Tips for Successful Web-Based Training

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Abstract

The COVID-19 virus forced many pesticide safety education programs to conduct training exclusively online in 2020. Although the transition was sudden, and for some temporary, many programs will continue to utilize online technologies for pesticide training. While online programs are convenient, more effort and consideration are required beyond opening a webinar and presenting material. Ensuring the presenter can be clearly seen and heard, without distractions, is accomplished by properly setting locations for camera, lighting, and microphones. Slide design and transitions likely need to be altered to maintain audience attention. Unique online considerations like bandwidth must be addressed to maximize engagement. Finally, maintaining an online audience's attention through interactions must be different from in-person training. This article provides essential tips and guidance on better hosting for online training of pesticide safety education.

Keywords: applicator recertification, COVID-19 pandemic, Microsoft Teams, pesticide safety education programs, virtual training, Zoom

Introduction

Pesticide safety education, certification, and training has traditionally been conducted in a face-to-face classroom environment. Although other technologies like online webinars and asynchronous modules have been utilized, stakeholders are most familiar with an in-person experience. As discussed in Bultemeier et al. (2021), the COVID-19 pandemic forced pesticide safety training onto a variety of online platforms. Many programs had to adapt and learn what technologies could be used, while providing a secure learning environment. Though many adopted these technologies, much can be learned about utilizing them most effectively. In short, simply moving content online does not automatically equate to an effective learning environment. A better understanding of how an online environment differs from an in-person training is necessary to maximize the effectiveness of each style.

Several unique challenges must be considered when planning an online training event. For example, one must maintain security and confirm attendance if continuing education

credits are provided for pesticide license renewal. This is more difficult while online than in person. Bultemeier et al. (2021) demonstrated that this can be accomplished via polling and chat interactions. Another important challenge is tracking and maintaining audience engagement. The measure of a successful online meeting should not simply be that the technology worked as planned but that learning and connection with the subject matter has occurred. Assessing understanding and connection with an audience is more complicated than it may appear since instructors are now combating “Zoom fatigue,” or exhaustion from online meetings (Bailenson, 2021). The author explores the possible causes of this phenomenon and describes how things such as too much eye contact, cognitive overload, and the impact of looking at oneself for hours on end can add to an overall fatigue with online learning. These considerations demonstrate that purposeful and intentional strategies must be employed to improve student engagement and learning.

Online training is typically viewed as convenient and is likely to increase in popularity. However, educators must remain focused on making the experience more effective for their audience. Focusing on how to create training designed for learner engagement will ultimately ensure the concepts of pesticide safety are adequately conveyed, even in an online environment. This article seeks to discuss the techniques that have been learned to improve online training. It will also discuss how to properly stage your frame (lighting and audio), better present the information on each slide, engage an online audience, and prepare for potential technical limitations such as internet speed.

Framing and Lighting

To better hold your audience’s attention and limit distractions online, it is best to consider a few simple steps before going live. As the presenter, you must be viewed in the clearest and least distracting way possible. It is important to note that studio quality production is not required, or even expected, by the audience. They likely understand that they are interacting with a subject matter expert, not a video production expert. However, minor annoyances can be significantly magnified over a multi-hour training, dramatically reducing the learning opportunities. Therefore, minimizing distractions can enhance the overall experience of your attendees.

Improper lighting can undoubtedly be a unique distraction online, so having proper lighting is essential to ensure attendees can see the expressions on your face. Enabling the audience to see the presenter provides a connection while also allowing the subtle nuances of nonverbal communication. Relying on overhead lighting can cast distracting shadows on your eyes and other parts of your face, making them difficult to see. A light source positioned directly in front is best, and a simple “ring light” (Figure 1) can be an affordable option. The lighting should be bright enough to make your facial features clear, but not overly harsh. Too much light can lead to a washed-out look where color contrast is muted and appears artificial. Some cameras and streaming software have video light correction as a built-in feature. Though digital lighting correction is a beneficial tool, it is not a replacement for a properly lit environment. Therefore, be sure

