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Streaming Science #4: Using Podcasts for Engagement with Your Target Audience[1]

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Introduction

This is the fourth publication in the *Streaming Science* EDIS series focused on how to use mobile hardware and software for engagement with your target audience. This publication focuses on how to produce podcasts to share science-based information with adult audiences and engage listeners in conversations about agricultural and natural resources topics impacting their everyday lives. Educators, scientists, Extension professionals, and students at land-grant universities and other organizations can cost-effectively produce their own podcasts for niche audiences (Chivers et al., 2021; Rose et al., 2021; Beattie et al., 2020).

Brief History and Definition

The use of audio to communicate has a rich history. The military and others used wireless telegraphs during the 1890s. Then, audio communication via radio technology and airwaves was developed in the early 1900s. AM/FM radio began in the 1920s; satellite radio, in the 1990s (Bathgate, 2020). And now there is the internet. The word "broadcasting" comes from agriculture and refers to the spreading or sowing of seeds (Merriam-Webster, n.d.). The word "podcast" is a combination of *broadcast* and *iPod* (Weldon, 2021). Podcasts came on the media scene in the early 2000s. Podcast production became widespread around 2015, when the first podcast listening application was offered on MP3 players, Apple mobile iPod devices, and smartphones (Bottomely, 2015). A podcast is "a downloadable audio file, found in an online podcast directory, searched out by listeners who may sign up to receive it on a regular basis" through various audio streaming services (Weldon, 2021, p. 9). Podcasts can be produced and listened to through a variety of methods and formats, and they often cover niche topics such as entertainment, health and wellness, science, food, crime, and more. The unique features of podcasts that set them apart from traditional radio broadcasting are that they are on-demand, have no time limitation, and audiences can choose when and where to listen to them (Rime et al., 2022).

Listener Demographics and Patterns

Podcast listening continues to grow in popularity. Research shows that 79% of the total U.S. population 12 years and older is familiar with podcasting, 62% have listened to at least one podcast, and 38% have listened to a podcast in the last month (Edison, 2022). Men (53%), women (46%), and non-binary (1%) people appear to listen to podcasts, and they are predominantly white (59%), with some African American (16%) and Hispanic (16%) audiences (Edison, 2022). Listeners are typically between the ages of 12–34 (47%) and 33–54 (33%) or are 55 and older (20%). While millions of people regularly listen to several podcasts, the act of listening itself is often a personal experience. People usually listen to podcasts at home (50%) or in their cars (20%) and on their smartphones (73%) or their computers (13%). Apple podcasts and Spotify are the most utilized podcast streaming platforms (Statista, 2023). Since podcasts are cheap to produce, not typically content-controlled by media networks or advertisers, and easily accessible, they cover a plethora of specific topics and often have niche audiences. The most popular podcast genres in the U.S. include comedy (22% share of weekly listeners), news (21%), true crime (18%), sports (17%), health/fitness (17%), religion/faith (16%), politics (16%), and self-help/productivity (15%) (Statista, 2023).

The Streaming Science Podcast Approach

Streaming Science includes a student-produced podcast series that began in 2016 at the University of Nebraska-Lincoln. Undergraduate and graduate students enrolled in a project-based course titled *Podcasting to Increase Science Literacy* in the University of Florida/Institute of Food and Agricultural Sciences (UF/IFAS) Department of Agricultural Education and Communication (AEC), facilitated by the lead author. Each create two science-focused podcasts. With student and guest speaker consent, the podcasts are then published via Streaming Science's podcast channel and shared with online audiences (Figure 1).



Figure 1. Podcasts are distributed through Buzzsprout to a variety of listening platforms. Credit:

Students in the course learn the basics of audio recording and editing, as well as about concepts such as science literacy, the scientific worldview, science inquiry, critical compassionate listening, the dialogic model for science communication, and attitude-change.

Podcast Creation

The following sub-sections outline intentional steps to the podcast creation process. National Public Radio's *Podcast Startup Guide* (Weldon, 2021) and *Turn Up the Volume: A Down and Dirty Guide to Podcasting* (O'Connell, 2017) informed many of the outlined suggestions. Examples of how *Streaming Science* podcasts are produced are also highlighted throughout.

A quick note about terms used in the following sub-sections: the term "podcast" is used to describe an overall audio program. "Series" or "theme" describe a group of episodes around a particular topic within a podcast, and "episode" is defined as the individual track or show.

