UF IFAS Extension UNIVERSITY of FLORIDA

UF/IFAS PEER REVIEWED

AEC763

https://doi.org/10.32473/edis-WC424-2022

Streaming Science #3: Using Scientist Online Electronic Field Trips for Engagement with Your Target Audience[1]

Jamie Loizzo, Caroline Barnett, Christine Krebs, and Gabriel Spandau[2]

Introduction

This is the third publication in the *Streaming Science* EDIS series focused on how to use mobile hardware and software for engagement with your target audience. The following article focuses on a second model, called *Scientist Online*, for live webcast electronic field trips (EFTs), which uses a scaled-down mobile technology approach and expert-to-audience dialogue-based format. Through *Scientist Online* EFTs, *Streaming Science* connects university scientists and Extension professionals with PK–12 students around the world for small-scale presentations, demonstrations, and discussions.

Expert Engagement

While education and engagement theory and research have indicated that learning happens best when it is experiential and hands-on (Kolb, 1983; Kolb, 2014), it is not always possible for target audiences to physically travel to in-person learning environments (Adedokun et al., 2011; Cassady et al., 2008; Loizzo et al., 2019). However, research has also shown that people can learn from vicarious experiences, such as engagement with or observation of expert role models (Bandura et al., 1963; Bandura, 1989). Target audiences can also vicariously gain a sense of place through technology-mediated communication and instruction featuring a variety of locations (Smith & Sobel, 2010).

EFTs make it possible for experts to engage audiences at a distance to dialogue and vicariously learn about content, related careers, and natural resources spaces (Loizzo et al., 2022). A two-way conversational dialogic approach is key to a scaled-down EFT model. Research over time has shown that simply sharing information with audiences has little impact on their attitudes and behaviors (Nisbet & Scheufele 2009; NASEM, 2017). Instead, experts should consider participating in programming that includes opportunity for dialogue with target audiences to positively affect changes in attitudes, knowledge, and behaviors (Reincke et al., 2020).

Scientist Online Production Process

The *Scientist Online* model is a simplified, one-on-one, dialogue-based version of the project's foundational EFT approach outlined in the Streaming Science #2 publication in this series. *Scientist Online* EFTs follow a preproduction, production, and postproduction cycle.

1. This document is AEC763, one of a series of the Department of Agricultural Education and Communication, UF/IFAS Extension. Original publication date December 2022. Visit the EDIS website at https://edis.ifas.ufl.edu for the currently supported version of this publication.

2. Jamie Loizzo, assistant professor and e-learning coordinator, Department of Agricultural Education and Communication; Caroline Barnett, graduate assistant, Department of Agricultural Education and Communication; Christine Krebs, education and training specialist, Center for Aquatic and Invasive Plants; and Gabriel Spandau, graduate research assistant, Department of Agricultural Education and Communication; UF/IFAS Extension, Gainesville, FL 32611.

Preproduction—Topic Identification, Expert and Materials Preparation, Audience Recruitment, and Practice

TOPIC IDENTIFICATION

The first part of preproduction is to identify the topic. *Streaming Science* primarily focuses on STEM content and contexts for subject matter, which is determined by science standards, partnerships and collaborators, and funding context. Science standards help guide the flow of information, make the content relatable for Florida classrooms, and incentivize teachers to include this program in their science lesson plans. This helps to give real-world context to student standardized testing preparation. Partnership and collaboration with experts can occur concurrently with identifying a topic. This includes working with scientists, Extension specialists and agents, industry professionals, or stakeholders with substantial expertise in the topic field. Often, the organization or partnership will identify a research project or topic they are working on that they would like to see highlighted during the *Scientist Online* EFT. From there, a location for filming and a target audience that best fits the purposes of the EFT can be selected.