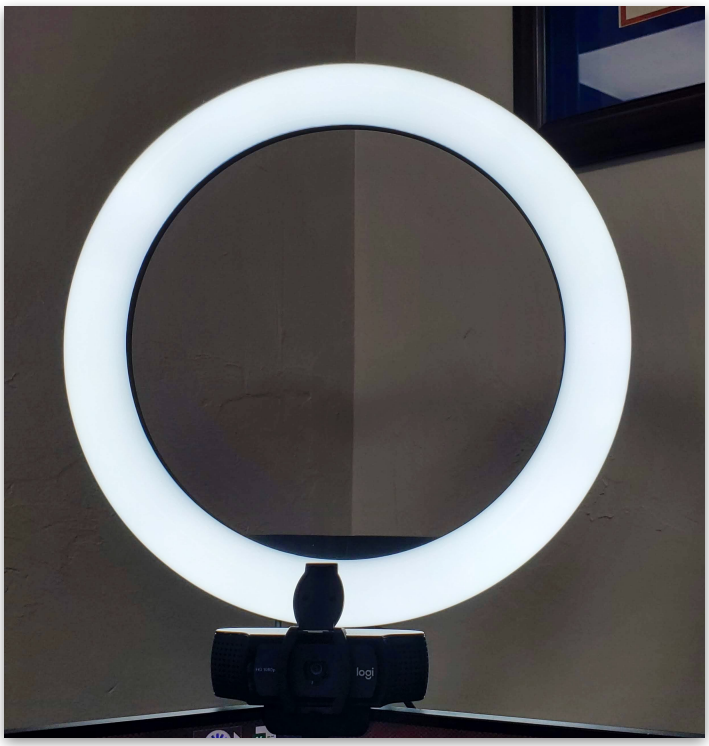

Figure 1. Example of a “ring light” front-facing light source.

to preview your video feed and experiment with different lighting setups before going live.

The next important consideration is the position of the camera. The camera should be level, slightly above your face, and angled down. This angle provides a natural feel and flatters most facial features. If using a built-in camera on a laptop, the device should be propped up or placed on a stand to achieve the proper height. The presenter should also practice maintaining focus into the webcam while presenting, connecting with the learner as it stimulates eye contact as a form of nonverbal communication. Lastly, one should occasionally clean the camera lens with a soft cloth as it can get smudged. This can reduce clarity of the video feed and add unnecessary distraction.

With proper lighting and framing achieved, the presenter should now ensure that the background is free from additional distractions. First, examine the frame for anything moving, like a ceiling fan. If so, change locations to avoid it being in the frame. Second, check the background for anything of a personal nature that might be considered inappropriate. This is particularly important if presenting from your home. Items like alcohol, political memorabilia, taxidermy, or other such objects should be removed and avoided. Some individuals may have strong feelings about these items that would ultimately distract from the learning process. Avoid using an overly cluttered space as well since the focus should remain on the content and the presenter. Next, position yourself so that no one walks behind you during your livestream. Avoid sitting in front of or too close to windows, as they can alter lighting and introduce additional noise. If the

presenter does not have a private office, presenting from home or another secure location should be considered.

Sometimes it may be challenging or impossible to remove all distractions from your background. In that instance, a virtual background may be used. This technology is evolving and improving rapidly, but imperfections do exist. If using a virtual background, ensure the selected image doesn't bleed into your clothing or hair. An inexpensive green screen can sharpen the contrast and reduce this bleed-over effect. But it is important to note that wearing clothing with any green coloration, even small or irregular designs, will superimpose the background onto the presenter. But as with anything, the virtual background should be purposefully selected to avoid additional distraction or irritation (Figure 2). Just because the presenter may enjoy a background scene from their favorite movie does not necessarily mean it is the best choice for professional training.