Purpose and Planning

Determine the purpose of the overall podcast.

- What will your podcast be about? Who will listen to it? What is your mission?
- Start by listening to existing podcasts from the same genre as yours (i.e., science, health, politics, news, financial, etc.) that might have similar topics, audiences, and missions as your podcast. Take note of what you like, do not like, and what you would do differently.
- Define your target listeners and ask some of them for content ideas. Identifying your target audience and engaging with them from the beginning can help with content creation and ensure you are providing relevant information to your most dedicated listeners.
- Develop a mission statement and identify goals and objectives of your podcast series.
- Identify a tone for your podcast (i.e., educational, serious, humorous, motivational, etc.).
- Name/brand your podcast to match your purpose, audience, mission, and tone.

The *Streaming Science* podcast is geared toward a general online audience, but based on social media engagement, the platform's podcasts typically reach a more academic, university-affiliated audience.Science enthusiasts without background knowledge are well-primed to enjoy the *Streaming Science* podcast. Each semester, the *Podcasting to Increase Science Literacy* class explores a different topic. Past podcast series themes have included *Climate Change*, *Women in STEM*, *Big Data*, *The Science of Superstorms*, *H2Know*, *COVID-19's Impact on the Scientific Enterprise*, and *Artificial Intelligence (AI) in Action*. Before diving into their individual episodes, students work together at the beginning of the semester to develop their podcast series' purpose and define who their target audience is for the content they will capture as outlined above.

2. Build the team.

- Producing a podcast includes multiple roles and responsibilities. Depending on how often you plan to record, edit, and post your episodes, you will need to identify a personnel strategy with defined roles and responsibilities to consistently develop

and post episodes to foster a niche target audience following.
- Responsibilities may include researching content, scheduling guests, posting to website and social media, marketing/fundraising, engaging listeners, and recording, hosting, editing, transcribing, and publishing tracks.
- Some podcasts are produced by one person either as a full-time job, side hustle, or hobby, while others are larger operations and may include multiple employees working full or part-time.
- Potential personnel titles include content developer, host, producer, editor, and marketing and operations assistant.

Over the years, more than 65 student hosts and 100 guests have contributed to the *Streaming Science* podcast. Students choose guest speakers including scientists, Extension specialists, and other experts who relate to their podcast series theme; the students then craft an episode centered around the series' goals and audience.

3. Plan the format.

- Decide on a hosting style. Will you have a single host, cohosts, rotational hosts, or roundtable conversation?
- O'Connell (2017) recommended to start with episodes of 30 minutes or less and "earn" more time after building an audience and reputation. Length can be adjusted and should be determined based on listener feedback and analytics as well as production team time constraints.
- If discussing several topics in an episode, chunk content into smaller 10- to 15-minute segments. For instance, an episode might be organized into: segment one, topical theme one (10 minutes); segment two, topical theme two (10 minutes); and segment three, topical theme three (10 minutes). Maintain regular segments between episodes, while sometimes adding/trying a new segment for freshness.
- Determine if the podcast will be seasonal or year-round. Podcast episodes are often referred to by season and episode number. For example, if the plan is to do one episode a month for a full year and repeat annually, call the first year Season One, Episode One. The second year would start with Season Two, Episode One and so on.
- Consistency is key. Podcast episodes should be released at the same time and intervals so that listeners can know when to expect them. Develop a publishing schedule and stick to it. For example, new tracks might be posted every Tuesday morning or the first Friday afternoon of every month. There might be ten episodes in a season, with a break between seasons. Communicate the posting schedule to listeners.

Most *Streaming Science* podcasts are conversational, an undergraduate or graduate student interviews an expert for approximately 15 to 30 minutes. Questions are meant to contextualize the expert's work for a general audience and to provide an entertaining yet educational introduction to the spotlighted scientific topic. Students may include additional voice tracks to narrate their reflections and provide a summary of a conversation, or, sometimes, the podcast episodes consist of multiple interviews woven together. Each podcast episode includes an intro, outro, and music at the beginning and end. Each series has a similar intro and outro to maintain consistency across a topic.