EXPERT AND MATERIALS PREPARATION

The more time to prepare, the better. It is important to meet with your scientists or subject matter experts (SMEs) at least twice before the program begins and at least a month ahead of the EFT implementation. By meeting with SMEs ahead of time, it makes it easier to (1) get to know them and their work, (2) tour their work environments (labs, field sites, etc.), (3) further plan the content, such as location, developing PPT slides, identifying props to be used, and continuing to craft messages to meet science education standards, and (4) schedule the dates and times the EFTs will be offered. EFTs are highly technical in nature, so it is important to ensure that the selected location will support Wi-Fi connectivity and is clear of distractions visually and audibly.

When assembling communication materials, such as advertisements and PPT slide templates, consider providing SMEs an already formatted communication toolkit to match the program's branding; for instance, SS provides SMEs a PPT template to work from that includes branding with relevant logos as well as a suggested outline for their speaking points. Our prior research from our *Scientist Online* EFTs indicated youth audiences preferred experts to use props to demonstrate content more than slides and talking on the screen (Krebs et al., 2020). We often work with the SMEs to develop their content following the steps of scientific inquiry: issue under investigation (big picture context), research questions and hypotheses, study design (including data collection and analysis), tools and technology used, and results.

AUDIENCE RECRUITMENT AND PRACTICE

Toward the end of the preproduction stage is the best time to initiate audience recruitment tactics. Once a topic and expert team are identified and collaboration has begun, determine the target audience for the program and begin recruitment. Promote the EFT through appropriate channels, such as direct contact, word of mouth, email listservs, social media, and related events or meetings. Consider having a registration form for audience members to sign up to participate; this is helpful for scheduling, determining audience size, and follow-up reporting about program reach and audience analytics. The first *Scientist Online* EFTs utilized the Skype in the Classroom platform, which included a scheduling feature, connection to Microsoft Educators around the world, and the Skype videoconferencing software (Beattie et al., 2020). However, the platform no longer exists, and we now use Google Forms for participants to register. Provide participants with scaffolded materials such as guides, viewing technology suggestions, and connection information for successful EFT implementation. We develop and share a Teachers' Guide and send informational emails to participants before the EFT. Before webcasting live, it is important for the SMEs and production team to practice the program: test the internet connection from the desired location, determine visual background and camera angles, and practice running through the content for speaker comfortability.

Figure 1. Behind-the-scenes photos of various *Streaming Science: Scientist Online* EFTs.
Credits: Jamie Loizzo, UF/IFAS

Production—Hardware, Software, Team Roles, and Content Format

Scientist Online utilizes cost-effective mobile hardware and cloud-based software to connect experts with youth in classrooms, home schools, clubs, and after-school programs around the world. Provided below is a list of technology used and some considerations for each:

- Internet—If a locally established internet or Ethernet connection is limited or not available, a mobile internet hotspot such as the Verizon MiFi JetPack is beneficial for video streaming. Make sure to check internet provider maps and test connection speeds with a mobile application such as Speed Test & Wifi Analyzer+.
- Laptop—Use a laptop with streaming software and a built-in or USB camera for the main head and shoulder shots of the expert speaking and screen sharing.
- Stand—In order to smoothly move the laptop to show viewers around the location, place the computer on a stand with wheels, such as a music stand secured to dolly wheels.
- iPad or Smartphone—A mobile device such as an iPad or smartphone can also be connected to the same videoconference call to provide close-up shots of props, demonstrations, and other angles of the location.
- Microphone—On-camera hosts and guests should use handheld or lavalier microphones for the clearest quality audio (smartphone wireless microphone systems such as Samson Go Mic Mobile or iRig Mic Lav are some options).
- Streaming software—For an EFT with one-on-one engagement, typical videoconferencing software such as Zoom, Skype, or Microsoft Teams will suffice; it is also possible to have multiple locations call into the program, but the conversation may become overwhelming as compared to a call with only two participating sites. In the *Scientist Online* approach, audience participants are encouraged to unmute their video and audio and verbally ask questions during the program instead of only using the chat function.
- Miscellaneous—The laptop, mobile device, and microphone receiver should all be fully charged the day before the EFT; fresh batteries should be installed in the microphone before the program. An extension cord is useful for keeping the laptop fully charged during the program. Headphones should be used with the mobile device to prevent an audio feedback loop with the laptop; a portable Bluetooth speaker connected to the laptop might be helpful for making the sound louder from the laptop for the speaker to hear participants in noisy settings. All gear should be recharged between EFTs. The equipment can overheat in full sun or high-temperature locations, so an umbrella, tent or overhang is useful to keep the expert speaker and equipment cool.

