EXAMINING UNIVERSITY STUDENT PODCASTS AND EVALUATING APPS USING THE MOBILE APP RATING SCALE (MARS)

Carolyn S. Hanson, University of Florida
Frederick R. Kates, University of Florida
Morgan Calzon, University of Florida
Maysen Calzon, University of Florida
Morgan Simonson, University of Florida
Ryan Romero, University of Florida
Hanadi Hamadi, University of North Florida

ABSTRACT

Podcasts can have a positive impact on students' online experiences in higher education. University students in groups of 5–7 created podcasts for an online Survey of Diseases and Disabilities course. To facilitate quality podcast creation, we identified the best mobile application tools using the Mobile Application Rating Scale (MARS). MARS is an easy-to-use multidimensional app quality rating scale requiring minimal training useful for selecting the highest performing podcast software to aid students in generating high-quality podcasts. After creating their podcasts, the students completed a survey about their experience to determine their perspectives of audio podcasts in relation to course content review and to identify the locations where students primarily listened to the podcasts. Most students felt that the summarization components of the podcast assignment improved their understanding of class content and listened to the podcasts at home or on a walk. Students with competing demands appreciated the flexibility podcasts provided, particularly if they were auditory learners. When implementing new technology, we recommend investing time upfront to evaluate digital technology to maximize student learning.

Keywords: *audio podcasts, online learning, MARS, COVID-19, mobile technology, digital technology*

INTRODUCTION

As the world around us experiences disruption and change, it is only natural that education will evolve to support student learning. User-generated content such as podcasts represent a major shift in how students engage with technology (Dyson, 2012; Henry, 2022; O'Callaghan et al., 2017). Podcasts are distinctive because they can be consumed on the move in nontraditional learning environments (Drew, 2017b; Goldman, 2018). The term *podcast* is a combination of the word *iPod* and *broadcast*. MP3 is a coding format for digital audio files for recording speech, music, or a combination of the two, and broadcast refers to the ability to send out media (Mastrian & McGonigle, 2019). Studies focusing on podcasts have found that students enjoy the change of instructional delivery and demonstrate increased engagement with the content (Park, 2019; Peden & Domask, 2011; Rios et al., 2018). In particular, group-generated podcasts allow students to improve their communication, critical thinking, teamwork, organization,

and research skills (Armstrong et al., 2009; Moryl, 2016; Sanders, 2022).

During the COVID-19 pandemic, online learning became the new standard in educational systems (Finnegan-Kessie et al., 2020; Sahin & Shelley, 2020). Technology has been crucial in transitioning to a primarily distance learning environment. Technological media such as Zoom have allowed live lectures to be provided remotely to maintain safe and distanced interactions (Ransdell & Rieck, 2020; Sahin & Shelley, 2020; Serhan, 2020). With this abrupt change and increased reliance on technology in educational institutions, there has been a shift to utilizing technological media to foster interactive learning environments (Peterson et al., 2020; Tejedor et al., 2021).

Group work is a method of learning used in many higher education classrooms to improve teamwork and collaborative skills (Ramdeo et al., 2022; Riebe et al., 2016). In a distance learning environment, face-to-face group projects must adjust to being remote (Finnegan-Kessie et al., 2020). Due to advancements in technology, distanced group work and collaboration are possible, and expanding on and observing different types of assignments created in groups is essential. The podcast is a medium that, in a group assignment, requires various audio components to be recorded by each group member and combined into a cohesive unified podcast. Podcasts allow for students to contribute to the assignment as each audio component is unique to each group member. This audio podcast component may help to facilitate group work that is more collaborative in comparison with a plain text group assignment. Students may discover that it is more meaningful to participate in an online course when connecting with team members on a focused assignment (Henry, 2022; Rios et al.,2018).

