carefully planning each episode's content is important. Despite the popularity of some more spontaneous entertainment podcasts, extemporaneous episodes are likely to go off-track, resulting in overly long, hard-to-follow episodes. There are two typical approaches for planning host-only (no guest interview) podcast episodes, scripts, and bullet points. We decided to script each episode by writing out exactly what would be said. This approach requires more up-front time and may sound like exactly what it is – someone reading a script. However, using a script keeps the episode on track, which allows for more efficient episodes. In addition, using a script results in less editing being required. However, many podcasters prefer following an outline of bullet points, which may result in a more natural-sounding episode. Bullet points or an outline also takes less time to develop, but we caution that this time savings may be lost due to additional editing requirements. When conducting interviews, it is important to outline the main topics and points the host wants to cover with the guests. We recommend not only having a basic outline of the flow but also providing the guest with the outline and potential questions. Again, this preparation time will result in less editing. Regardless of the approach used, we liken preparing an episode to preparing for a class. Few of us can go into a classroom with no plan and be effective. Well-planned class sessions are typically more effective than those that are unplanned. The same can be said of podcast episodes.

7.3   Recording and Editing

Creating podcast episodes requires only minimal equipment and software; it can be done with a smartphone and a voice memo app. However, relatively small investments can result in significant improvements in quality. Generally speaking, there are two chances to improve quality, before and after hitting the record button. For novices, it is usually easier to take steps to improve the original quality of the recording. Improving quality after recording requires specialized software and expertise.

There are three critical elements to good sound quality, the equipment, the environment, and the podcaster. Even a relatively small investment in a good quality dynamic microphone, such as the USB microphones mentioned earlier, will result in a noticeable improvement over a laptop or webcam microphone. It is not necessary to purchase expensive microphones or audio interfaces; a good quality

USB microphone is more than sufficient for producing excellent sound quality, especially when recording in a suitable environment.

The recording environment should be relatively free of background noise (such as fans, printers, etc.) and should have a minimum of hard surfaces, which can cause echoes. Hard surfaces can be treated with simple soft elements such as rugs, pillows, and even blankets hung on a wall. Some podcasters go so far as to record in walk-in closets due to the soft surfaces offered by the clothing. Dynamic microphones are better at rejecting background noise and echo than condenser microphones, which is the other common technology used in vocal microphones. So, unless you have an excellent recording environment, we recommend dynamic microphones. Although sound quality is important, content quality is perhaps more critical. As noted earlier, working from a well-thought-out script or outline is an important element of quality content. But mistakes are inevitable, so some editing is often required. We recommend an approach known as "minimum effective editing," which involves recording the entire episode without stopping for errors (Gray, 2022). When you make an error, simply note it, correct yourself, and move on. We like to note the error with the click method, which involves snapping your fingers close to the microphone three times. This makes a distinct shape in the audio waveform, making it easy to identify where to make cuts when editing.

The third element of recording quality is the podcaster's microphone technique. It is beyond our scope to go into details on microphone technique, but this involves having the microphone positioned to the side and about four inches from the mouth. This positioning will reduce plosives (popping sounds) and allow sufficient recording volume while speaking naturally. Investing in an inexpensive pop filter or windscreen can also reduce plosives. Audio recording and editing software are also necessary. Often, recording and editing are done within the same program, especially for solo podcasts. But it is also possible to record using another system, such as a digital recorder or video conferencing software (e.g., Zoom), then import the audio file into the editor for final editing. A wide range of such software exists, with suitable free and low-cost options available. We caution against investing in expensive, complex editing software due to the expense and learning curve involved. Several suitable choices are described in Table 8. Note that the table is not intended to be comprehensive but rather provides some common choices.