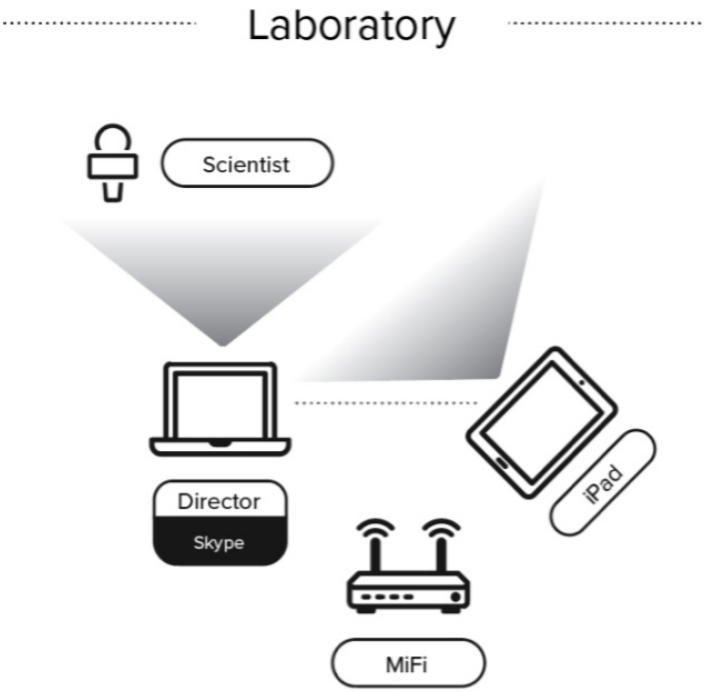

Figure 2. A Diagram of an Example *Streaming Science: Scientist Online* Production Setup.
Credits: Loizzo et al. (2020)

It usually takes an expert presenter and a professional communicator to effectively implement and facilitate a *Scientist Online* EFT. The expert can operate the laptop, their slides, props, and facilitate the dialogue. The professional communicator can introduce the program, support dialogue by monitoring the chat, and use an additional mobile device such as an iPad to show the audience wide shots of the location and close-ups of props used in a demonstration. The programs can vary in length and should be customized to the target audience's schedule. For instance, we often ask teachers to indicate what time of day they prefer to connect and the length of their class period. *Streaming Science* encourages scientists to organize their content as follows:

- Introduction—Background information about the expert; show participants around their live location.
- Big Picture—What issue are they working on? Why should the target audience care? What is the big picture context of their work?
- Discussion Break—Participants unmute and ask questions/discuss ideas or post them in chat.
- Research Breakdown—Experts apply and discuss a specific research study in terms of the scientific inquiry

steps (hypothesis, data collection and analysis, tools they use, and solutions they are finding or research tweaks they are making based on preliminary findings).

- Discussion Break—Participants unmute and ask questions/discuss ideas or post them in chat.
- Call to Action—Expert outlines ways participants can make science-based decisions and behavior changes to positively influence the scientific issue presented in the program.
- Further Discussion—Expert and participants have further dialogue about the program topic, location, and related careers until close of program time.