Podcasts are a trending technological medium that will help instructors facilitate assignments that familiarize students with a mobile, 21st century digital learning tool. Educational podcasts have been investigated in the past to better understand how they can be used to engage students in learning course content, such as by implementing genres to generate storylines and enhance student motivation (Drew, 2017a). Audio podcasts are a technological medium, like music, that can be played virtually anywhere (Chan & Lee, 2005; Hew, 2009; McGarr,

2009). The audio podcast's transportable aspect sparked the idea of utilizing audio podcasts in an educational environment.

A standardized approach to analyzing applications has been employed to evaluate mobile applications or software to create podcasts objectively. The Mobile Application Rating Scale (MARS) is a Likert scale consisting of five categories and a content-specific category to quantitatively evaluate the quality and status of mobile applications (Stoyanov et al., 2015). This scale has been used to evaluate mobile health applications (mHealth apps) with great success (Romero et al., 2019). An emerging tool, the MARS is used to rate applications to distinguish the best ones on the market for their respective purposes. Though primarily used with mHealth apps, this scale has the potential to evaluate apps in a variety of genres, including digital technology. An objective way to evaluate podcast apps facilitates the selection of more user-friendly and higher quality products and can lead to better outcomes for students. Use of the MARS provides the opportunity to dissect podcast creation apps to determine the value of certain core heuristics of the applications.

AIMS

This study aims to (1) select the highest performing podcast software based on the MARS criteria to aid students in generating high-quality podcasts for a student project, (2) determine student perspectives of audio podcasts in relation to course content review, and (3) gain insight on the utilization of audio podcasts as a mobile educational tool by identifying the locations where students primarily listened to the audio podcasts. As technology progresses and becomes a more centralized focus in society, it is essential to better understand how technological media can be used to improve and expand educational learning techniques.

METHODS

Podcast Assignment in a Higher Education Classroom

A podcast group assignment was part of an undergraduate course entitled Survey of Diseases and Disabilities. This blended course provided students access to online lectures to prepare for more in-depth and in-person weekly discussions with group members and the instructor. As a result of COVID-19, this hybrid course pivoted to online,

which included the new podcast assignment. The Survey course covers common diseases and resulting disabilities. Students in the six class sections were divided into groups of 5–7 and were assigned a particular disease or condition. The purpose of the assigned topic for the podcast was to summarize creatively the weekly material, which was then used to study for two examinations. Each group of students created one audio podcast of 8–10 minutes in length, with each group member contributing at least 2 minutes of audio to the project. This course was offered exclusively online to 274 students over Zoom in the fall of 2020.

Search and Selection Criteria for Podcast Applications

Podcast apps available on the Apple Store and Google Play Store were investigated methodically to determine which apps would best benefit students in generating content review podcasts. In order to successfully create audio podcasts, podcast applications were sorted into two categories: audio recording apps and podcast editing apps. Audio recording apps were applications that permitted the ability to record audio clips. Podcast editing apps were applications that combined the audio clips created by each group member into one unified audio podcast. The following search terms were used in the Apple Store and Google Play Store to locate appropriate audio recording apps and podcast editing apps: "podcast creator," "podcast maker," "podcast editor," and "audio recorder." The four search terms yielded a total of 894 applications on the Apple Store and 800 applications on the Google Play Store.

Exclusion Criteria for Podcast Applications

The applications reviewed were sorted through exclusion criteria in the initial screening. The applications that passed the initial screening were then reviewed using MARS to establish the highest quality applications for their respective purposes. Applications were excluded from being categorized as audio recording apps if they were unable to download for free, create audio recordings, share audio files, be categorized as an app with the intended purpose of creating or sharing audio, be viewed with an app interface written in English, record audio without video, be free from religious affiliation, download without requiring a subscription package or a limited free trial, record audio for

a minimum of 10 minutes, be purchased outside of a package bundle, or be found in both the Apple Store and Google Play Store.

Applications were excluded from being categorized as podcast editing apps if they were unable to meet the same requirements listed above for the audio recording apps excluding the requirements to record audio for a minimum of 10 minutes and record audio without the video. In addition to the previous exclusion criteria, applications were excluded from being categorized as podcast editing apps if they were unable to combine two or more audio components.