Production

4. Curate an engaging and informative conversation.

- Podcasts are often personal and conversational; they transport the listener to a place or offer them new ideas through a story.
- Research the episode topic, guest, and/or story to be told ahead of time.
- Have a pre-meeting with the guest to establish a rapport and outline a map for the conversation so that they feel comfortable.
- Decide how each podcast episode will begin, what will be in the middle, and how it will conclude. What is the main takeaway the listener should have? Developing a script template for your podcast may be helpful to keep your episodes consistent and on topic.
- Hosts should actively indicate interest during an interview and listen intently to interviewees. Hosts should respond to guests with relevant segue comments during the interview and ask clarifying questions that lead to the next topical point. The conversation thus flows and is easy for podcast listeners to follow.

In the *Podcasting to Increase Science Literacy* course, students take on all the roles (content development, hosting, editing, marketing) when it comes to planning and producing their episodes. Students reach out to their intended guests early in the semester to schedule a pre-meeting and recording date. Then, students prepare for the pre-meeting by researching their guests and the topic. They identify popular press, presentations, blogs, and peer-reviewed publications by and about the guest speaker as well as information from a variety of sources and viewpoints of the topic to be discussed. During the pre-meeting, the student host and guest speaker get to know one another, go over recording hardware/software setups, develop a plan for the podcast conversation, and schedule a recording date.

5. Record audio like a professional. Audio can be recorded in a variety of ways. The key to professional-sounding audio is to use a microphone.

- Mobile options: smartphone or tablet with an audio splitter and two lavaliere or handheld microphones (such as iRig, RODE, or iVoice splitters and microphones) with an app such as Voice Memos, GarageBand, or Anchor to record soundZoom Multi-channel Microphones (field recorder microphone that records to SD memory cards and can connect to XLR microphones)
- Desktop options: laptop with USB microphone(s) (such as Blue Yeti or RODE) and software to record sound (such as Zoom, Riverside.FM, and Anchor)
- Studio options: XLR microphones, cables, boom arms, and mixer (such as TASCAM Mixcast, RODEcaster Pro)

Professional headphones are also recommended. It is important to listen to the audio as it is recorded and playback in the field/studio to ensure it is saved and sounds of high-quality without background noise. It is important to get sound quality right prior to recording. Most of the suggested audio recording equipment can be purchased from vendors and sites such as iOgrapher, B&H Photo, or Amazon.

Audio technology changes quickly, and over the years, *Streaming Science* has used a variety of hardware and software for podcast production. Students have recorded in-person interviews with iPads and smartphones using iRig splitters with lavaliere microphones in scientists' labs, classrooms, and offices. They have also used a small studio in the UF Department of Agricultural Education and Communication with a mixer and XLR microphones. For remote interviews, students have interviewed podcast guests through Zoom and Riverside.FM. A benefit of Riverside.FM is that the software records the host and guest voices on two separate tracks to isolate and edit specific sound issues at a higher level of professionalism than if the voices are blended on a single track.

6. Edit audio like a professional.

- Usually, podcasts are edited in audio software (such as Adobe Audition, Audacity (free), GarageBand, and Zencastr) on a laptop or desktop computer.
- Clean up the audio tracks to improve vocal quality: remove background noise. Level and equalize voices. Set volume limits and adjust any other vocal or noises that may be distracting. Most editing software include several filter options to improve audio quality. YouTube and LinkedIn tutorials are helpful for learning how to apply these techniques.
- Next, edit the content for flow. Cut content that is too long, boring, or does not make sense. Re-arrange any soundbites or conversation segments that flow better in a different manner. Then, remove "uhs," "ums," or any other filler words that might be distracting. Next, add bridging narration, advertisements, intros, and outros. Add natural sounds and music sparingly.
- Music can enhance the feeling and branding of a podcast via the intro, outro, and transitions. Some royalty free music sites include Incompetech, Free Music Archive, and Pixabay. Podcasting software such as Anchor.fm offer built-in music options.

Most of the *Streaming Science* podcasts are edited in Adobe Audition. Audition allows for multi-track professional audio editing and is typically the communications industry professional standard. However, some students have used Audacity as a free desktop alternative to Adobe Creative Cloud. Additionally, a couple of students opted to use the GarageBand mobile app on an iPad, but they did describe that the app had some limited capabilities for making advanced detailed edits to voice tracks.