Postproduction—Target Audience Follow-up and Analytics

After a *Scientist Online* EFT, it is ideal to follow up with the target audience. EFT developers should send an email to participants with:

- links to recordings of the EFT,
- reminders about any wraparound materials or activities audience members could complete to reinforce or expand learning of EFT content, and
- suggestions for staying connected to any community of practices (CoPs), or email listservs related to the EFT.

Additionally, it is ideal to measure EFT impacts on participants' content knowledge, attitudes, and/or behavior intentions via pre/post or retrospective postevaluations and viewing analytics from the livestreaming platform. More recommendations for developing a CoP and assessing EFTs can be found in articles six and seven of this EDIS series.

Program Examples

Streaming Science: Scientist Online EFTs began in 2019 at the University of Florida for middle and high school–aged audiences. Examples of past programs include:

The Science of Mosquitoes—Connected students with entomologists who discussed the biology of mosquitos, mosquito-related diseases, disease prevention and protection, and careers in entomology. In partnership with the UF/IFAS Center for Public Issues Education, Lucky Lab, and part of the Prevent & Protect project funded by the Florida Department of Health.

The Water Around Us—An introduction to water science, urban water sheds, nutrient cycling, and manatee food webs in partnership with the UF/IFAS Department of Soil, Water, and Ecosystem Sciences.

Restore the Shore—An overview of living shorelines and their benefits in combatting the effects of sea-level rise and coastal erosion in partnership with the UF/IFAS Nature Coast Biological Station and funded by the Florida Sea Grant.

Future of Our Food—This program taught students about everyday agricultural practices, including grafting, cover crop use, and different forms of strawberry production, while also advancing the ideas of sustainability and protecting the environment in partnership with the UF/IFAS Horticultural Sciences Department Teaching Garden.

Summary

EFTs can be developed and implemented via a variety of instructional and communication technologies and formats. The outlined *Scientist Online* EFT version offers a systematic and simplified approach for utilizing a scaled-down mobile technology setup for connecting experts in agricultural and natural resource spaces and places with target audiences. *Scientist Online* EFTs are rooted in the following principles:

- Emphasis on a one-site-to-one-site method to promote rich dialogue as experts and guests engage in scientific content.
- Target audience introduction to locations they may not have otherwise visited, STEM research seeking solutions to agricultural and environmental challenges, related careers, and calls to action for science-based decision-making and behaviors.
- Utilization of mobile multimedia technologies for low-cost, immersive live video webcasting.
- Science communication professionals and experts working collaboratively for EFT development, implementation, and evaluation.

Supplemental Information

The *Streaming Science: Scientist Online* EFT model is ever evolving based on research, teaching and learning experiences, and evaluation feedback. To learn more about the model and related research in greater detail, review the following academic peer-reviewed professional development and scholarly presentations and articles:

Nickerson, C., Barnett, C., Nash, T., Loizzo, J., Warner, L., Barry, S., & Allen, M. (2022). Picturing coastal climate change mitigation strategies: Science engagement impacts on youths' conceptualizations of living shorelines [Poster presentation]. Association for Communication Excellence

(ACE) in Agriculture, Natural Resources, and Life and Human Sciences, Kansas City, MO.

Loizzo, J., Barnett, C., Warner, L., Barry, S., & Allen, M. (2022). Online outreach and engagement in the HyFlex era: Connecting youth with UF/IFAS Experts during COVID-19. College of Agricultural and Life Sciences (CALS) Teaching Enhancement Symposium. University of Florida. (Recorded presentation due to COVID-19).

Barnett, C. P., Beattie, P. N., Suits, T. E., Sheppard, T. D., Loizzo, J. L., Warner, L. A., Diaz, J. M., Reisinger, A. J., & Siders, A. C. (2021, March). The water around us: Youth's connectedness to water through a manatee-focused electronic field trip. Public Interest Environmental Law Conference (PIELC). (Online due to COVID-19).