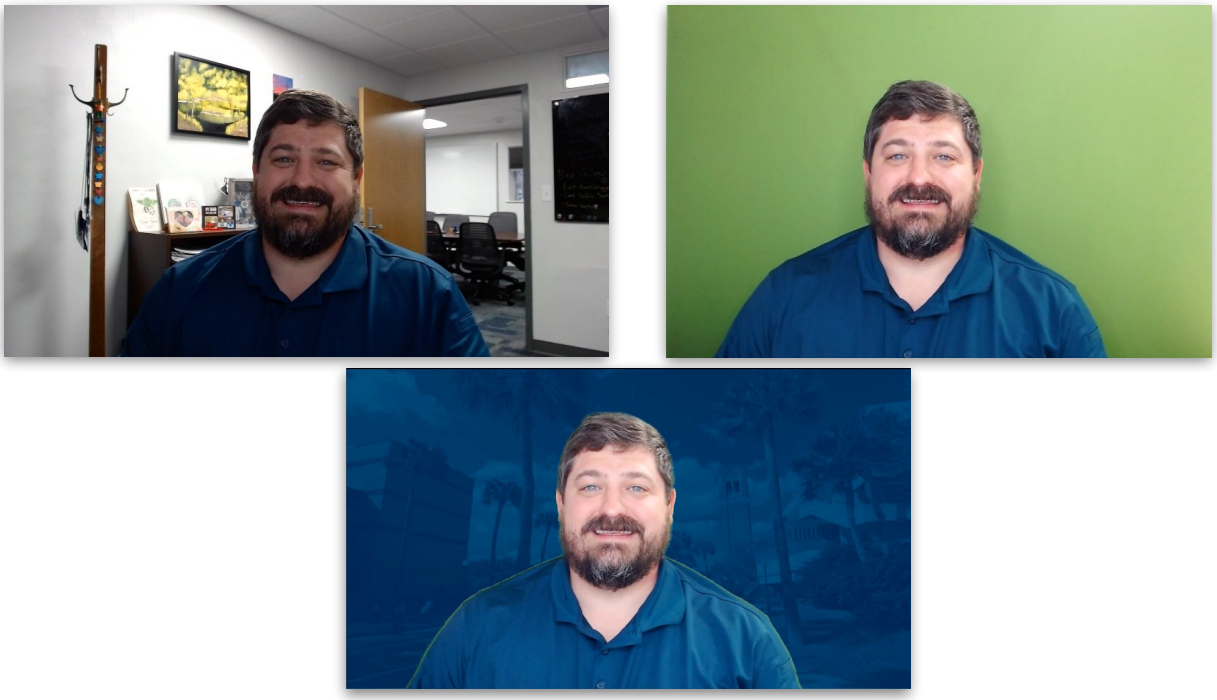

Figure 2. Proper camera position with a background that might be too cluttered (top left), with green screen usage to properly use a virtual background (top right and bottom)

With all the pieces in place to properly see the presenter and reduce distractions, the presenter must look at their audience. Mount your camera near the middle of the computer display so that reading slides results in looking into the camera. It is common for dual-monitor users to mount the camera on one screen but have presentation materials on the other. Presenting in this manner makes the audience feel the presenter is talking to someone else, as they are looking away the entire time (Figure 3). Remember, the best camera angle is eye level or slightly higher and centered near the presentation materials. This setup provides a comfortable scenario for the presenter and the participants.

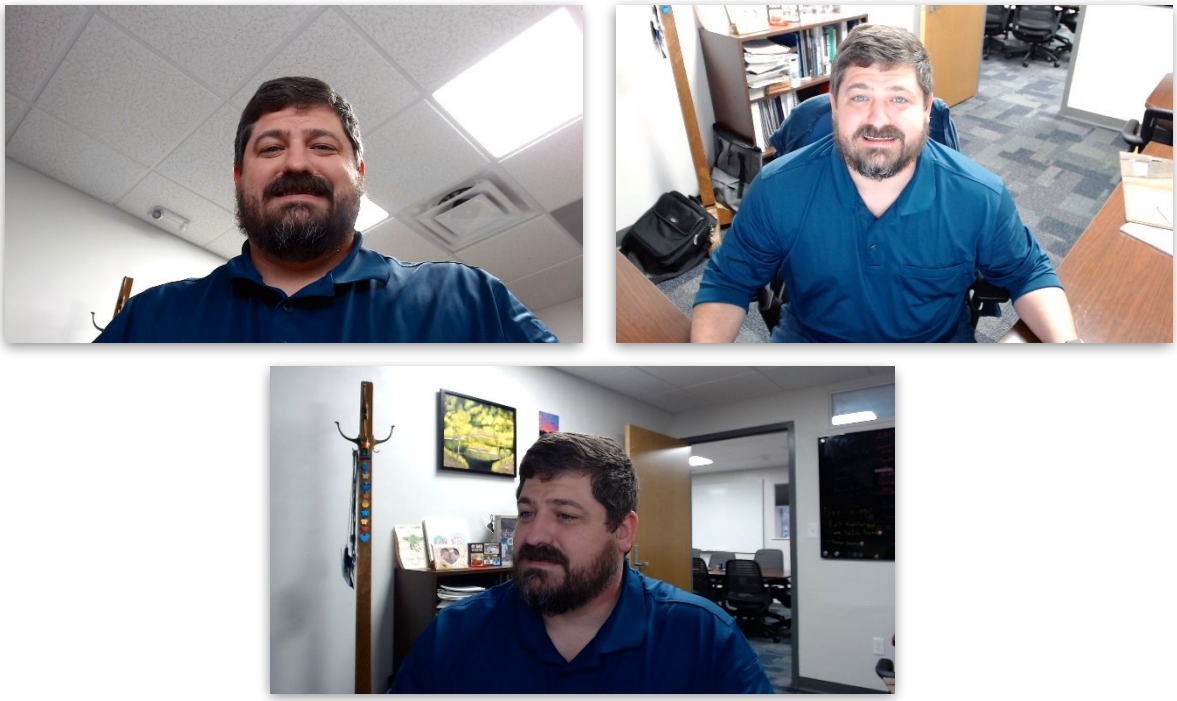

Figure 3. A camera angle that is too low (top left), too high (top right), and looking at the screen, not the camera. All of these are distracting and inappropriate for online training.

Audio and Participant Distractions

Now that the presenter has taken care of the visual aspect of being online, they must address the auditory considerations and unique way participants exist online. In the virtual meeting room, everyone has a front-row seat. It is not likely that someone attending an in-person presentation would stare at the speaker for the entire meeting (Bailenson, 2021). Using a video feed to introduce yourself, conduct question-and-answer sessions, respond to chat, and conclude the meeting as appropriate. When using screen share to display materials, turning off the camera allows the presenter to focus on the presentation materials. Additionally, encouraging participants to turn off their video feed reduces their tendency to stare at themselves and become distracted (Hinds, 1999). Turning off the feed also allows the viewer to focus on the materials and not what is going on in their or other's video streams. Finding the right balance will depend on the audience, the type of material being presented, and the goals of the event.