7. Distribute your podcast far and wide.

- A podcast should first be posted to a hosting service platform to begin the distribution process. There

are several podcast hosting services to choose from, such as Anchor, Blubrry, Buzzsprout, PodBean, Transistor, and SoundCloud.

- Some podcast hosting services are free, and some have monthly or yearly charges, depending on audio file storage size requirements. While some services may be free, there may be file size limitations and advertising embedded on the site. Make sure to read the fine print details when choosing a hosting provider.
- A hosting service can stream podcast tracks to popular listening platforms such as Apple Podcasts, Google Podcasts, Spotify, Stitcher, and more.
- To maximize podcast accessibility, make sure to share the written text transcript of the podcast audio and show notes on the website. Sites such as Otter.ai can provide written transcripts of audio files. However, it is important to have someone proofread and correct misspellings and grammatical errors in automated transcripts for accuracy.
- Consider developing educational or discussion guides for each podcast episode; teachers, clubs, or other groups may use the guides for further learning about the featured topic.

Originally, *Streaming Science* first posted its podcasts to SoundCloud because it could stream to iPhones and Android devices through its own mobile app and was thus not limited to only iTunes. However, *Streaming Science* has switched onto Buzzsprout because the platform can push podcasts to *multiple* popular listening services, such as Apple Podcasts and Spotify.

Promotion and Engagement

1. Create and connect multiple online presences for a podcast to help grow its brand and audience. Consider leveraging a website and social media profile(s) on Facebook, Instagram, and Twitter to promote upcoming guests and episodes and the greater podcast.
2. Connect your online presence to similar organizations and podcasts to maximize visibility across social media channels: follow the social media accounts of your guest speakers and those similar organizations.
3. Have a conversation with the audience. Ask listeners to share questions and comments at in-person events and via email, phone, and social media posts to make the podcast more of a community dialogue.
4. Consider in-person engagements that you may regularly attend, such as annual professional conferences, community presentations, or guest lectures; these can be additional opportunities to gain more listeners.
5. Create logo-branded free merchandise—such as T-shirts, water bottles, and stickers—that can be given to listeners who interact with the podcast either online or at in-person events.
6. Track listening analytics to measure reach. Most podcast distribution services provide analytics reports that include total number of plays, estimated audience size, top episodes based on number of plays, geographic location of listeners, listening platforms used, and some listener demographics.
7. Survey listeners to measure reach. Announce the survey in a podcast episode, at community events, and in presentations. Create and send a customized survey via email listserv and social media to listeners to examine their motivations for listening and satisfaction with specific episodes.

Every *Streaming Science* podcast series has a featured subpage under the "Podcasts"category on the website. On the subpages, podcast players are embedded to allow in-page listening, in addition to a direct link to the Buzzsprout page that houses all the previous episodes. The podcast producers provide cover art, episode descriptions, and social media graphics and text to be used on *Streaming Science* Facebook, Twitter, and Instagram accounts, which redirect to the podcast series subpage on the website. For listener engagement, some podcast episodes include audience call-in questions for guest speakers that were recorded via a service called SpeakPipe; and all social media pages have comments turned on, allowing followers to share their questions and comments. *Streaming Science* tracks listening analytics through its distribution platforms. On SoundCloud, *Streaming Science* podcasts had 3,002 plays from 2016-2023. A *Women in STEM* episode was the most popular. The U.S., Mexico, and Spain were the top three countries to listen. On Buzzsprout, *Streaming Science* has had 977 downloads from 2021-2023 with the U.S., Europe, and Asia as the top three listening locations. "The State of the Scientific Enterprise during COVID-19"episode featuring an entomologist was the

most popular episode. Most listened to *Streaming Science* podcasts on the Buzzsprout website (26%), their web browser (17%), the Buzzsprout embedded player on the *Streaming Science* website (15%), Spotify (14%), or Apple Podcasts (8%).

Summary and Additional Extension Podcasts

Podcasts are popular and a low-cost way to reach a variety of target audiences with science-based information. There are several ways to host, record, edit, distribute, and promote a podcast depending on the target audience and purpose. Science communication undergraduate and graduate students use desktop and mobile hardware and software to develop *Streaming Science* podcasts typically around a science-focused topical theme featuring in-depth discussions with science and Extension experts with the goal to increase listeners' science literacy.