Barnett, C. P., Suits, T. E., Sheppard, T. D., Beattie, P. N., Loizzo, J. L., Warner, L. A., Diaz, J. M., Reisinger, A. J., & Siders, A. C. (2021). Youth's connectedness to water through a manatee-focused electronic field trip [Poster presentation]. Southern Region American Association for Agricultural Education (SAAAE) Conference. (Online due to COVID-19).

McLeod-Morin, A., Beattie, P., Stone, W., Kent, K., Loizzo, J., & Telg, R. (2020). The science of mosquitoes: Youths' perceptions, engagement, and learning from a Skype in the Classroom science communication program. *Advancements in Agricultural Development*, *1*(2), 79–89. https://doi.org/10.37433/aad.v1i2.51

Krebs, C. L., Loizzo, J. L., Stone, W. A., & Telg, R. W. (2020). Scientist Online: Entomologists' experiences engaging with school audiences through Skype in the Classroom. *Frontiers in Communication—Science and Environmental Communication*, *5*(576593). https://doi.org/10.3389/fcomm.2020.576593

Beattie, P. N., Loizzo, J. L., Kent, K. W., Krebs, C. L., Suits, T. E., & Bunch, J. C. (2020). Leveraging Skype in the Classroom for science communication: A Streaming Science – Scientist Online approach. *Journal of Applied Communication*, *104*(3), 1–15. https://doi.org/10.4148/1051-0834.2328

References

Bandura, A. (1989). Social cognitive theory. In R. Vasta (Ed.), *Annals of child development. Vol. 6. Six theories of child development* (pp. 1–60). JAI Press.

Bandura, A., Ross, D., & Ross, S. A. (1963). Vicarious reinforcement and imitative learning. *The Journal of Abnormal and Social Psychology*, *67*(6), 601.

Beattie, P. N., Loizzo, J. L., Kent, K. W., Krebs, C. L., Suits, T. E., & Bunch, J. C. (2020). Leveraging Skype in the Classroom for science communication: A Streaming Science – Scientist Online approach. *Journal of Applied Communication*, *104*(3), 1–15. https://doi.org/10.4148/1051-0834.2328

Kolb, D. (1983). Experiential learning, experiences as the source of learning and development. Englewood Cliffs, New Jersey: Prentice Hall.

Kolb, D. A. (2014). *Experiential learning: Experience as the source of learning and development*. FT press.

Krebs, C. L., Loizzo, J. L., Stone, W. A., & Telg, R. W. (2020). Scientist Online: Entomologists' experiences engaging with school audiences through Skype in the Classroom. *Frontiers in Communication—Science and Environmental Communication*, *5*(576593). https://doi.org/10.3389/fcomm.2020.576593

Loizzo, J.,Harner, M., Weitzenkamp, D., & Kent, K.(2019). Electronic field trips for science engagement: The Streaming Science model. *Journal of Applied Communications*, *103*(4), 1–11. https://doi.org/10.4148/1051-0834.2275

Loizzo, J., Krebs, C., & Nickerson, N.(2022). Connection classrooms to natural resource places and faces: Electronic field trips and virtual reality tours. *The Agricultural Education Magazine, 95*(1), 10–13. https://www.naae.org/profdevelopment/magazine/archive_issues/Volume95/2022%2007%20--%20July%20August.pdf

National Academies of Sciences, Engineering, and Medicine (NASEM). (2017). *Communicating science effectively: A research agenda*. Washington, DC: The National Academies Press. https://doi.org/10.17226/23674

Nisbet, M. C., & Scheufele, D. A. (2009). What's next for science communication? Promising directions and lingering distractions. *American Journal of Botany*, *96*(10), 1767–1778. https://doi.org/10.3732/ajb.0900041

Reincke, C. M., Bredenoord, A. L., & van Mil, M. H. W. (2020). From deficit to dialogue in science communication. *EMBO Reports*, *21*(9). https://doi.org/10.15252/embr.202051278

Smith, G. A., & Sobel, D. (2010). *Place- and community-based education in schools*. Routledge.

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 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.