With everyone's visual needs considered, the audio portion of a presentation should be managed. Feedback or echoing from the presenter's audio can be distracting and annoying. Preparation is key to working out some of the issues that can arise with your audio quality. Relying on your computer or device's built-in microphone may not be a good option as the sound quality can vary. Test out your microphone with friends or colleagues and record the session. Listen to it on the recording to see if it is clear. Using a headset can be helpful for improving sound quality and reducing background noises. Place the microphone in front of and slightly below your mouth, as this will provide clear

audio while reducing the popping sound when saying words that start with P or F. There are also separate plug-in microphones that can provide clear audio quality and not cover your face and head like a headset (Figure 4). The critical point is that the built-in microphone on your computer may not be adequate for consistent online training, and alternative equipment should be considered.

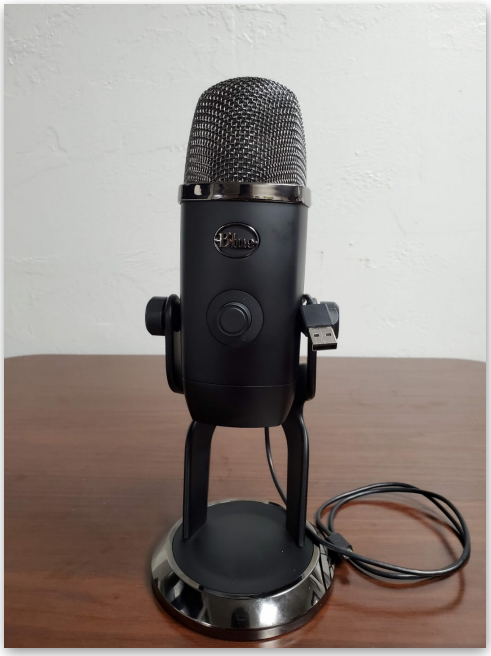

Figure 4. USB-style microphone that can greatly enhance audio quality over webcam or computer microphone

To reduce the echo from your audio, consider placing your setup in a location less prone to producing echoes and additional noises. The distractions caused by unwelcome sounds can be minimized by presenting from rooms that have thick, soft types of materials like carpets, rugs, wall hangings, or furniture. If this is not possible, a portable sound shield can be inexpensive and will help reduce echo as well as background noise when placed properly (Figure 5). Using a shield and setting the microphone to unidirectional, versus omnidirectional, mode will considerably sharpen the sound quality by limiting stray noises.

However, distractions are often inevitable. Sometimes lawn maintenance is scheduled without your knowledge, and that unmistakable sound is occurring just outside the window. Office phones ring, fire alarms are tested, and colleagues can be disruptive. The audience likely understands that some things are outside of your control and will show patience. If the presenter plans and minimizes these unintended occurrences, they will be fewer in number and the training will be greatly improved.

