

**Preparing Career and Technical Education Majors for Laboratory Management through  
Virtual Reality**

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## Introduction

The practice of using agricultural laboratories is a part of the foundation of agricultural education (Shoulders & Meyers, 2012; Franklin, 2008; Newcomb et al., 2004). Teaching in safe and well designed laboratories are a critical component of not only agricultural education, but all career & technical education (CTE). The instructor is responsible for providing a safe learning environment for their students. Laboratory safety and management is a critical part of the teacher education process. Virtual reality (VR) can be implemented into the educational environment to improve student awareness and safety (Lucas, Thabet, & Worlikar, 2007). The use of VR in a laboratory management setting can also be cost effective for pre-service teachers. A major restriction can be travel costs to visit laboratory settings or lack of access to said laboratories. “VR laboratories will overcome this problem and other problems associated with laboratory management” Onyesolu, 2009, pg. 295). The utilization of VR to prepare students for laboratory management in future careers has great potential in the future. Students in an organization and management for laboratory programs course in Spring 2020 used 360-degree spherical cameras to document and create a VR tour of CTE laboratories at the independent school district of their choice. This activity creates an innovative approach to prepare the CTE students to be cognitively aware of their environment.

## Methodology

In an effort to improve student knowledge and awareness of laboratory safety, students used virtual reality technology to develop VR tours of various CTE laboratories. As a part of a class assignment, students were tasked to visit an independent school district and develop a tour that could be viewed using a VR headset. Students would then lead a synchronous tour of the laboratories at their respective schools. During the virtual tours, the other students in the class will look for safety violations and potential safety hazards. They will also be asked to identify any safety measures that have been integrated into the laboratories as well. The instructor created a packet that includes the step-by-step directions on how to create a story board for virtual tours. The packet also includes the steps for setting up and using the 360 camera kits. Instructions also include how to create a VR tour using Google Tour Creator, including how to add points of interest, narrations, and how to publish the tours. The instructor has also created the purpose, objectives, descriptions, and scoring guides for the Virtual School tours and the School Laboratory Improvement assignments. Students who are bilingual will be encouraged to use both languages in their narratives to reach a more diverse audience.

## Implications

Many perceived benefits have been identified through the use of VR for laboratory management. First, the saved VR tours will be used for future CTE students to use as reference when they are selecting where they want to student teach. These tours allow students an in depth look into potential student teacher sites without the additional time and money spent in travel. As an additional note, students are also able to see a wider range of CTE laboratories in less time. Second, these tours also offer a view into programs student may be unfamiliar with due to their lack of experience. There are students who are in CTE programs that may have not experienced a CTE laboratory before. These VR tours allow students without pervious experiences to fully

grasp the holistic experience of laboratory management. Third, the VR tours preview would assist in reducing anxiety for the student teachers. The reduction in anxiety comes from the knowledge of how and where these laboratories are set up prior to a physically teaching in them. Finally, this innovative project gives student teachers experience in using VR technology in an educational setting. This positive experience can be transferred to their students with the continued use of VR in an educational setting. To date, twenty-four VR tours have been collected.

### **Future Plans & Recommendations**

Future plans includes having students participate in a laboratory improvement project where the students will identify an issue in a secondary CTE laboratory and work with the CTE teacher to fix the issue. The students will use the virtual reality kits to create a pre and post tour of the laboratory highlighting what the issue(s) was and what they did to fix the problem or improve the functionality of the laboratory. The student will then lead a synchronous VR tour of the improvement project to their peers outlining what the issue was and how they improved the laboratory. This innovative activity creates an opportunity for the students to learn about several issues that they could encounter in their respective laboratories and the steps that their peers took to improve the laboratories. This activity reinforces that the teachers are responsible for ensuring their laboratories are safe and that they must take an active roll in managing the laboratories.

Although we recognize that VR technology is not a replacement for in-person experiences, there are many benefits that expose students to more technology and laboratory management setting in a more efficient avenue. We recommend the implementation of VR technology in the teacher education program to encourage a more diverse understanding of laboratory safety and management.

### **Resources Needed**

The costs associated with this project include:

- \$380 per Ricoh Theta V 360-Degree Spherical 4K HD Digital Cameras
- \$29 per Aluminum Light Photography Tripod Stands
- \$10 per Dream Vision Virtual Reality Smartphone Headsets.
- \$16 per EVA storage case

The 360 degree spherical camera can sued to capture video and pictures to allow student to upload and piece together their tours. The tripod stand allows for unobstructed photography. The VR headsets use smarts phones to display the tours for the other student in the class. Finally, the storage case for transportation between the schools and the university. We recommend the purchase of a classroom set (25). Additionally, teacher-educators will need a strong relationship with CTE instructors to allow for students to visit laboratories and be willing to work with student in identifying potential laboratory safety issues.

## References

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