Online Education Tools: Effective Practices from DOSITS

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Online learning through virtual seminars (webinars), live streaming, virtual meetings, website material, and instructional videos all rose in use and popularity during the 2010s. With the onset of the Covid-19 pandemic in 2020, the Acoustical Society of America (ASA) and its members, along with the rest of the world, dramatically increased their use of these virtual tools. Life was transformed into Zoom meetings, Microsoft Teams engagements, and other online learning experiences. This cultural shift has led to some positive developments, such as broader engagement in learning experiences with those whose involvement has been limited previously by a lack of travel funding. However, there have been some negatives, including calendars overcommitted with many more online learning experiences that lacked the depth one would experience in person.

Still, even with some negatives, the very positive advantages of online learning and meetings suggest that even as the pandemic wanes, these new-found tools and skills will not. Indeed, the ASA, like many other societies, has started to explore how it can expand its impact by providing educational tools that not only are directed at members but also at a wider community interested in acoustics in all of the diverse ways in which it is approached by its members.

Moreover, along with the increased use of virtual tools, the selections of available tools have increased, and the tools themselves have been greatly improved. Most virtual platforms are now more stable, are easier to use, and have added functionality, and perhaps most significantly, most people have become more familiar with using such tools, particularly as participants in events or consumers of information.

Knowing about the increased interest in online education and tools by the ASA and its members, the editor of *Acoustics Today*[1] asked the Discovery of Sound in the Sea (DOSITS) project, an affiliate of the ASA and *Acoustics Today*, to share lessons learned over the 20 years of our online educational presence.

As background, Scowcroft (2021) provides the history of the DOSITS project, which celebrated its 20th anniversary last year and will be celebrating the 20th anniversary of the project website (see dosits.org) on November 30, 2022, with a special webinar (see dosits.org/webinar2022). One of our most cherished honors is the Science Writing Award in Acoustics for Media other than Articles presented by the ASA in 2007. The foundational core of the project is to make acoustics accessible for all audiences, including the public, educators, students, news and media professionals, and decision makers (Vigness-Raposa et al., 2014, 2016). DOSITS has accomplished this using multiple digital platforms (Morin et al., 2017) and educational principles that develop critical thinking skills and deeper engagement.

Thus, the purpose of this article is to share best practices for developing online learning experiences, highlighting the techniques for building and engaging your audience. It provides insight into some educational tools that have been very successful in engaging and challenging participants in their online learning. Multiple digital platforms as potential vehicles for online learning are presented, including webinars and how to structure them to have broad reception and impact; websites with sufficient versatility to engage across different devices and guide participants along a progressive path of knowledge development; and short instructional videos to build interest and animate abstract or hard-to-visualize scientific processes.

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1 For full disclosure, the editor of *Acoustics Today* is a member of the DOSITS science advisory board.

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Building and Engaging Your Audience

Online learning experiences should be designed to target a specific audience and meet its needs while also understanding the obstacles and challenges for online learning. Needs assessments can be helpful, asking your audience members about their backgrounds, learning expectations, content needs, and engagement characteristics. Understanding their foundational knowledge and the content and format they find most useful to support their work is critical to building and engaging your audience.

The content of the experience should also be targeted. Are you trying to fill a knowledge gap in existing resources, providing expanded information on a specific topic or are you trying to present new information to an informed audience? Because online audiences may come from a variety of backgrounds, it is important to provide links to resources covering foundational information, designing the learning experience to bring all audience members to the same level, allowing for successful engagements.

Part of knowing your audience is a consideration of logistics. If you are expecting to reach a global audience in real time, you must carefully select a date and time that is most convenient to the majority of participants. Are there technological challenges, such as times at which Internet connectivity or accessibility of certain online tools are reduced? It is important to remember that participants may not have administrative access to their computers and installing novel software could be difficult.

Finally, you must market your online learning experience to your potential audience. Make sure there are posts on common email listservs, appropriate professional society bulletins, or perhaps social media platforms. Providing information about the content and format of the event is critical. It may be helpful to develop an outline or create a short video to advertise the experience. Ensuring that the audience's expectations are aligned with the learning experience is foundational to success.

Specific Tools
Webinars and Other Live Events

This discussion focuses on webinars, but other live events, such as live streaming, can be related depending on how they are structured. Certain audiences are unable to join Webex or Zoom webinars because of security restrictions. Thus, it is advantageous to provide multiple options for the audience to participate in the webinar, such as concurrent live streaming on YouTube or Facebook.

The first step in designing a successful webinar is to select an appropriate speaker or presenter. This individual should be knowledgeable in the focused content of the webinar as well as in the goals of the webinar and background information on the audience. The speaker should also conduct a trial run of their presentation to ensure compatibility of their media with the software platform as well as with the appropriate Internet bandwidth, lighting, and quality of their audio. During the trial run, feedback to the speaker is helpful on topics such as pace of delivery, clarity of terms, and progressive development of knowledge and/or references to background information.

The webinar presentation should be structured to include references to ongoing research and/or case studies as well as an interactive question and answer (Q&A) session. Audiences appreciate the real-world connection provided by case studies that demonstrate the implementation of the science being presented. For the Q&A session, the audience should submit questions to the webinar platform throughout the presentation. A moderator can curate questions and pose them to the presenter, providing for real-time interactions with the expert. We have found that webinars should be about 1 hour in duration, with a presentation of approximately 40 minutes and a Q&A session of 20 minutes. This allows enough time for the speaker to present their topic in sufficient depth without being tempted to dive too deep, for the audience to ask questions and engage with the presenter, and for participants to find time for the webinar in their schedules. During the Q&A session, questions should be included from all participation platforms.