Table 8. Audio Editing Software

Software	Description
Audacity	Pros: Audacity is free, open source, and available on a variety of platforms. It provides all of the functions required for podcasting and offers many advanced functions. Numerous learning resources are available. Cons: Audacity is known for being somewhat unstable across updates. It can be somewhat difficult to learn. Older versions of the system required extra steps to export MP3 files.
Garage Band	Pros: Garage Band is free for Apple platforms and offers all of the necessary functions for podcast editing. It is relatively easy to learn and flexible. Cons: Garage Band is only available for Apple platforms. It has limited functionality compared to other systems.
Hindenburg Pro	Pros: Hindenburg Pro is designed for podcasting and radio production. It is easy to learn and use for basic functions and also allows advanced editing. Cons: Hindenburg Pro currently costs approximately $100 (USD) per year (educational pricing). Because it is focused on podcasting and radio production, it is not as fully featured as some other alternatives.
Descript	Pros: Descript produces an automated transcript, which allows editing by cutting text (in addition to editing through the audio waveform). It also provides an AI-based system that automatically improves audio quality. Cons: Descript can be difficult to learn. The software is frequently updated, which can cause additional learning difficulties. Descript has a free version that is restricted to 10-minute recordings. Recordings of up to 60 minutes require a subscription (currently, $12 (USD) per month).
Alitu	Pros: Alitu is a cloud-based system specifically designed for podcast recording and editing. It provides automated audio engineering functions to improve sound quality. Editing is relatively intuitive. Alitu also provides podcast hosting and distribution. Cons: Alitu requires a subscription (currently $38 (USD) per month). The system is relatively new.

Editing can be time-consuming, especially when learning how to edit effectively. Carefully planning the content can reduce editing time related to the content, such as cutting rambling diversions. Even with a carefully constructed script, mistakes are likely to occur during recording. If they're minor, it may not be necessary to cut them. For errors that need to be edited out, we use the "click" method to make facilitate editing. This involves clicking one's fingers two or three times to mark the spot for the edit. The clicking sound makes a recognizable pattern in the waveform (a graphical representation of the audio), which is easy to find while editing. We recommend recording one or two test sessions to become familiar with the recording process prior to recording actual episodes.

7.4 Exporting and Uploading

Once the recording has been edited, the typical process is to save the file to MP3 format, although other formats can be used. For course-related podcasts, exporting to mono is acceptable. The MP3 file is then uploaded to the host and scheduled for release. The RSS feed allows automatic distribution to podcast apps.

Cover art is also required. Using readily available tools such as Canva, a square image of between 1400 by 1400 to 3000 by 3000-pixel image is created and saved to a PNG or JPEG file, then uploaded to the host. The same cover art can be used for all episodes, or custom covers can be created for each episode.

7.5 Creating and Adding Show Notes

Each episode also includes show notes, which typically include brief descriptions of the episode, links to resources mentioned, and other information, such as acknowledgments. In the context of a course-related podcast, these notes can be quite brief. Podcast apps will show these notes when an episode is accessed. The show notes for an episode of our podcast are shown below. As can be seen, our notes are minimal, but show notes can be more complex.

> *This episode of the [redacted] Podcast discusses the high points of Chapter 1 of the book [redacted] and published by [redacted]. For more information on the book, visit [redacted]. If you would like a script for this episode, please email me at [redacted] and use "[redacted]" as the subject.*

Most hosts and apps will accommodate transcripts. These can be time-consuming to create, even with a script. Automated services are available, but they vary in quality. Rather than providing transcripts, we offer to send our script to listeners upon request. We plan to add transcripts in the future.

7.6 Releasing Episodes

After being uploaded to the host, episodes can be released immediately or can be scheduled for later release. We released them immediately, but in some cases, instructors may want to release episodes in conjunction with the course schedule. However, once an episode is released, it remains available, so restricting access to align with the course schedule would be work intensive, requiring each episode to be "unpublished" and then re-released. Restricting access would be easier if the episodes are only available within a learning management system. We saw no need to restrict access, so we made all episodes available on a perpetual basis. To align episodes with course material, we gave frequent reminders to students based, recommending that they listen to relevant episodes before and after class and during exam preparation.