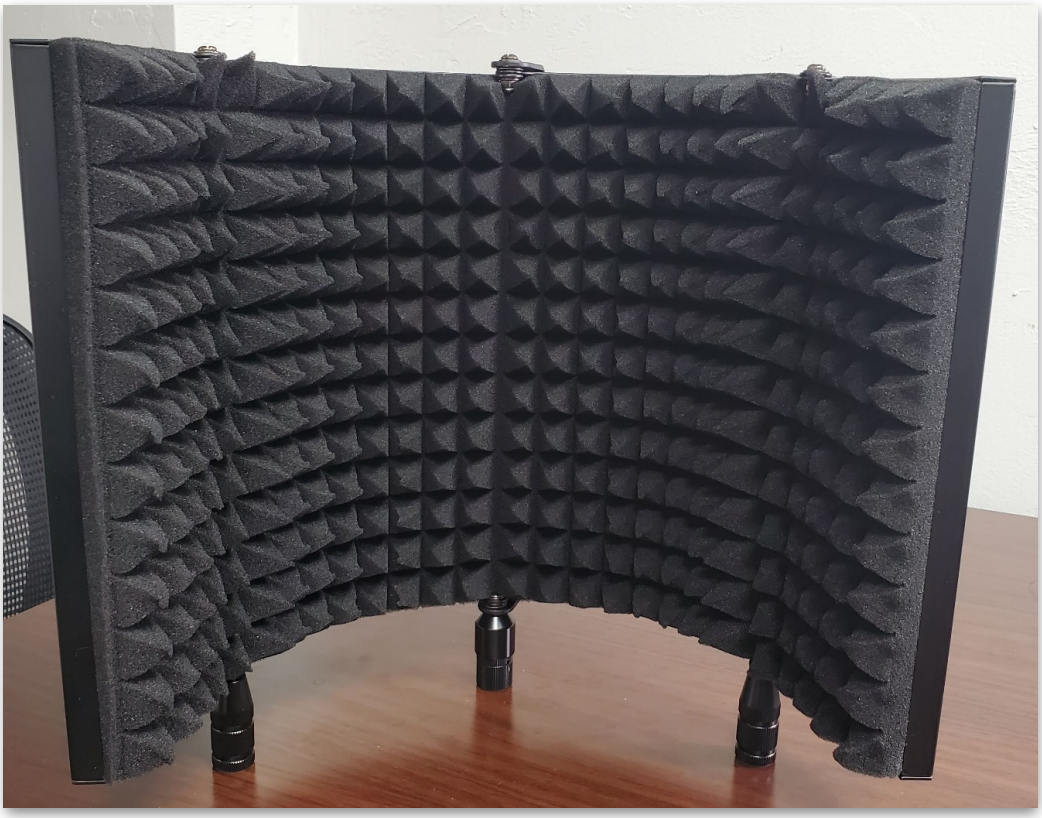

Figure 5. Sound-absorbing shell

Bandwidth Considerations

During the pandemic, the dramatic increase in online teaching, learning, and overall internet use revealed deep disparities in access to reliable broadband connections (McKinley, 2020). The speed of the internet and the amount of data passing over that connection mean that considering bandwidth during a meeting is essential. Just because a remote learner can log on does not mean they will be able to participate as fully as the rest of the participants if the organizer is not considering proper bandwidth etiquette. Being aware of these constraints is as important as adequate lighting, framing, and possible distractions.

One common method for sharing online content is screen sharing. Screen sharing is essentially live-streaming a presenter's screen or specific window to all participants, and it is a high-bandwidth activity for all parties during the event. Modern video conferencing solutions can dynamically scale the quality and resolution of screen sharing for participants whose connections cannot support the highest quality. While quality scaling can improve bandwidth usage, it results in varying experiences for all participants and, in some cases, excludes participants whose connections are too poor for simultaneous live camera feeds and screen sharing.

Recent changes in technology, such as the delivery of Microsoft® PowerPoint (PowerPoint) via Microsoft® Teams (Teams) using PowerPoint Live, help reduce this

issue. This method makes the PowerPoint presentation file a meeting asset available directly to all participants. The bandwidth consumption with this method is much lower due to the file only being loaded once at the beginning of the presentation versus constant live-streaming during the entire event. Because the file becomes a part of the meeting, there is equal access by all participants and the file is viewed directly in the highest quality possible. Audience members might be able to take screen shots of slides but do not have direct access to the file. If the presentation materials are desired after the meeting is over, a separate file would have to be provided by alternate means.

This technique also allows the unique capability of sharing control of the presentation between presenters without changing screen-sharing privileges. This offers seamless control for group presentations and quick recovery if a presenter has connection issues or is disconnected entirely. Another presenter can take control of the slide deck and carry on with the presentation with minimal disruption.

Another unique feature of PowerPoint Live is allowing participants to interact with slides directly, such as with hyperlinks and other interactive links. Because slide text is accessible by attendees, this also allows for slide text translation in nearly 20 different languages. This provides unique translation capabilities for a diverse audience. Closed captioning is included as well, which could help ensure compliance with Americans with Disabilities Act requirements. In addition to several language options, participants can also view the slides in high contrast color mode to accommodate those who may have a vision impairment.

However, there are considerations if using this method of sharing. An overly large file size could be problematic for users to fully download, which defeats the purpose of reducing bandwidth. Allowing additional time at the start of the presentation may help participants load the file. Perhaps a better solution is to reduce the overall file size by compressing pictures, avoiding large video files, or breaking the presentation into smaller segments. Consider embedding online video from media sites such as YouTube and Vimeo into the slide deck rather than using local media for scenarios where videos will be used. This allows each participant’s system to connect to the corresponding media site and render the video at the best quality their connection can support.

Presentation of Material

Although unique considerations of online training such as camera framing, microphone selection, and bandwidth are important, one must also consider that presentations (i.e., PowerPoint shows) for online use will likely need alteration if previously used for in-person discussions. As educators transitioned to online delivery, the design of the material often did not change. Some may have done an excellent job with lighting, sound, and even creating a more interactive session, but few altered the material itself. Attention span and focus on a platform like Zoom are different from in person (Bailenson, 2021; Peper et al., 2021).

One of the reasons keeping attention is so critical is that it is easier to multitask or engage in distractions while attending online programing. During in-person training, it is less common for someone to check emails, shop, or otherwise ignore the presented material. Online formatting makes it much easier to divide one's attention if the material is not designed to keep everyone mentally occupied.

Text-heavy slides, or slides that stay on the screen for extended periods, make finding other stimuli more interesting by comparison. Having slides remain on screen for extended periods became popular in the past to force audience members to focus on the presenter instead of reading the slides and not listening. This allowed the presenter to use body language and voice inflection to maintain contact with the audience.

