

## Special Issue on Innovation 2018

### Using 360-Degree Video for Immersive Learner Engagement

#### Abstract

A 360-degree video is a powerful tool that can bring learners into environments that would otherwise be inaccessible. These videos are simultaneously recorded in all directions, allowing the viewer to control viewing direction. Viewers can experience these videos on a computer, smartphone, or tablet or with a virtual reality headset. Camera and software equipment needed to produce 360-degree videos is affordable, allowing Extension educators to produce their own videos. This article addresses the practical aspects of producing 360-degree-video content that can be shared online or in a classroom setting.

**Keywords:** [virtual reality](#), [360-degree video](#), [virtual field trips](#), [immersive](#), [learner engagement](#)

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### Introduction

An innovative technology, 360-degree video allows for the simultaneous recording of viewpoints in all directions from a stationary location. Once processed, the final product may take on multiple forms; however, one such product form allows the end user to control the viewing direction while replaying the video. In this form, the technology can facilitate innovative interactions with Extension learners for certain training opportunities (e.g., field equipment operation) that have not been possible in the past. Guenther and Swan (2011) found that farmers were likely to use more technology than university students, indicating that new technologies such as 360-degree video are relevant and useful for a wide range of Extension clients.

We and other Extension professionals at the University of Nebraska–Lincoln hosted field days for agricultural producers, consultants, and service providers in 2015 and 2016. Crop canopy sensors mounted on a high-clearance applicator for nitrogen fertilizer management were demonstrated at the field days. Logistically, it was not possible for field day attendees to ride in the applicator and see firsthand how the technology worked. However, by using 360-degree video and virtual reality headsets, we were able to allow field day attendees to experience the fertilizer management technology operation in real time. Attendees wore virtual reality headsets and by turning their heads in a natural manner were able to "look around" the high-clearance applicator cab as it moved through the field. Audio narration instructed viewers on where to focus their gazes to see specific items.

Extension professionals noted that when attendees had the opportunity to view the 360-degree video prior to the formal presentation, they asked more informed questions and seemed to have a better grasp of the overall system. This experience demonstrated that 360-degree technology is a promising tool for engaging learners and bringing real-world experiences into a classroom setting.

Although headsets allow the most immersive experience, 360-degree-video content also can be viewed on a smartphone, tablet, or computer. On a smartphone or tablet, viewers can "look around" by turning the device; on a computer, viewers can "look around" by clicking and dragging with a mouse. We filmed several different aspects of corn harvest using a 360-degree camera, and elementary students viewed the videos in their classrooms. Although headsets were not available for the students, they still were able to interact with the video.

## Creating a 360-Degree Video

### Selection of Scene to Film

Select a location that has important activities surrounding a particular position as the 360-degree-video technology gives viewers the ability to see in all directions. Recorded or live 360-degree video also allows viewers to access locations that are normally inaccessible, such as hazardous or fragile environments or places that are too far away or too small for a group to visit. Electronic field trips, recorded with standard cameras, were shown to be effective avenues for learning (Adedokun, Parker, Loizzo, Burgess, & Robinson, 2011; Klemm & Tuthill, 2003; Placing & Fernandez, 2001); 360-degree video could build on this approach, providing viewers a more immersive experience.

### Camera Equipment

Camera equipment required to film 360-degree video is becoming affordable and user friendly. Popular consumer-grade options include SamsungGear 360, Nikon KeyMission 360, and Ricoh Theta V. These cameras feature two fish-eye lenses, each capturing 180 degrees of a scene. Depending on the scene you are shooting, you may want to select cameras that allow underwater filming. Most 360-degree cameras have functions that can be controlled with an app on a smartphone. To take advantage of this feature, check the compatibility of the camera with your smartphone.

### Best Practices for Capturing Good Video

When images from the two fish-eye lenses have been stitched together via software, the line where they were stitched may be apparent. This line will be more obvious if the area of stitching is on a face or detailed feature. To avoid this stitching-line effect, turn the camera so that the space between the lenses is toward an object of less importance and so that the main features of interest are directly ahead of the front or back lens.

### Postproduction Software Requirements

Once the video is captured, the final video is produced through the use of software. First, the video from each of the fish-eye lenses is stitched together; many 360-degree cameras provide access to video-stitching software. The video can then be edited in standard video-editing software. Common edits include splicing together several scenes, adjusting color, and adding narration. Narration can be very powerful, as it allows you to instruct the

viewer to look at points of interest in your video and explain what they are seeing. Some video edits require specialized tools to accommodate the 360-degree footage. For example, adding text and logos requires special editing tools so that text is displayed squarely when the video is viewed in a spherical format. Specific 360-degree editing tools are available in Adobe Premiere Pro.

## Publishing and Sharing the Final Video

There are numerous options for publishing 360-degree-video content. Videos can be shared online on YouTube, Vimeo, Twitter, and Facebook. If your learners will be viewing the video in a classroom setting, providing virtual reality headsets will allow them to have the most immersive experience. A smartphone will fit into the headset to allow the video to be played from a service such as YouTube. More expensive headsets, such as Samsung VR Gear, offer more features, such as buttons on the headset for controlling the video; alternatively, headsets such as the Google Cardboard are inexpensive and very basic.

## Conclusion

Video recorded via 360-degree technology is a powerful tool for bringing learners virtually into environments that they otherwise could not access. In our informal pilot project, farmers who used this technology expressed enjoyment of the experience and, after viewing the 360-degree video, appeared to better grasp the concepts explained during the remainder of the field day. Use of innovative technologies, such as 360-degree video, is necessary for Extension to continue to engage with clients in an increasingly digital world.

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