7.7 Learning Resources and Helpful Tips

Of course, there is a learning curve to podcast production. Fortunately, resources for learning how to podcast abound online; many of these resources are free. Podcast hosts are often a good source of learning resources. For example, both Buzzsprout and Libsyn offer extensive learning resources that are not restricted to their customers. There are also independent podcast coaches, some of whom provide free materials for beginning podcasters. One example is The Podcast Host (https://www.thepodcasthost.com/), which offers a variety of guides, including a "Starting out" guide intended for the beginner. There are numerous similar guides available online. There are also several podcasts and YouTube resources devoted to helping podcasters build their skills. Table 9 provides examples of such resources. Even though starting a podcast is relatively easy for individuals comfortable

with information technology, ongoing improvement of one's skills can lead to significant continuous improvement of a podcast's content.

Table 9. Learning Resources

Title	Description	URL
Apple's Resources for Podcast Creators	Resource website	https://podcasters.apple.com/support/4033-resources-for-podcast-creators
The Podcast Host	Resource website	https://www.thepodcasthost.com/
Buzzsprout Podcasting Basics	Tutorial	https://www.buzzsprout.com/blog/category/podcasting-basics
Libsyn – How to Start a Podcast	Tutorial	https://libsyn.com/how-to-start-a-podcast/
Podcasting Manual by Blubrry	Tutorial	https://blubrry.com/manual/
School of Podcasting	Podcast	https://schoolofpodcasting.com/episodes/
Podcasting for Educators	Podcast	https://podcastingforeducators.com/podcast
The Proffitt Podcast	Podcast	https://krystalproffitt.com/podcast/
How to Use Audacity to Record & Edit Audio	YouTube tutorial	https://www.youtube.com/watch?v=yzJ2VyYkmaA
Hindenburg Systems Tutorials	YouTube tutorial	https://www.youtube.com/@SpokenWorld
How to Record & Edit a Podcast in Garageband	YouTube tutorial	https://www.youtube.com/watch?v=xhesskgmIsQ

Our experiences led us to discover several tips that others may find helpful (see Table 10).

Table 10. Helpful Tips

Tip	Comment
Planning and preparation pay off	Spending some time to carefully plan each episode will significantly reduce the need for editing and improve the quality of each episode. This is especially important for creating concise, easy-to-follow episodes. We suggest either creating a script or a very detailed set of bullet point notes.
Practice before recording	Rehearsal will also reduce editing time and improve quality. If you're using a script, read the script aloud before recording. If you use bullet points, doing a practice run will be helpful. Recording the practice sessions can be helpful in building your presentation skills.
Reminders help	Frequent, low-key reminders can nudge students towards taking advantage of the podcast. These reminders should emphasize the convenience provided by podcasting's on-demand, any-time, any-place, any-device nature, which makes it possible to listen while performing other tasks. We also helped students understand the favorable cost/benefit ratio of listening. Also, be sure to reiterate that the podcast episodes are not substitutes for other learning activities.
Invest (modestly) in equipment	Even small investments in equipment can lead to significant sound quality improvements. Although it is possible to use microphones built into devices such as webcams, laptops, and smartphones, the sound quality will be poor. Reasonable quality USB microphones, such as the Audio-Technica ATR2100X-USB or the Sampson 2QU, are widely available for under $100 (USD). These will produce excellent sound quality and are simple to connect via USB.
Recording environment matters	The recording environment also affects sound quality. Most faculty offices should be acceptable, but we recommend avoiding recording in rooms that are prone to echo or background noise.
Perfect is the enemy	We also recommend not being focused on perfecting sound quality. It is difficult and expensive to reproduce the sound quality of high-end broadcasters or podcasters. So, we recommend making the sound good enough to not be a distraction, but we do not see the need to make further investments in perfecting sound quality.

Keep it short	we strongly recommend keeping episode length to less than ten minutes, so avoid the temptation to put every detail in the podcast, although it is fine to direct students to the textbook or other learning materials for more detail. Remember that the podcast is a supplement to lectures, the text, and other learning activities. So, it is important to focus on the most important elements. Keeping episodes short also encourages students to listen.