Figure 1. Audio Recording Apps Filtered through Search Criteria
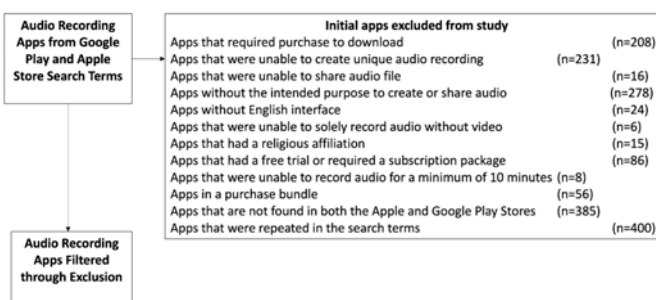
Note: The applications were filtered through the Audio Record Apps search criteria.

Applications found in more than one of the four search terms were omitted from the selection criteria a second, third, or fourth time. Once an application was excluded due to one criterion, it was automatically eliminated from further investigation.

Mobile Application Rating Scale (MARS) Scorer Qualifications and Evaluation

The MARS was conducted using three scorers (undergraduate and graduate students) who, before performing the ratings, watched a MARS training video on how to rate applications consistently. In order to assess interrater reliability, the raters each performed a mock rating on three applications assigned to them: LearnEnglish Podcast, Luke's English Podcast App, and VOAPod: Learn English. Following the mock rating, the scorers were evaluated based on interrater reliability and deemed appropriately reliable after scoring the mock applications in accordance with the MARS procedures. The scorers were then given the podcast editing apps and the audio recording apps that met the

inclusion criteria to evaluate using the MARS (see Table 1 and Table 2). A total of 20 audio recording apps and 15 podcast editing apps were finalized after eliminating the excluded apps. These applications were then narrowed down, through MARS evaluations, to the top five apps for each category. The selection of 15 to 20 applications per category for MARS evaluation was chosen to evaluate and determine the best quality applications available for podcast creation. In order to give students sufficient app options for their podcast creation, the top five MARS scoring applications for each category were attached to their podcast assignment instructions.

Data Collection

After all groups had submitted their podcasts over the semester, students were invited to complete a brief survey consisting of 20 multiple choice questions and three free response questions regarding their individual podcast experience. Students signed an IRB approved, informed consent question at the beginning of the survey. Students were allowed class time on two occasions to complete the survey and were reminded three times to participate to improve the response rate. Of the 274 students, 225 completed the questionnaire with an 82% participation rate. Of these 225 responses, two participants checked "no" under the IRB consent question, and one participant did not answer the consent question. Therefore, these three survey responses were not evaluated, leaving a total of 222 analyzed survey responses.

RESULTS

Scoring of Podcast Applications using MARS

The final scores documented by the scorers using the MARS were averaged for the podcast editing apps and the audio recording apps respectively (see Table 1 and Table 2). A higher MARS score represents a higher quality application in terms of app function and interface elements. The top scoring applications were deemed to be of the highest quality for their respective podcast generating goals. As a result of the MARS investigation, the five apps recommended for audio recording apps were: AroundSound, Easy Voice Recorder, ShurePlus MOTIV, Dolby On, and Voloco. The five apps recommended for podcast editing apps were: Anchor, Podbean, Sound Trap, BandLab, and Spreaker. The top-rated applications, along

with user-friendly instruction videos on the apps, were attached to the podcast assignment instruction page accessible to all students on their course webpage. Students had the option to choose any of these apps, but they could also use another app with which they were familiar. Explicit instructions were documented to assist students with this assignment. A rubric was posted to outline expectations for the podcast. One of the grading criteria included the use of creative expression to enhance the memorability of the content. Specific examples were not given to prevent instructor bias and to allow free artistic expression of the students. No students had questions about the process other than several wanting specific creative examples on how to complete the assignment.

