A Pandemic Pivot: Podcast as an Active Engagement Tool in the Classroom and Beyond

Derek Dang1, Sahar Moughnyeh2, Emily Stephens1, Vashti Convers3, Sarah Adkins-Jablonsky3,4, and Samiksha Raut1*

1Department of Neuroscience, The University of Alabama at Birmingham
2Department of Genetics and Genomics Sciences, The University of Alabama at Birmingham
3Department of Biology, The University of Alabama at Birmingham
4Alabama College of Osteopathic Medicine

Abstract

Higher education in STEM undoubtedly integrates the use of technology as a primary mode for content delivery to undergraduate students. This became especially salient throughout the shift to online education during the COVID-19 pandemic. Despite Learning Management Systems (LMSs) being the primary platform for delivering online instruction and fostering peer interactions, technologies embedded in LMSs do not maximize engagement, and therefore, students may not be able to share LMS materials with peers outside of the classroom. On the other hand, podcasts, episodic audio files that present information in a spoken word format, are commonly used in engaging students beyond the classroom across a variety of social media platforms. In contrast to traditional pedagogies, podcasts allow students to reflect on content rather than recite newly acquired information. This article outlines the basics of using podcasting in the classroom including recommendations for selection of podcast topics, formation of student groups, and production of a podcast, and highlights the anticipated student benefits along with potential applications. Previous studies have correlated student podcast usage to positive affectual experiences and learning outcomes, which play a role in Science, Technology, Engineering, and Mathematics retention. Furthermore, since podcasts use audio rather than visual recordings, podcasts can thus foster inclusion by helping to avoid barriers posed by video recordings such as students’ low confidence, various invisible barriers, or being overly conscious of their appearance. We recommend utilizing podcasts as a teaching tool to empower students to reflect and actively collaborate to synthesize course content related to classroom instruction and beyond.

INTRODUCTION

Conversation as Pedagogy

Active learning strategies allow instructors to rethink learning to empower students, a pivot from the traditional classroom dynamic of students simply watching, listening, or taking notes (1). Active learning engages students in peer-to-peer dialogue reflected in the conversational pedagogical framework (1-4). The conversational framework represents a constructivist approach to learning that allows students to formulate their own thoughts and ideas, enabling them to be communicated through conversation (2-4). The conversational framework can be paired with team and peer learning to facilitate active collaboration among students. A recap and retrieval study from Stavnezer and Lom measured students’ experiences and found that 95% of students surveyed enjoyed explaining a topic to one another and gained a deeper understanding through the experience (5). Koh and colleagues demonstrated that students who participated in teaching along with retrieval out-performed other students on overall test scores (6). Working in groups and setting collective group objectives not only improves student motivation and content retention but also paves the way towards the development of qualities like mutual respect and responsibility towards other group members (7). Thus, conversational pedagogies have the capacity to positively influence students’ learning outcomes and represents an important avenue in the context of an active-learning classroom.

Podcasts as an Engagement Tool

Online instruction, especially during the COVID-19 pandemic, hosted student conversations on Learning Management Systems (LMSs) with an intent to foster peer-to-peer interactions (8). Despite its ubiquity, an LMS may not fully engage students in virtual conversations beyond basic features like discussion boards, chats, and peer/group assignments. As a result, students may utilize these platforms to merely complete assignments for credit as opposed to actively engaging and immersing themselves in the content. Above all, LMSs are not designed to maximize student engagement in conversation beyond the classroom. Hence, there is a need to rethink approaches towards student engagement in higher education, especially on online platforms. While many pedagogies increase engagement in the classroom, the podcast stands out as a unique platform for a variety of reasons.

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Correspondence to: sraut@uab.edu, Department of Biology, The University of Alabama at Birmingham, 1300 University Blvd. CH490-B, Birmingham, AL 35294

*Correspondence to:
Podcasts, like radio talk shows, are audio recordings that can stylistically capture a conversation about a topic under study. As mentioned earlier, they also offer benefits of conversational framework pedagogies.

Previous studies show that collaborative creation of audio learning objects, such as podcasts, lead to enhanced learning outcomes related to individual and collaborative learning (9). As Mike Sharples in “Learning as Conversation” aptly summarizes, “conversation-based learning has less to do with the exchange of knowledge and more to do with becoming informed on how others interpret and understand topics” (2). Since podcasting allows students to work together and share perspectives among themselves and other invited interviewees, students can gain a wider breadth of knowledge and can approach situations from different perspectives. Finally, creating a podcast allows students to gain experience and greater insight into effectively communicating with their audience. While research on podcasting as a pedagogy is still in its nascent stages, previous studies related to similar initiatives like “infographics creation” show cognitive and affective gains when students adopt the role of an educator in a group. For instance, feedback from students tasked with creating an infographic reported that the process required deeper understanding and synthesis of material before condensing it into something unique (10). Similar outcomes are reported for infographic assignments in an online learning environment (11). We expect podcasts to have a similar impact as students are required to deeply understand the material before they can reconstruct the information, communicate effectively, and ultimately, share their perspectives.