8 Conclusion

Podcasting as a supplemental learning resource is a relatively low-cost and effort move towards better aligning information systems education with today's on-demand world, although adding a podcast to the introductory course is only a small step in this direction. In our view, the learning benefits exceed the costs. Further, the approach presented here can easily be adapted to many other courses in a typical IS curriculum. Virtually any course that includes conceptual material is a viable candidate. There may even be clever ways to integrate a podcast into programming courses, perhaps by discussing the source of common errors or providing hints and tips. We are living in an on-demand world. IS educators should consider leveraging on-demand technologies to improve student learning. In our case, our efforts were surely rewarded.

References

Anton, E., Oesterreich, T. D., Schuir, J., & Teuteberg, F. (2022). A new way to reflect the IS identity? Uncovering the intellectual core of podcasts. *Forty-Third International Conference on Information Systems,* Copenhagen.

Armstrong, G. R., Massad, V. J., & Tucker, J. M. (2009). Interviewing the experts: Student produced podcast. *Journal of Information Technology Education: Innovations in Practice*, 8, 79–90.

Baier, K., Hendricks, C., Gorden, K. W., Hendricks, J. E., & Cochran, L. (2011). College students' textbook reading, or not. In *American reading forum annual yearbook* (Vol. 31, No. 31, pp. 385-402).

Bennett, P., & Glover, P. (2008). Video streaming: Implementation and evaluation in an undergraduate nursing program. *Nurse Education Today*, 28(2), 253–258.

Berry, Richard. (2015). A golden age of podcasting? Evaluating serial in the context of podcast histories. *Journal of Radio & Audio Media*, 22(2), 170-178.

Brooke, A. (2022). Podcast Statistics and Data [August 2022] *Buzzsprout.* Retrieved from https://www.buzzsprout.com/blog/podcast-statistics

Chan-Olmsted, S., & Wang, R. (2022). Understanding podcast users: Consumption motives and behaviors. *New Media & Society*, *24*(3), 684-704.

Chin, A., Helman, A., & Chan, T. M. (2017). Podcast use in undergraduate medical education. *Cureus*, 9(12).

Chung, M. Y., & Kim, H. S. (2015). College students' motivations for using podcasts. *Journal of Media Literacy Education*, 7(3), 13-28.

Clary, G., Dick, G., Yagmur Akbulut, A., & Van Slyke, C. (2022). The after times: College students' desire to continue with distance learning post pandemic. *Communications of the Association for Information Systems*, 50(1), 52-85.

Clump, M. A., Bauer, H., & Bradley, C. (2004). The extent to which psychology students read textbooks: A multiple class analysis of reading across the psychology curriculum. *Journal of Instructional Psychology*, 31(3), 227-233.

Copley, J. (2007). Audio and video podcasts of lectures for campus-based students: Production and evaluation of student use. *Innovations in Education and Teaching International*, 44(4), 387–399.

Cridland, James. (2022). How to Get Universal Links to Your Podcast for Everyone. *Podnews*, Retrieved from https://www.podnews.net/article/universal-links.

De Gagne, J. C., Park, H. K., Hall, K., Woodward, A., Yamane, S., & Kim, S. S. (2019). Microlearning in health professions education: scoping review. *JMIR Medical Education*, 5(2), e13997.

Dennis, A. R., Fuller, R. M., & Valacich, J. S. (2008). Media, tasks, and communication processes: A theory of media synchronicity. *MIS Quarterly*, 32(3), 575-600.

Drew, C. (2017a). Educational podcasts: A genre analysis. *E-Learning and Digital Media*, 14(4), 201–211.

Drew, C. (2017b). Edutaining audio: An exploration of education podcast design possibilities. *Educational Media International*, 54(1), 48-62.

Dupagne, M., Millette, D. M., & Grinfeder, K. (2009). Effectiveness of video podcast use as a revision tool. *Journalism & Mass Communication Educator*, 64(1), 54–70

Edison Research. (2022). *Podcasting's Key Statistics For 2022*. Retrieved from https://www.edisonresearch.com/podcastings-key-statistics-for-2022/

Faramarzi, S., Tabrizi, H. H., & Chalak, A. (2019). Learners' perceptions and attitudes towards L2 vodcasting tasks in an e-learning project. *Teaching English with Technology*, 19(3), 3-21.