Table 1: MARS Scoring—Audio Recording Applications

Application	Average MARS score
ShurePlus MOTIV	15.83
Dolby On: Record Audio & Video	16.36
Voice Recorder – Voz	11.42
Rev Voice Recorder & Memos	14.81
Hear Boost: Enhanced Recorder	11.84
Easy Voice Recorder	15.33
Voice Recorder + Audio Editor	14.11
Temi – Recorder & Transcriber	13.87
iRig Recorder LE	13.32
Voice Recorder: Audio Editor	14.63
Voice Changer – Audio Effects	13.54
Audio Memos SE	14.03
PCM Recorder Lite	13.97
Philips voice recorder	14.50
Auphonic Recorder	13.85
Song Maker: Music Mixer Beats	15.01
Voloco	15.77
Around Sound – Audio Recorder	15.56
Mix Pads	10.32
GOM Recorder	14.00

Note: The average scores provided for each application are the averaged MARS score from the three scorers.

Table 2: MARS Scoring—Podcast Editing Applications

Application	Average MARS Score
Voice Record Pro	13.98
Awesome Voice Recorder	13.49
Lexis Audio Editor	12.88
Spire: Music Recorder & Studio	14.63
WavePad Music and Audio Editor	13.26
Podcast Studio By Spreaker	15.20
Podcast App & PodcastPlayer – Podbean	15.79
Anchor	17.02
Adobe Premiere Rush for Video	15.19
Band Lab—Music Making Studio	15.51
n-track studio 9	13.27
Easy mp3 converter	11.66
Soundtrap	15.88
Audio Cutter Converger Merger	13.34
Video Converter MP4 MOV AVI HD	13.34

Note: The average scores provided for each application are the averaged MARS score from the three scorers.

Quantitative Survey Data

After partaking in the creation and utilization of podcasts, students completed a survey asking various questions relating to their perceptions and usage of the podcast assignment in their course. The survey was analyzed and the following three tables (see Table 3, Table 4, and Table 5) present quantitative data.

Demographic Characteristics

Most students who participated in the podcast assignment and completed the survey were females between the ages of 20 and 21 in their junior year of college. Over half of the surveyed students reported their race and ethnicity as Non-Hispanic whites (see Table 3).

Participants' Perceptions

A majority of students agreed or strongly agreed that the summarization components of the podcast assignment improved their understanding of module content. Over half of the students reported that they could better remember course information through creating summary podcasts compared to plain text submissions. A majority of students reported that the podcast was a beneficial technological medium to use in reviewing the material. Additionally, approximately 75% of students reported agreeing or strongly agreeing that the podcast assignment was a beneficial medium in facilitating collaborative group work while in a socially distant learning and online environment (see Table 4).

The survey demonstrated that approximately 25% of the students thought the auditory components of the podcasts were useful as they were primarily auditory learners. This method facilitated their preferred learning style more positively than other review methods. In educational settings, a variety of methods are needed to address individual differences in learning. The audio podcast assignment can easily be adapted to accommodate students of various learning styles (such as implementing an audio transcript for visual learners).

Podcast Usage

Many students reported listening to podcasts in their dorm, house, or apartment. Interestingly, the second-highest reported location students listened to the podcasts was while on a walk. More students

Table 3: Participants Demographic Characteristics, N=222

Age	Frequency	Percentage
18–19	9	4.05
20-21	211	95.05
22-24	2	0.9
Gender		
Female	192	86.49
Male	29	13.06
Transgender	1	0.45
Race/Ethnicity: - Selected Choice		
African American/Non-Hispanic Black	19	8.56
Asian/Pacific Islander	31	13.96
Hispanic/Latino	39	17.57
Multiracial	4	1.8
Non-Hispanic White	128	57.66
Not Listed (please specify)	1	0.45
Class status		
Junior	215	96.85
Senior	7	3.15

Note: Information taken from the student survey describing participant demographic characteristics

Frequency = number of students who took the survey that chose a specific response