Podcast Design

Educators implementing podcasts within a curriculum should begin by selecting a specific topic tied to the learning goals and objectives of their course. Furthermore, production software (see Figure 1) and student evaluation should be actively considered. Finally, if available, we recommend recruiting peer leaders or teaching assistants to aid instructors working to meet the needs of multiple students especially in a large-enrollment classroom.

The usual timeline for assigning students a podcast related project could involve a few weeks or even a full semester/term to create a quality product.

**PREPARATION: TOPIC SELECTION AND LEARNING OBJECTIVES**

For podcast topic selection, choose a theme that is heavily discussed in class to give students a strong scientific background. We recommend using backward design wherein learning goals and objectives center around a specific topic that could be tied to a podcast activity. As an example, in an introductory non-majors biology class in Spring 2021, our students created podcasts aligned with learning objectives about the COVID-19 pandemic similar with our learning objectives from previous semesters (11) (also see S4. Pandemic Pivot - Example Learning Goals and Objectives). Other examples can address socio-scientific issues like climate change, genetic engineering and vaccination. We recommend adding active learning lectures, primary literature articles, and other resources related to the selected podcast topic. This type of curricular design helps students see a connection between societal topics of interest and course content, which is many times beyond the scope of a textbook chapter. This strategy ultimately enables the students to further explore and enhance their scientific literacy which is especially critical for non-major students whose only exposure throughout their college career is one or two required science courses. We therefore, recommend that instructors should encourage students to utilize and integrate relevant scholarly sources related to the topic to enrich their own learning and awareness. We recognize that students, especially introductory-level students, may have limited experience finding, analyzing, and evaluating scientific source material. In preparation, we suggest instructors create a prerequisite LMS module or a short presentation to expose students to databases such as Google Scholar, PubMed, etc. and to instruct students how to critique their value (12). Furthermore, we encourage the CREATE strategy (see S2. Pandemic Pivot - Handout) as a method for students to approach primary scientific literature (13).

**GETTING STARTED: TEAM ASSIGNMENTS AND PEER LEADERS**

We encourage assigning podcast teams by adopting the “Group Work” rubric from Wilson et al., CBE-LSE (14). A student team should consist of three to five students to promote greater productivity and reduce social loafing (14). Teams tend to perform well when their members hail from diverse academic and cultural backgrounds (14). While there is no one ideal method, students can be grouped randomly, strategically, or be permitted to self-organize among themselves. Random assignment may encourage teams to be more focused and task oriented when creating a podcast (15). Additionally, paid tools such as CATME are available to strategically organize students into teams. Self-grouping allows students to experience a greater sense of commitment to their team, reduces group conflicts, and encourages enthusiasm (15, 16). There are many factors to consider when choosing a team formation method including class size, but ultimately, instructors should choose a method that is congruent with their teaching style and course objectives. We recommend that if this team activity is implemented in a class-size above 25, instructors should employ assistance from teaching assistants, peer-learning assistants, and/or upper-level
undergraduate students as volunteers. These assistants can function as peer leaders to monitor group work and serve as liaisons to provide progress updates to instructors. Our experience suggests that this strategy is particularly helpful for large enrollment classes (n >100), in which it may not be possible for one instructor to monitor the progress of multiple student groups. It would be ideal if an instructor can provide an orientation session to familiarize peer leaders with the podcast creation process and other instructions related to monitoring the progress of the student teams.

PRODUCTION: RECORDING, EDITING AND PUBLISHING

Once student teams have been identified, they work with their peer leader or instructor to determine a specific topic within the context of the assigned course topic/theme. Then, they need to create an outline of research questions related to the subsequent discussion of the approved/assigned topic. For instance, in our Spring 2021 class, students selected a myriad of topics related to the overarching theme of our module entitled “COVID-19 Vaccine Awareness.” “The Long Haulers” and “SARS-CoV-2 Vaccines on Infertility” were two of the topics. Beyond the first step, students enter a review period via zoom sessions outside of class time, in which they are instructed to further explore information from scientific literature related to the chosen topic. Thereafter, they create a thorough script for their podcast that includes incorporating scientific references, answering their research questions, and verifying that all students are participating. For the latter, we recommend using the Group and Self-Assessment tool (17). We further recommend that instructors consider this aspect of peer review when assigning a grade for this activity. Peer leaders can act as a resource to review reference material and oversee the script to suggest edits related to its scientific accuracy. Once approved by either a peer leader and/or an instructor, students record their audio using one of several platforms including Zoom, smartphones and recording devices (see Supporting Files S1, S2). Audio clips generated from these recordings can then be stylistically combined with music or other unique characteristics using free video editing software such as iMovie (for Mac) or Windows Movie Maker (for Windows). Once complete, students can use the free platform Anchor.fm to publish the podcast directly to the popular audio platform Spotify for submission and share it with a target audience. Students can also submit the audio file directly to their LMS without using Anchor.fm if it is not the intention to share the podcasts with the public. At the instructor’s discretion, this activity can act as a form of public service outreach, as students can disseminate their podcasts beyond the course via social media outlets such as Instagram, Facebook, Twitter, etc. We highly recommend that these student-created podcasts be shared virtually after obtaining appropriate student consent and/or media waivers under the governance of their respective home institutions.