Fernandez, V., Simo, P., & Sallan, J. M. (2009). Podcasting: A new technological tool to facilitate good practice in higher education. *Computers & Education*, *53*(2), 385-392.

Gammerdinger, W. J., & Kocher, T. D. (2018). Understanding student perceptions and practices for pre-lecture content reading in the genetics classroom. *Journal of Microbiology & Biology Education*, 19(2), 19-2.

Ghosemajumder, S. (2002). Advanced peer-based technology business models (Doctoral dissertation, Massachusetts Institute of Technology).

Gray, Colin. (2022). Minimum Effective Podcast Editing: The Mee Podcasting Method. *The Podcast Host*. Retreived from https://www.thepodcasthost.com/editing-production/the-mee-podcasting-method-editing-production/.

Hew, K. F. (2009). Use of audio podcast in K-12 and higher education: A review of research topics and methodologies. *Educational Technology Research and Development*, 57(3), 333-357.

Hoeft, M. E. (2012). Why University Students Don't Read: What professors can do to increase compliance. *International Journal for the Scholarship of Teaching and Learning*, 6(2), n2.

Huang, C., Li, J., & Ross, K. W. (2007). Can Internet video-on-demand be profitable? *ACM SIGCOMM Computer Communication Review*, *37*(4), 133-144.

Kane, R. & Dahlvig, H. (2022). Traditional faculty resistance to online higher education. *American Journal of Qualitative Research*, 6(2), 1-16.

Kay, R. H. (2012). Exploring the use of video podcasts in education: A comprehensive review of the literature. *Computers in Human Behavior*, 28(3), 820-831.

Kazlauskas, A., & Robinson, K. (2012). Podcasts are not for everyone. *British Journal of Educational Technology*, 43(2), 321-330.

Lewis, S. L., & Francis, R. W. (2020). Podcasting as a Mode of Motivation in Online and Blended Learning. In *Learning in the Digital Age*, T. Asino, ed., Oklahoma State University Libraries.

Listen Notes. (2022). *Podcast Stats: How many podcasts are there?* Retrieved from https://www.listennotes.com/podcast-stats/

Ljubojevic, M., Vaskovic, V., Stankovic, S., & Vaskovic, J. (2014). Using supplementary video in multimedia instruction as a teaching tool to increase efficiency of learning and quality of experience. *International Review of Research in Open and Distributed Learning*, 15(3), 275-291.

Lonn, S., & Teasley, S. D. (2009). Podcasting in higher education: What are the implications for teaching and learning?. *The Internet and Higher Education*, 12(2), 88-92.

Marunevich, O., Bessarabova, O., Shefieva, E., & Razhina, V. (2021). Impact of podcasting on English learners' motivation in asynchronous e-learning environment. In *SHS Web of Conferences* (Vol. 110). EDP Sciences.

Marx, J. & Mirbabaie, M. (2021). The role of parasocial interactions for podcast backchannel response. *Twenty-Seventh Americas Conference on Information Systems*, Montreal.

Matava, C. T., Rosen, D., Siu, E., & Bould, D. M. (2013). eLearning among Canadian anesthesia residents: a survey of podcast use and content needs. *BMC Medical Education*, 13(1), 1-8.

Mayer, R. E. (2008). Applying the science of learning: evidence-based principles for the design of multimedia instruction. *American Psychologist*, 63(8), 760.

Mayer, R. E., & Moreno, R. (1998). A cognitive theory of multimedia learning: Implications for design principles. *Journal of Educational Psychology*, 91(2), 358-368.

McClung, S., & Johnson, K. (2010). Examining the motives of podcast users. *Journal of Radio & Audio Media*, *17*(1), 82-95.