However, in a virtual setting, the impact of these influences is dramatically minimized. Although there is little comparison of slide design for in-person versus online use, LeFebvre et al. (2022) reported that text-heavy slides with bullet points were less desirable and changed the analytical way the audience viewed the information presented. In short, less text on a slide makes for a richer learning experience. Online, this effect is likely magnified more than in person. Therefore, educators need to keep slides moving more rapidly, use more images, and create regular interactions with participants to maintain engagement. Text-dense slides (Figure 6) pull attention away from the verbal presentation, cause more eye fixation, and reduce the retention of the material (LeFebvre et al., 2022). Although transitions must be faster, the ability to highlight finer detail is enhanced compared to the typical "large screen in a big room" setup. This can be done by tiling in bullets one at a time, clicking to highlight key text within a bullet, or simply putting less on each slide. One or two critical pieces of information on one side of a slide with an accompanying picture on the other side (Figure 6) is another way of quickly engaging and then transitioning.

Unfortunately, there is little guidance around online attention span and how often stimuli need to be provided to keep attention. There are certainly studies being done that will provide this guidance, but pesticide safety educators will benefit immediately by asking participants about their frequency of distraction.

Audience Interaction

Beyond lighting, sound, and overall presentation design, direct interaction with an online audience is critical. A well-planned, well-designed program that engages learners can work just as effectively as face-to-face instruction. It might even be possible to get participants more engaged because the online platform allows a sense of anonymity that in-person learning does not.

Participants and presenters are accustomed to interaction with individuals experienced in face-to-face meetings. Re-creating this level of interaction in a virtual/online setting requires more deliberate thought and planning. This places a premium on providing opportunities for participants to use multiple cognitive functions and the full ranges of senses, including visual, kinetic, and auditory (Stover et al., 2015). There are several

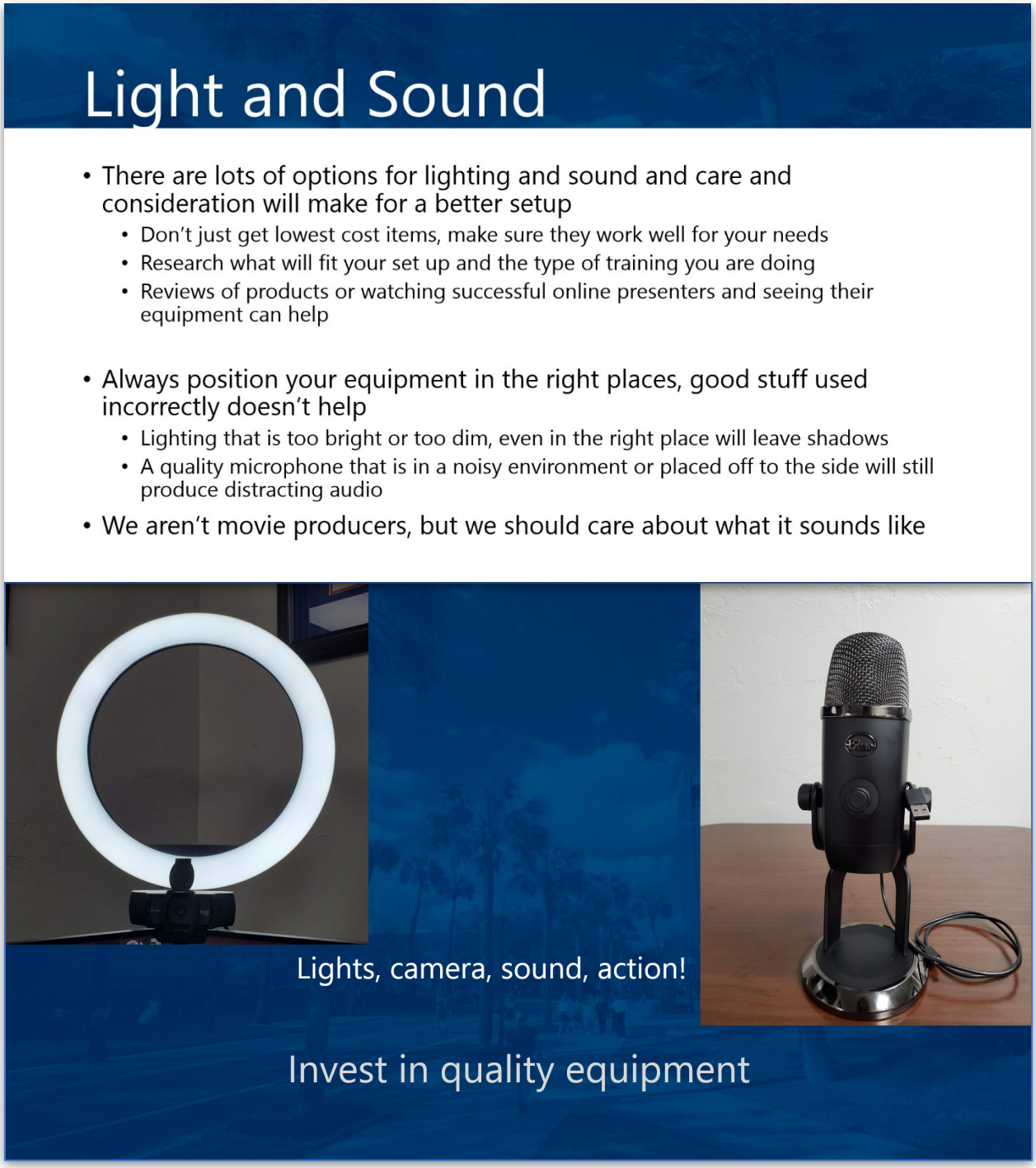

Figure 6. Slide with too much text (top) that can distract attendees versus a simple slide that engages a different type of thinking (bottom)