POTENTIAL BENEFITS AND APPLICATIONS

Student Benefit

The benefits of active learning, particularly through the Conversational Framework (2-4), are well documented (1), and the active creation of audio learning objects like podcasts allows students to tap into this powerful learning outlet (9). While being guided by research questions, students learn how to employ effective research methods to appraise primary literature within a collaborative environment. Thus, creating a podcast enables students to enhance their critical thinking skills and provides them with an opportunity to contextualize information beyond the course material for effective science communication to the public.

Potential Applications

Podcasts open a conversation between students and an unseen audience about a wide range of topics from current events to cutting-edge breakthroughs in science. As an example, we use student-led podcast as an engagement tool to help students understand the importance of misconceptions related to COVID-19 vaccines. Our Spring 2021, non-majors biology course took place at a critical time in history as the world began to roll out vaccines for COVID-19. We wanted our non-majors biology students to explore and engage in this critically important current event and, most importantly, share the knowledge gained in our course with others. In addition to utilizing podcasts as a classroom engagement strategy for non-majors courses, this podcast project can also be effectively applied in upper-level biology classrooms to engage students by expounding on scientific principles and their ramifications. Students of cell biology, for example, may find use in creating a podcast about topics related to stem cells or genetically modified organisms. Similarly, students in a genetics course can engage in creating a podcast about various gene editing techniques like CRISPR with their peers. Regardless of course content, creating a podcast enables students to hone important skills like understanding and interpreting primary literature in addition to further developing skills like collaboration. We also envision that the podcast project can be utilized to engage students in co-curricular activities. As an example, our group has developed a podcast series entitled “New School, New You”, for heightening the issues experienced by transfer students (18). Beyond the classroom, student-led podcasts can be shared via campus social media platforms allowing students to exchange academic, social, and emotional experiences (18). Finally, student generated podcasts can be utilized to further explore learning gains in a course as a part of discipline-based education research.

LIMITATIONS

Limitations faced in student-led podcast production include access to technology, production downfalls, and quality of the final product. While 96% of people aged between 18-29 own smartphones (19), podcast production may require access to more advanced technology such as sustained internet speed, access to computers with microphones, and storage space and devices to collect voice recordings. In the United States, 9% of college students may not have access to a personal computer (20). This means that there is a possibility that some students may need additional resources and/or may not be able to participate. In this case, it would be important for instructors to seek campus-wide initiatives towards getting loaner laptops or similar technologies, if available. Additionally, the production of the podcast may be met with difficulties like confusion on how to record, edit, and upload the final product. We recommend providing the students with adequate and clear instructions on podcast creation along with a list of free and useful resources.
(see S1. Pandemic Pivot - Instructions). Finally, podcasting may not be as common as video creation, so while resources exist for ensuring high caliber video production (21), instructors need to monitor the quality of the podcast to ensure that students produce a product that has clear audio, professional voice, and accurate information. Indeed, while the use of a grading rubric can enable peer leaders to monitor the quality of the podcast, students also receive active and direct feedback to create an accurate and professional podcast.

SCIENTIFIC TEACHING THEMES

Active Learning
Podcasting allows students to work in teams to achieve individual and collaborative learning outcomes by comprehending and critically synthesizing the information related to the assigned topic. Student groups must thoroughly explore their topic/theme in the light of the course content by actively referring to the primary literature. After developing their own research questions, students learn to defend their perspective using scientific principles. In addition, students work in collaborative teams with regular feedback from peers, peer leaders, and the instructor.

Assessment
We suggest using guided reflections (see S3. Pandemic Pivot - Reflection) before and after the podcast activity to assess students’ understanding of the overarching topic and knowledge related to it. These reflections can be used to gauge the students’ level of understanding as well as to assess their growth in terms of research methods and critical thinking throughout the activity. Additionally, instructor-designed rubrics (see S2. Pandemic Pivot - Handout) can designate point values towards the entire activity. Instructors can also incorporate peer assessment of group members to the rubric to encourage equitable participation.

Inclusive Teaching
Peer leaders can act as moderators to encourage a collaborative yet inclusive learning environment. Effective student placement in groups can ensure that all groups have access to appropriate technology, include diversity, and encourage inclusion of student identities and perspectives. Those student groups who consent to sharing their final products on a public platform could be provided with an opportunity to conceal their identity if they agree by simply using their first names or by using alternate names. Additionally, instructors need to respect that students have the right to refuse public release of their content.

SUPPORTING MATERIALS
• S1. Pandemic Pivot - Instructions
• S2. Pandemic Pivot - Handout
• S3. Pandemic Pivot - Reflection
• S4. Pandemic Pivot - Example Learning Goals and Learning Objectives

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