Extension can develop, implement, and evaluate podcasts for outreach, engagement, and education. Centers, lab groups, and county offices should consider following the steps outlined in this document to create a podcast mission, format, and content plan and invest in hardware and software scaled to fit their budget and delivery needs. Within UF/IFAS, several groups and individuals have launched successful podcasts for niche purposes and audiences. Some examples include:

1. UF/IFAS Center for Aquatic and Invasive Plants (CAIP) - Working in the Weeds:

- **Purpose:** Regularly connects people who "work in the weeds" and other curious stakeholders to clarify and discuss issues surrounding aquatic and invasive plants, highlight relevant research, share experiences from the field, and more (Krebs & Ferrell, 2022–present).
- **Format:** Bi-weekly, conversational interviews
- **Production team:** Christine Krebs (cohost, content development, and promotion), Raychel Rabon (content development, editing, and promotion), and Dr. Jason Ferrell (cohost and content development)
- **Hardware/software:** RODECaster Pro Podcast Production Studio, Shure SM58 Cardioid Dynamic Vocal Microphones, Adobe Audition editing software
- **Distribution:** Anchor (Spotify, Apple, Google, Overcast, Amazon Music, iHeartRadio, Castbox, Pocket Cast, Radio Public, and Stitcher)
- **Promotion:** Aquaphyte (CAIP digital newsletter), *Aquatics Magazine* promotional advertisement, scheduled social media posts (Facebook, LinkedIn, Instagram, and Twitter), professional conferences, and other in-person engagement opportunities
- **Listener analytics:** 4,308 all-time plays, average 120 plays per episode, streamed in 33 countries, 67% of listeners are in Florida (according to Anchor analytics).

2. UF/IFAS Honey Bee Research and Extension Laboratory (HBREL) - Two Bees in a Podcast:

- **Purpose:** Invites honey bee researchers, industry members, and other stakeholders from around the world to discuss recently published literature—exposing listeners to honey bee research, industry updates—and answer questions from the listeners regarding honey bee management, queen issues, pests, disease, nutrition, and pesticides.
- **Format:** Weekly episodes, each between 40 minutes to one hour long. The format has evolved over the years, but generally, episodes have included at least one guest speaker and ended with a 10- to 15-minute Q&A segment. Questions are pulled from listener emails or direct messages on social media.
- **Production team:** Amy Vu and Dr. Jamie Ellis (cohosts and content development), undergraduate student (editing and publishing), and another undergraduate student (reviews and proofreads transcriptions)
- **Hardware/software**: AKG K240STUDIO Semi-Open Over-Ear Professional Studio Headphones, On-State DS7200B Adjustable Desktop Microphone Stand, FIFINE Headphone Amplifier, AKG P220 Vocal Condenser Microphone, 2019 Microphone POP filter, bee-life 6-inch Dual Layered POP shield, Zoom, Adobe Audition, Otter.ai
- **Distribution:** The podcast is published on Anchor.fm and distributed on Wednesdays over seven platforms: Apple Podcasts, Spotify, Anchor, Podbean, Google Podcast, Facebook, Twitter, an e-mail listserv, and the honey bee lab's website.
- **Promotion:** The lab shares episode links on Facebook and Twitter. Hosts also give regular

Extension talks and promote the podcast during every PowerPoint presentation. Beekeepers' associations have promoted the podcast through word of mouth.

- **Listener analytics:** Two Bees in a Podcast has over 550,000 plays, with an audience size of over 2,400 a week in over 50 different counties. Listener demographics include male (70.7%) and female (27.9%), primarily between the ages 35–44. 77% listen on Apple Podcasts, 11.2% on Spotify, 2% on Podbean, and 9.8% on other platforms.