methods presenters can use to engage their virtual audiences. A presenter's method of choice may be influenced by the platform, topic, or audience size. Presenters may incorporate polls, quizzes, question-and-answer sessions, real-time activities, giveaways, breakout rooms, theming, websites, or discussion questions.

Polls

Most platforms currently being used for online training, including Zoom and Teams, allow for polls or quizzes to be developed before the training. These types of questions are launched manually by the speaker or host during the presentation when needed. The presenter can then choose to share the results with the participants to improve discussion. Halpern and Hakel (2003) found that students were poor at self-assessment related to their understanding of complex topics unless they were given more direct feedback on their comprehension. Additional research found that the polling allowed students to feel more engaged and increased their overall participation in the training (Stover et al., 2015). The use of polls can help to clarify areas participants find challenging or highlight knowledge gaps for additional review.

The best way to gauge understanding via polls is to have them inserted throughout the virtual event. Concluding an event with a single poll or survey misses the opportunity to discuss gaps in knowledge and maintain active learning for the audience (Bransford et al., 2000). The type of questions asked can impact measuring understanding as well, with multiple choice being the most common option. However, research has suggested that multiple-choice questions alone may overestimate the student's true mastery over the content (Couch et al., 2018). In follow-up research, the authors demonstrated that multiple-true-false was a more accurate predictor of learning than multiple choice alone (Brassil & Couch, 2019). Multiple-true-false is when a question will not merely present several most right options but ask the participant to rate each statement as true or false (Figure 7). This question format helps demonstrate more specific knowledge gaps and helps determine what information may need a clearer explanation.

1. An applicator wants to increase the gallons per acre applied to the crop. How can this be achieved?
    a. Increase pressure and reduce speed **T**/F
    b. Decrease pressure and increase speed T/**F**
    c. Increase nozzle size and pressure **T**/F
    d. Decrease nozzle size and pressure T/**F**

2. Where do I find the proper PPE to wear during a pesticide application?
    a. The pesticide label **T**/F
    b. The safety data sheet T/**F**
    c. Pesticide company sell sheet T/**F**
    d. My county extension agent T/**F**

Figure 7. Examples of multiple-true-false questions. Bolded and underlined responses are correct.

Regardless of what option is used – true/false, multiple choice, multiple-true-false, or mere opinion – polls can effectively engage the audience. Research has shown that polling can reduce learner anxiety, better expose gaps in knowledge, increase participation, and help with feedback for teacher and learner alike (Price, 2021). Research has yet to identify the perfect number for poll questions, but interactive polls launched throughout the training are more effective than single survey-based polls at the end of the event.

Breakout Rooms

Where polls are an excellent way for the teacher to get and provide feedback to participants, the use of breakout rooms can additionally challenge participants to interact with one another. A balance needs to be found in the size of the breakout groups. Too many participants make it challenging to manage, whereas too few will stifle conversation. The authors of this publication have found two to eight to be a well-balanced number of participants. Effective breakout rooms should have moderators, definitive timelines, and clear discussion parameters explained at the beginning of the breakout session.

Once in the breakout sessions, encouraging participants to share their videos can help foster shared learning and group connections. This must also be balanced against the increased demand on bandwidth, which can cause broken audio and video feeds or shut the meeting down entirely. Breakout rooms are most effective if each group is asked to present their discussion points with the entire class, which keeps them working toward a goal during the breakout. Polling is a way to quickly gauge understanding; breakout rooms allow for deeper discussion, connection with other learners, and the opportunity for participants to teach others what they just learned (Chandler, 2016).

Real-Time Activities

It is easy to assume that attending a virtual learning event means only interacting with the instructor through a computer in a virtual environment. However, game-based learning (GBL) can be completed solely on a computer (think augmented reality) or in real time. Game-based learning integrates gaming elements in education to achieve defined academic outcomes (Kirriemuir & McFarlane, 2004; McGonigal, 2011; Li, 2020). GBL might include scavenger hunts in real time where participants are asked to find items in their surroundings. For example, participants might be given time to go outside and search for different life cycles of insects or plant classifications. Learners bring back what they found and share with the group. Another example would be a signal word scavenger hunt around the house or a personal protective equipment (PPE) roundup. Some creative educators incorporate augmented reality and “escape room” (cooperative puzzle solving activities)-type learning opportunities. The motivation for using GBL is to create learning by doing and to cultivate a fun and inspiring learning environment (Kirriemuir & McFarlane, 2004). Educators should be aware of GBL or “edutainment” pitfalls, including creating tasks or games that are too simple for the audience, unequal or incomplete participation, and participants becoming bored if the

activity is repetitive (Kirriemuir & McFarlane, 2004). It is important to consider discussing these GBL activities with your state lead agency before utilizing these innovative techniques to ensure proper credit can be obtained for the training.