Percentage = percentage of students who took the survey that chose a specific response

Table 4: Participants Perception of the Podcast Assignment, N=222

Podcast Perception Statements	Strongly Disagree N(%)	Disagree N(%)	Neutral N(%)	Agree N(%)	Strongly Agree N(%)
1. Given that the podcast process requires the summarization of module information, it improved my understanding of the content in the module.	2(0.9)	10(4.5)	32(14.41)	125(56.31)	53(23.87)
2. Preparing a podcast is less time-consuming compared to creating a PowerPoint with equivalent content development.	20(9.01)	79(35.59)	44(19.82)	68(30.63)	11(4.95)
3. The podcast process increased my motivation to learn.	4(1.8)	40(18.02)	91(40.99)	74(33.33)	13(5.86)
4. As a student, I prefer to listen to a podcast rather than read a plain text document to learn equivalent subject material.	14(6.31)	71(31.98)	49(22.07)	60(27.03)	28(12.61)
5. I remember information that I learned from creating a summary podcast easier than from plain text submissions.	6(2.7)	37(16.67)	56(25.23)	89(40.09)	34(15.32)
6. This method of learning was helpful to me because I am an auditory learner.	17(7.66)	79(35.59)	69(31.08)	47(21.17)	10(4.5)
7. I intend to use the podcast process again in another course.	10(4.5)	82(36.94)	90(40.54)	35(15.77)	5(2.25)
8. The podcast assignment was a beneficial medium of reviewing material in the context of the current COVID19 pandemic (i.e., hybrid or distance learning).	5(2.25)	19(8.56)	41(18.47)	126(56.76)	31(13.96)
9. The podcast assignment was a beneficial medium used to facilitate collaborative group work in a socially distant classroom environment amidst the current COVID 19 pandemic.	5(2.25)	5(2.25)	47(21.17)	110(49.55)	55(24.77)
10. Uploading an audio file to my course site was easy.	5(2.25)	16(7.21)	19(8.56)	144(64.86)	38(17.12)
11. Uploading an audio file to my course site was easier than uploading a video file.	2(0.9)	11(4.95)	140(63.06)	38(17.12)	31(13.96)
	N	Mean	Std. Dev.	Min	Max
Overall Perception	222	3.370598	0.5832798	1.363636	4.818182

Note: Information taken from the student survey describing participant perceptions of the podcast assignment.

N=number of students who chose a specific response

% percentage of students that took the survey who chose a specific response

reported listening to the podcasts while on a walk than at the library (the third most common location reported; see Table 5) and indicated that students utilized the mobility aspect of the podcast while reviewing course material. Students also reported listening to the content review podcasts while at the gym. These findings are novel as other technological media would be inaccessible or difficult to use while mobile. The pandemic could have impacted the places in which students listened to podcasts due to avoiding areas with high frequencies of people, such as libraries, gyms, and grocery stores. Similarly, due to the safe and less restrictive nature of being outside, walks may have been seen as a more popular option for listening to podcasts.

Most students utilized their laptops to generate and create their podcast assignments. Students are required to have a laptop for this course, which might have played a factor in why most students created their podcasts on this particular device. A majority of students used the Apple Store to obtain podcast creating and editing apps.

DISCUSSION

Table 5: Participants Podcast Usage, N=222

	N	%
Where did you listen to the podcasts? **Check all that apply**		
At dorm/house/apartment	186	83.78
On a walk	50	22.52
At library	27	12.16
Other	27	12.16
On the way to class	25	11.26
At the gym	11	4.95
At the store	3	1.35
What device(s) did you use to watch the student **generated podcasts? Check all that apply**		
Laptop	182	81.98
Smartphone	105	47.30
Tablet	8	3.60
Desktop	7	3.15
What device(s) did you use to create the student **generated podcast? Check all that apply**		
Laptop	186	83.78
Smartphone	142	63.96
Desktop	12	5.41
Tablet	5	2.25
Application Store used to obtain app **used in podcast assignment.**		
App Store	155	69.82
Other	53	23.87
Google Play	14	6.31

Note: Information taken from the student survey describing podcast usage.