The webinar should be supported with associated resources to engage the audience. Providing an outline of the webinar to participants prior to the event is highly recommended. The outline should include Internet links to background information and/or scientific papers to enhance and elaborate on the webinar concepts. After the webinar, a PDF of the presentation and a transcript of the event can provide deeper audience engagement. Recording the webinar to allow for asynchronous viewing is encouraged, but this may also require some technical editing prior to posting.

Figure 1. *The web page for a Discovery of Sound in the Sea (DOSITS) webinar demonstrating best practices for audience engagement (see dosits.org/modeling).*

Figure 1 is a screen grab illustrating these principles for a recent webinar hosted by the DOSITS project. The webinar was "Acoustic Propagation Modeling" presented by Aaron Thode of the Scripps Institution of Oceanography (La Jolla, California) (see dosits.org/modeling). An outline of the webinar was provided prior to the event with links to supporting content on the DOSITS website. After the webinar was conducted, a PDF of the presentation and a transcript of the webinar were created and posted. In addition, an archived recording of the webinar was made available. After the webinar is conducted, a survey of the participants can provide very constructive, immediate feedback on the level of the content, the pace of the presentation, and whether the needs of the audience were met as well as providing suggestions for future webinar topics and/or speakers. It may also be important to your audience to be able to receive a Certificate of Professional Development or verification of participation. The DOSITS project has conducted numerous needs assessments of our audiences, and this has been continually mentioned as a much-appreciated benefit to our annual webinar series.

Websites

Websites were one of the first available online learning tools, but their structure and function have changed considerably over the past two decades as Internet connectivity has increased. However, the foundational principles of good online learning websites remain steadfast. The content should be organized into digestible sections, with titles and structure that challenge inquiry. Starting titles with "what," "how," or "why" challenges the audience to think critically and internalize the content. Making the content interactive also leverages the advantages of online tools. For the DOSITS project, the Audio Gallery (see dosits.org/audio) and the Science of Sound (dosits.org/science) are favorite sections because their interactive nature targets a wide variety of interests and ability levels.

Science topics may have a certain level of controversy, so basing a website on peer-reviewed literature is critical. The content of the website is verified and validated by providing references and links to peer-reviewed material. Synthesizing published science into digestible content for an audience can be a focused project goal, such as it is for DOSITS. Using peer-reviewed literature ensures that the scientific community has approved of the science and its methods. To further ensure that the synthesis process has not compromised the scientific integrity of the peer-reviewed literature, peer review of the website content itself can be conducted. The DOSITS project holds semiannual Advisory Panel meetings to review all content before it is published. Advisory Panel members, all of whom are ASA members, also work together to ensure that relevant publications are included in DOSITS content. It is also important to be transparent about how the website is funded and who has built it and is responsible for its maintenance.

Finally, a best practice for educational websites is to create structured tutorials. Structured tutorials link successive web pages to progressively develop knowledge on a particular topic. The web structure of websites can be overwhelming for some audience members, so a structured tutorial provides a clear starting point and a path for incrementally developing knowledge. For example, the DOSITS project has developed three structured tutorials: The Science of Sound, The Effects of Underwater Sound on Marine Life, and The Technologies of Underwater Sound (see dosits.org/tutorials).

Instructional Videos

Instructional videos should be short, focused clips that tap into the YouTube generational mindset of

instructional learning. It is important that instructional videos are not just lectures or talking heads but that they include animations, illustrations, or field recordings, leveraging the advantages of online learning tools. Video length will depend on the content being presented, but a general rule is a duration of less than five minutes. If more time is needed to adequately address the content, then a series of instructional videos would better serve the audience. Also make sure the instructional video is staying focused on a particular topic. Again, if the topic is complex, a series of instructional videos, each one focused on one facet of the content, would engage the audience better. The DOSITS project has developed three instructional videos: Science of Sound, Marine Mammal Hearing, and Hearing in Marine Fishes (see dosits.org/videos).

Summary

Online learning is a great mechanism for reaching diverse audiences, and its implementation will continue in popularity. Simple tweaks to existing practices can help build and engage audiences, propelling your online teaching to greater rewards. Remember that online learning is often optional; the audience is not required to complete a class or project as is often the case with traditional learning. Because online learning is something audience members are choosing to do, conducting questionnaires or needs assessments will inform your content choices and selection of appropriate educational tool(s). By understanding the interests and preferences of your audiences, you will develop educational tools that attract audiences as well as educate them.

References

Morin, H., Vigness-Raposa, K. J., Knowlton, C., Scowcroft, G., Miller, J. H., Ketten, D. R., and Popper, A. N. (2017). Implementing multiple digital platforms to effectively communicate research on underwater acoustics. *Proceedings of Meetings on Acoustics* 27(1), 010007. https://doi.org/10.1121/2.0000255.

Scowcroft, G. (2021). The Discovery of Sound in the Sea project: Twenty years of success in synthesizing science for nonexperts. *Acoustics Today* 17(4), 78-80. https://doi.org/10.1121/AT.2021.17.4.78.

Vigness-Raposa, K. J., Scowcroft, G., Miller, J. H., Ketten, D. R., and Popper, A. N. (2016). Discovery of Sound in the Sea: Resources for educators, students, the public, and policymakers. In Popper, A. N., and Hawkins, A. (Eds.), *The Effects of Noise on Aquatic Life II*. Springer-Verlag, New York, NY, pp. 1183-1190.

Vigness-Raposa, K. J., Scowcroft, G., Morin, H., and Knowlton, C. (2014). Underwater acoustics for everyone. *Acoustics Today* 10(2), 50-59.

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