Conclusion

Online training for pesticide license certification and recertification became a necessity during the COVID-19 pandemic and is likely to remain a viable and secure method for delivering training. Although there are ways to provide training securely, more consideration must be given to using these important platforms to maintain engagement and active learning. Properly staging the video, quickly moving through slides, engaging the audience, and minimizing the load on bandwidth can all help make the training more accessible. The focus of pesticide safety training should remain on educating applicators to perform their job in the safest, most effective manner. Online content delivery is convenient but must be approached with the intentionality to maintain fresh and engaging content. When all parts of the training are designed purposefully, online teaching can reach individuals with diverse work schedules and learning styles, while also achieving high educational impact.

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References

Bailenson, J. N. 2021. Nonverbal overload: A theoretical argument for the causes of Zoom fatigue. *Technology, Mind, and Behavior 2*(1). https://doi.org/10.1037/tmb0000030

Bransford, J. D., Brown, A. L., & Cocking, R. R. 2000. *How people learn* (vol. 11). Washington, D.C.: National Academy Press. https://nap.nationalacademies.org/catalog/9853/how-people-learn-brain-mind-experience-and-school-expanded-edition

Brassil, C. E., & Couch, B. A. 2019. Multiple-true-false questions reveal more thoroughly the complexity of student thinking than multiple-choice questions: A Bayesian item response model comparison. *IJ STEM Ed. 6*(16). https://doi.org/10.1186/s40594-019-0169-0

Bultemeier, B., Atkinson, M., Gasper, J., & Ferrell, J. 2021. Using Microsoft Teams and Zoom to deliver pesticide license training and certification. *Journal of Pesticide Safety Education 23.*

Chandler, K. 2016. Using breakout rooms in synchronous online tutorials. *Journal of Perspectives in Applied Academic Practice 4*(3): 16-23. https://jpaap.napier.ac.uk/index.php/JPAAP/article/view/216

Couch, B. A., Hubbard, J. K., & Brassil, C. E. 2018. Multiple-true-false questions reveal the limits of the multiple-choice format for detecting students with incomplete understandings. *BioScience 68*(6): 455-463. https://doi.org/10.1093/biosci/biy037

Halpern, D. F., & Hakel, M. D. 2003. Applying the science of learning to the university and beyond: Teaching for long-term retention and transfer. *Change 35*(4): 36-41. https://doi.org/10.1080/00091380309604109

Hinds, P. J. 1999. The cognitive and interpersonal costs of video. *Media Psychology 1*(4): 283–311. https://doi.org/10.1207/s1532785xmep0104_1

Kirriemuir, J., & McFarlane, A. 2004. Literature review in games and learning. Hal-00190453. https://telearn.archives-ouvertes.fr/hal-00190453/document

LeFebvre, L., Parsons, M., Entwistle, C., Boyd, R., & Allen, M. February 2022. Rethinking PowerPoint slide design for multimedia learning. *Journal of Educational Technology Systems*. doi:10.1177/00472395221077628

Li, L. 2020. Augmented reality facilitated scavenger hunt for mobile learning. *Journal of the Scholarship of Teaching and Learning 20*(2). https://doi.org/10.14434/josotl.v20i2.25777

McGonigal, J. 2011. *Reality is broken: Why games make us better and how they can change the world*. Penguin Random House. https://www.penguinrandomhouse.com/books/305501/reality-is-broken-by-jane-mcgonigal/

McKinley, S. 2020. Microsoft Airband: An annual update on connecting rural America. Microsoft on the Issues blog. https://blogs.microsoft.com/on-the-issues/2020/03/05/update-connecting-rural-america/

Peper, E., Wilson, V., Martin, M., Rosegard, E., & Harvey, R. 2021. Avoid Zoom fatigue, be present and learn. *Neuro Regulation 8*(1): 47-56. https://doi.org/10.15540/nr.8.1.47

Price, T. J. 2021. Real-time polling to help corral university-learners' wandering minds. *Journal of Research in Innovative Teaching & Learning 15*(1): 98-109. https://doi.org/10.1108/JRIT-03-2020-0017

Stover, S., Noel, D., McNutt, M., & Heilmann, S. G. 2015. Revisiting use of real-time polling for learning transfer. *Journal of Teaching and Learning with Technology 4*(1): 40-60. https://doi.org/10.14434/jotlt.v4n1.13002