N=number of students who chose a specific response

%=percentage of students that took the survey who chose a specific response

Current and Prospective Use of Audio Podcasts in Educational Settings

Prior research indicated a need for further exploration in determining how student-generated podcasts may influence student learning. Previous investigations have primarily focused on instructor-generated podcasts in educational settings (Hew, 2009). This study contributed to the body of knowledge on student-generated audio podcasts as past research indicated that most students in higher education listened to podcasts while on a computer at home or in a residential hall compared to a mobile device while on the go (Hew, 2009). Students in this study primarily listened to podcasts at their residence, while the second highest reported location was on a walk—indicating that some students utilized the mobility benefits of audio podcasts (Norris et al., 2020). Moreover, if students exercise while listening to review content, they may process and utilize the information more efficiently. Exercise can be compatible with learning and may be an additional benefit for those students reviewing material while walking or working out. Though physical activity has shown some improvement in educational outcomes, such as time on task, it is yet to be determined if cognitive performance in children and adolescents is impacted (Norris et al., 2020). This is a fertile area of study.

As distance learning has become the new standard in higher education, it is important to explore podcasts, as well as other technological media, to facilitate remote learning (Peterson et al., 2020; Tejedor et al., 2021). Henry (2022) advocated focusing on the specific characteristics of technology in order to improve student engagement. The mobile aspect of the podcast increases the value of using this particular technology and should be emphasized for its educational and health merits.

Students provided comments on the podcast experience and the most common theme was that creating the podcast was more meaningful and memorable than listening to other groups' podcasts. When students are purposefully engaged in synthesizing and presenting content, they are activating more of their cognitive resources. In comparison, listening to podcasts can be viewed as being passive. If there is little creative effort put forth by the podcast creators, the information most likely will not be remembered. Groups facilitate discussion and allow for experimentation, but it does take effort for some groups to be creative. The act of preparing and producing a podcast appeared to have more impact on assimilating content as it is a collaborative process. Students frequently commented that creating a podcast was more valuable for their exam preparation than simply listening to one. About half of the 48 groups were creative in their approach to summarizing content by utilizing interesting music and entertaining ways to interview people and by focusing on essential points.

Other groups read a great deal of information quickly without forethought on how to present it in a useful fashion. We advise instructors to guide students on what methods to employ to engage interest and emphasize the value of attracting the attention of listeners when creating a podcast. Capturing the interest of listeners takes planning and thinking about what is relevant but also using a novel or entertaining approach can make a memorable podcast.

Limitations

This study used the MARS to evaluate the quality of various applications. The MARS is a valid scale used for mobile health applications and has been used to evaluate other genres of applications in current research (Romero et al., 2019). Research should be conducted using the MARS to further evaluate the quality of various types of mobile applications. A limitation in the study was that applications evaluated by the MARS had to be in both the Google Play Store and Apple Store; therefore, applications that were sold solely by the Google Play Store or Apple Store were not reviewed or rated. Additionally, it would have been useful to add additional qualitative survey questions pertaining to the specific apps utilized by students. In this study, interrater reliability was conducted among the MARS evaluators. However, because the MARS evaluators used a rating scale with some subjectivity, there may have been discrepancies amongst rater scores. This study allowed students to decide where they listened to the podcasts, but it was certainly impacted by social distancing and restrictions placed on enclosed public spaces students could access.

Future Research

The next steps for researchers are to expand on emphasizing the mobility benefits of audio podcasts in educational settings. Future research should be conducted when there are no limitations in being in public spaces to further evaluate student use of educational podcasts in mobile settings. Additionally, research should be conducted to further evaluate the various benefits of student-generated audio podcasts in educational classroom settings. Previous research has examined how the genre can be both a versatile and engaging tool to enhance student learning (Drew, 2017a). In this study, students were invited and strongly encouraged to generate creative and engaging podcasts; however, particular genres were not specified nor were examples provided. We recommend that student-generated podcasts encompass a variety of genres to attract listeners' attention such as celebrity panel interviews, game shows, testimonials, musical parodies, etc. Students may need some assistance or be provided with limited examples to promote creativity.

