

Utilization of Immersive 360 Degree Spherical Videos and Google Cardboard in Medical Training and Simulation: A Novel and Multi-Dimensional Way of Learning

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Background: The current Millennial generation of medical residents more often use online and mobile devices to access key information and resources compared to the use of textbook sources employed by the previous Gen X population. Many of these trainees have used online media for the majority of their education and are skillfully adept at employing electronic hardware and software. Currently, there is a second emergence for consumer virtual reality (VR) which has not generated this much interest since the 1990s. Compared to that time, huge technological advancements have been made to develop standards, convincing levels of immersion, and content. While not VR, 360 degree videos serve as an affordable and easily reproducible gateway to the immersive experience which VR poises to offer. Use of this new medium, creates a whole new opportunity to enhance the resident's educational experience that was not previously able to be achieved.

Methods: A 360 degree video spherical camera was utilized to record a two minute video demonstration of Basic Life Support training from a certified ACLS instructor. The video was edited using video software that rendered the video in a 360 degree video mp4 format. The video was subsequently upload to popular video website, YouTube, which accepts and plays the 360 video format standard (link for video listed below). Mobile smartphones using both Apple iOS and Android operating systems were placed in a Google Cardboard Version 2.0 approved cardboard box viewer. Testers loaded the previously recorded video using the YouTube app on their smartphones, secured their phones in the cardboard box viewer, and either held the cardboard box viewer to their face or secured the viewer with a Velcro head strap. Testers were freely able to view the training video in any 360 degree direction from the fixed standpoint of the camera by just turning their head. This was accomplished using the smartphones built in accelerometers which is used frequently to re-orientate the screen as users move the device. This feature was utilized by the YouTube app to coordinate head movement and rotation around the video.

Results: The initial trial to develop a basic 360 degree medical video was successful. Testers displayed ease of use playing the 360 degree video using the YouTube app in both iOS and Android operating systems. Testers also reported satisfaction with viewing the 360 degree video on their smartphones without a cardboard box viewer. However, they acknowledged using a cardboard box viewer creates a more immersive environment which is not able to be accomplished just using a smartphone alone.

Conclusions: A novel method for medical training was explored. The advantages of 360 degree videos over conventional 2D videos include the ability to view multiple apparatuses and events concurrently, improve situational awareness, and mimic the ability for the viewer

to be physically present in the room. Future work will aim to optimize video quality and hardware to enhance the viewers immersion. Further medical curriculum development will aim to not only produce videos for procedures but also develop actual medical simulation as well.

Video link: https://youtu.be/Wfs_MqaaXkE

*For optimal viewing of 360 degree video, please view in the YouTube app on both iOS/Android smartphone/tablet devices or using the Google Chrome Browser for desktop.