3. UF/IFAS Center for Public Issues Education (PIE Center) - Science by the Slice:

- **Purpose:** "Explores the science behind issues affecting our daily lives, encompassing public health, agriculture, and natural resources. Experts discuss the science of complex challenges in our society, then, through analysis and storytelling, piece together the motivations that reveal the way people think about, form, and act on opinions regarding these pivotal issues" (Phillip et al., 2021–present).
- **Format:** Rotational hosts with 1–2 guest interviewees; ~30 minutes episodes; 1–2 episodes published on the last Wednesday of each month
- **Production team:** Phillip Stokes (rotational host, content development, editing, and promotion), Michaela Kandzer (rotational host, content development, and promotion), Aly Morrison (editing), Raychel Raybon (editing), Sydney Honeycutt (promotion), Ricky Telg (reviewer), Karlibeth Leitheiser (education resource development)
- **Hardware/software:** RodeCaster Pro II for in-person interviews, Shure MV5 Digital Condenser USB Microphone, Rode NT2000 Condenser Microphone, Squadcast, Adobe Audition, Otter.ai
- **Distribution:***Science by the Slice* is hosted through Buzzsprout and distributed to Google Podcasts, Apple Podcasts, Spotify, Amazon Music, and embedded on the PIE Center's website.
- **Promotion:***Science by the Slice* is promoted on the PIE Center website, Facebook, Instagram, and LinkedIn, as well as through an email listserv after each episode release. The team also has merchandise, such as stickers and koozies, to hand out at events.
- **Listener analytics:***Science by the Slice* has 4,672 all-time plays from an audience in 38 different countries. The United States of America is the top location making up 91% of all listenership. The top apps used to listen are Apple Podcasts (40%), Buzzsprout embed player on the PIE Center website (18%), and Spotify (8%).

4. UF/IFAS Extension Polk and Pinellas Counties – Naturally Florida

- **Purpose:** Introduces Floridians and those visiting Florida to the wild spaces around them and the wild things that live here; encourages co-existence with Florida's native plants, animals, and ecosystems; and inspires listeners to seek out additional information and engage in citizen science projects to document Florida's biodiversity (Carnevale & Milligan, 2021).
- **Format:** 15- to 25-minute monthly episodes
- **Production team:** Lara Milligan (co-host, content development) and Shannon Carnevale (co-host, content development, editor)
- **Hardware/software:** Yeti Blue microphones, Riverside.FM, and Adobe Audition
- **Distribution:***Naturally Florida* is hosted through Anchor.fm and distributed to Apple Podcasts, Spotify, Google Podcasts, Amazon Music, Audible, Anchor, Breaker, Castbox, Pocket Casts, and RadioPublic.
- **Promotion:***Naturally Florida* is promoted on Polk and Pinellas County Extension Facebook Pages, and Polk County's Instagram. Additional promotional efforts include the website (www.naturallyfloridapodcast.com), transcripts (which increase SEO), posted flyers, news releases, guest podcasts, Extension presentations, and word of mouth.
- **Listener analytics:** As of June 2023, *Naturally Florida* has over 24,000 plays with an average of 434 plays per episode. Listener demographics include male (45.5%) and female (48.3%), primarily between the ages of 23 and 59, with most listeners falling in the 28–34 age range. 66.2% listen through Apple Podcasts, 14.5% through Spotify, 4.5% on the web browser, 2.6% on Google Podcast, and 12.3% on other platforms.

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Appendix A: *Streaming Science* Series Overview

Streaming Science #1: An Introduction to Using Mobile Devices for Engagement with Your Target Audience

Introduces the *Streaming Science* platform, the mobile technologies students have used to contribute work to the *Streaming Science* platform, and an overview of the types of content created for *Streaming Science* using mobile technologies.

Streaming Science #2: Using Webcast Electronic Field Trips for Engagement with Your Target Audience

Describes the webcast electronic field trip (EFT), how *Streaming Science* has used the webcast EFT format, and considerations for using this type of instructional and communication technology.

Streaming Science #3: Using Scientist Online Electronic Field Trips for Engagement with Your Target Audience

Describes the *Scientist Online* EFT, how *Streaming Science* has used the *Scientist Online* EFT format, and considerations for using this type of instructional and communication technology.

Streaming Science #4: Using Podcasts for Engagement with Your Target Audience

Describes podcasting, how *Streaming Science* has used podcasting, and considerations for using this type of instructional and communication technology.

Streaming Science #5: Using Virtual Reality Tours for Engagement with Your Target Audience

Describes virtual reality, how *Streaming Science* has used virtual reality, and considerations for using this type of instructional and communication technology.

Streaming Science #6: Using Google Classroom for Engagement with Your Target Audience

Describes Google Classroom, how *Streaming Science* has used Google Classroom to host a community of practice, and considerations for using this type of instructional and communication technology.

Streaming Science #7: Using Evaluation to Assess Engagement with Your Target Audience via Mobile Technologies

Describes how *Streaming Science* has used evaluation measures to determine engagement with target audiences through mobile technologies.

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