CONCLUSION

This assignment was structured to allow everyone in the group to participate collaboratively with easy to create and consume technology. The findings from this study highlight that podcasts were reported to be a beneficial medium in understanding and summarizing course content and facilitating group work in a socially distant learning environment. Students utilized the podcast to review course material in various settings including at home, on walks, at the gym, and so forth—showcasing the mobile aspects of the podcast. The MARS was utilized to evaluate podcast apps that were the best to use to ensure a good product and a good learning experience.

Classes are gradually returning to in-person instruction, but educators have learned how to pivot to online learning in times of sickness, disaster, and extenuating student and instructor circumstances to allow "live" or synchronous education. It is conceivable that online options will be utilized to an even greater extent, which the pandemic has shown to be effective. With technological advancement, we can diversify our educational methods to enhance learning. No matter the context, the podcast is a recommended tool to review material in a user-friendly manner while students are outside and engaging in physical activity or in their home.

References

Armstrong, G. R., Tucker, J. M., & Massad, V. J. (2009). Achieving learning goals with student-created podcasts. Decision Sciences Journal of Innovative Education, 7(1), 149–154. https://doi.org/10.1111/j.1540-4609.2008.00209.x

Chan, A., & Lee, M. J. (2005). An MP3 a day keeps the worries away: Exploring the use of podcasting to address preconceptions and alleviate pre-class anxiety amongst undergraduate information technology students. In DHR Spennemann & L. Burr (Eds.), Good practice in practice: Proceedings of the Student Experience Conference (pp. 58–70). Charles Sturt University.

Drew, C. (2017a). Educational podcasts: A genre analysis. E-Learning and Digital Media, 14(4), 201–211. https://doi.org/10.1177/2042753017736177

Drew, C. (2017b). Edutaining audio: An exploration of education podcast design possibilities. Educational Media International, 54(1), 48–62. https://doi.org/10.1080/09523987.2017.1324360

Dyson, L. E. (2012). Student-generated mobile learning: A shift in the educational paradigm for the 21st century. anzMLearn Transactions on Mobile Learning, 1(1), 15–19. Australian and New Zealand Mobile Learning Group. http://hdl.handle.net/10453/22869

Finnegan-Kessie, T., Donnellan, P., Oswald, T., & Vaugh, T. (2020). Socially distanced higher education: Redesigning progress. AISHE-J: The All Ireland Journal of Teaching and Learning in Higher Education, 12(3), Article 3. http://mural.maynoothuniversity.ie/15766/

Goldman, T. (2018). The impact of podcasts in education. Pop Culture Intersections, 29, 1–16. https://scholarcommons.scu.edu/engl_176/29

Henry, A. (2022). Student engagement with digital video production. ELT Journal, 76(1), 109–118. https://doi.org/10.1093/elt/ccab050

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. https://doi.org/10.1007/s11423-008-9108-3

Mastrian, K., & McGonigle, D. (2019). Informatics for health professionals (2nd ed.). Jones & Bartlett Learning.

McGarr, O. (2009). A review of podcasting in higher education: Its influence on the traditional lecture. Australasian Journal of Educational Technology, 25(3). https://doi.org/10.14742/ajet.1136

Moryl, R. L. (2016). Pod learning: Student groups create podcasts to achieve economics learning goals. The Journal of Economic Education, 47(1), 64–70. https://doi.org/10.1080/00220485.2015.1106363

Norris, E., Steen, T. van, Direito, A., & Stamatakis, E. (2020). Physically active lessons in schools and their impact on physical activity, educational, health and cognition outcomes: A systematic review and meta-analysis. British Journal of Sports Medicine, 54(14), 826–838. https://doi.org/10.1136/bjsports-2018-100502