McKinney, D., Dyck, J. L., & Luber, E. S. (2009). iTunes University and the classroom: Can podcasts replace Professors? *Computers & Education*, 52(3), 617-623.

McNamara, S., & Drew, C. (2019). Concept analysis of the theories used to develop educational podcasts. *Educational Media International*, 56(4), 300-312.

Muppala, J. K., & Kong, C. K. (2007). Podcasting and its use in enhancing course content. *Computers and Advanced Technology in Education*, 570-067.

O'Bannon, B. W., Lubke, J. K., Beard, J. L., & Britt, V. G. (2011). Using podcasts to replace lecture: Effects on student achievement. *Computers & Education*, 57(3),

Pilarski, P. P., Johnstone, D. A., Pettepher, C. C., & Osheroff, N. (2008). From music to macromolecules: Using rich media/podcast lecture recordings to enhance the preclinical educational experience. *Medical Teacher*, 30(6), 630–632.

Podcast Industry Insights. (2023). Retrieved from https://podcastindustryinsights.com/apple-podcasts-statistics/.

Popova, A., Kirschner, P. A., & Joiner, R. (2014). Effects of primer podcasts on stimulating learning from lectures: How do students engage? *British Journal of Educational Technology*, 45(2), 330–339.

Prakash, S.S., Muthuraman, N., & Anand, R. (2017). Short-duration podcasts as a supplementary learning tool: Perceptions of medical students and impact on assessment performance. *BMC Medical Education*, 17(1), 1–14.

Rajpal, S., & Devi, V. A. (2011). Podcast: Enhancing Listening and Speaking Skills. *Language in India*, 11(10), 265-265.

Rayna, T., & Striukova, L. (2016). 360° Business Model Innovation: Toward an Integrated View of Business Model Innovation: An integrated, value-based view of a business model can provide insight into potential areas for business model innovation. *Research-Technology Management*, 59(3), 21-28.

Riddell, J., Swaminathan, A., Lee, M., Mohamed, A., Rogers, R., & Rezaie, S. R. (2017). A survey of emergency medicine residents' use of educational podcasts. *Western Journal of Emergency Medicine*, 18(2), 229-234.

Rowley, D. J., & Sherman, H. (2001). From strategy to change: Implementing the plan in higher education. *John Wiley & Sons*.

Russell, J. E., Smith, A. M., George, S., & Damman, B. (2023). Instructional strategies and student eTextbook reading. In *LAK23: 13th International Learning Analytics and Knowledge Conference,* Arlington, TX, USA, 613-618.

Ryan, T. E. (2006). Motivating novice students to read their textbooks. *Journal of Instructional Psychology*, 33(2) 136-140.

Sadeghi, A. R., & Ghorbani, S. (2017). The impact of TED-vodcast on Iranian EFL learners' academic oral proficiency. In *Multiculturalism and Technology-Enhanced Language Learning* (pp. 80-96). IGI Global.

Sullivan, J. L. (2019). The platforms of podcasting: Past and present. *Social Media+ Society*, *5*(4), 2056305119880002.

Tam, C. O. (2012). The effectiveness of educational podcasts for teaching music and visual arts in higher education. *Research in Learning Technology*, 20, 14919.

Taylor, T. A. (2018). On-demand service platforms. *Manufacturing & Service Operations Management*, 20(4), 704-720.

Traphagan, T., Kucsera, J. V., & Kishi, K. (2010). Impact of class lecture webcasting on attendance and learning. *Educational Technology Research and Development*, 58(1), 19-37.

Van Bergen, P. (2014). Recasting lecture material using podcasts: An educational psychology case study. In *Curriculum Models for the 21st Century* (pp. 259-277). Springer, New York, NY.

Van Slyke, C., Topi, H., & Granger, M. (2021). Special Section: COVID-19, Learning Pedagogy, and Educational Systems, *Communications of the Association for Information Systems*, 48.

Wrather, K. (2016). Making 'Maximum Fun' for fans: Examining podcast listener participation online. *Radio Journal: International Studies in Broadcast & Audio Media*, 14(1), 43-63.

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