O'Callaghan, F. V., Neumann, D. L., Jones, L., & Creed, P. A. (2017). The use of lecture recordings in higher education: A review of institutional, student, and lecturer issues. Education and Information Technologies, 22(1), 399–415. https://doi.org/10.1007/s10639-015-9451-z

Park, T. (2019). Engaging students through a podcast assignment in Canvas LMS. In K. Graziano (Ed.), Proceedings of Society for Information Technology & Teacher Education International Conference (pp. 1101–1103). Association for the Advancement of Computing in Education (AACE). https://www.learntechlib.org/primary/p/207782/.

Peden, B. F., & Domask, B. Z. (2011). Do podcasts engage and educate college students? In R. L. Miller, E. Amsel, B. M. Kowalewski, B. C. Beins, K. D. Keith, & B. F. Peden (Eds.), Promoting student engagement (Vol. 1, pp. 170–177). Society for the Teaching of Psychology. http://teachpsych.org/ebooks/pse2011/index.php

Peterson, L., Scharber, C., Thuesen, A., & Baskin, K. (2020). A rapid response to COVID-19: One district's pivot from technology integration to distance learning. Information and Learning Sciences, 121(5/6), 461–469. https://doi.org/10.1108/ILS-04-2020-0131

Ramdeo, S., Balwant, P., & Fraser, S. H. (2022). Not another team assignment! Student perceptions towards teamwork at university management programs. Higher Education, Skills and Work-Based Learning, 12(6), 1122–1137. https://doi.org/10.1108/HESWBL-01-2022-0015

Ransdell, S., & Rieck, J. (2020). Closing the distance in distance learning: Strategies to increase intrinsic motivation in the time of COVID-19. Distance Learning, 17(3), 87–90.

Riebe, L., Girardi, A., & Whitsed, C. (2016). A systematic literature review of teamwork pedagogy in higher education. Small Group Research, 47(6), 619–664. https://doi.org/10.1177/1046496416665221

Rios, T., Elliott, M., & Mandernach, B. J. (2018). Efficient instructional strategies for maximizing online student satisfaction. Journal of Educators Online, 15(3), n3. https://www.thejeo.com/archive/2018_15_3/houston

Romero, R. L., Kates, F., Hart, M., Ojeda, A., Meirom, I., & Hardy, S. (2019). Quality of deaf and hard-of-hearing mobile apps: Evaluation using the Mobile App Rating Scale (MARS) with additional criteria from a content expert. JMIR MHealth and UHealth, 7(10), e14198. https://doi.org/10.2196/14198

Sahin, I., & Shelley, M. (Eds). (2020). Educational practices during the COVID-19 viral outbreak: International perspectives. International Society for Technology, Education and Science (ISTES) Organization. ISTES Organization. https://www.istes.org/educational-practices-during-the-covid-19-viral-outbreak-international-perspectives-7-b.html

Sanders, M. (Ed.) (2022). Creating inclusive and engaging online courses: A teaching guide. Edward Elgar Publishing.

Serhan, D. (2020). Transitioning from face-to-face to remote learning: Students' attitudes and perceptions of using Zoom during COVID-19 pandemic. International Journal of Technology in Education and Science, 4(4), 335–342.

Stoyanov, S. R., Hides, L., Kavanagh, D. J., Zelenko, O., Tjondronegoro, D., & Mani, M. (2015). Mobile app rating scale: A new tool for assessing the quality of health mobile apps. JMIR MHealth and UHealth, 3(1), e27. https://doi.org/10.2196/mhealth.3422

Tejedor, S., Cervi, L., Pérez-Escoda, A., Tusa, F., & Parola, A. (2021). Higher education response in the time of coronavirus: Perceptions of teachers and students, and open innovation. Journal of Open Innovation: Technology, Market, and Complexity, 7(1), 43. https://doi.org/10.3390/joitmc7010043