Virtual Reality in Higher Education

Darlene Brothers-Gray[1*], Wendy Velez-Torres[2]

[1]Department of Criminal Justice, College of Behavioral and Social Sciences, Coppin State University, 2500 W. North Avenue, Baltimore, Maryland 21216
[2]Department of Information Technology Division, Senior Instructional and Digital Accessibility Specialist, Coppin State University, 2500 W. North Avenue, Baltimore, Maryland 21216 wvelez-torres@coppin.edu
**Corresponding author: dbrothers-gray@coppin.edu*

Abstract: In this session, we will delve into our innovative use of virtual reality (VR) in a forensics course, demonstrating its potential to revolutionize teaching and learning. Our journey began by integrating VR into multiple aspects of the curriculum, resulting in an engaging and immersive educational experience. We will walk you through our process, from concept to execution, and showcase the various activities that empowered students to actively participate in forensic investigations. Our discussion will highlight how we utilized accessible VR resources to ensure that all students could fully engage with the course content. We will also emphasize the pivotal role of Playposit in creating a concrete, data-driven digital assessment that accurately measured student comprehension and critical thinking skills in a VR-rich environment.

Keywords: accessibility, crime scene investigations, immersed virtual reality, playposit

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Introduction

Virtual reality (VR) is an immersive technology that utilizes computer-generated simulations to create lifelike experiences in a virtual environment. By wearing VR headsets and interacting with specialized equipment, users are transported into simulated worlds where they can explore, manipulated objects, and engage with realistic scenarios (1).

Playposit is a web-based video tool. With this tool, instructors can add questions and hotspots to online videos. The playlists feature allows instructors and trainers to create rich interactive video courses (without a huge learning curve) (2). Customizable certificates can be attached to these courses, attesting to a learner's completion of all modules within the playlist.

The VR forensic investigation certificate at Coppin State University is centered around the virtual reality lab where students immerse themselves in lifelike crime scenes. Utilizing various VR technologies including 360 YouTube videos, online content, fully immersed VR experiences with headsets, and VR apps on mobile devices. Students actively participate in investigating crime scenes.

This paper demonstrates how to create virtual environments that spark curiosity, foster creativity, and challenge critical thinking. This will empower students to become lifelong learners who embrace challenges and contribute meaningfully to their communities.

Methods

Process for Accessing VR

The pedagogy model utilized was immersive experiences. Students are immersed in the realistic crime scene. The professor fills out a general interest form with the InstructionalTechnology Department. A meeting is arranged to meet with instructional technology team to choose from the various content. A diverse range of content is available for the subject of crime scene investigations.The professor engages with content to create assessments/assignments based off the curriculum. The Professor sets a date for class session(s). The student fills out a waiver for legal purposes to ensure the students are safe and the university is covered legally. A tutorial is provided to the students showing them how to uae the VR headsets by the student workers/instructional technology team members. Students engage in the VR experiences. The professor engages students with assessments/assignments. Thus, a structured process ensures faculty and students can easily access and utilize VR technology for educational purposes. Collaboration between faculty and instructional technology team facilitates effective integration of VR into the curriculum.

TABLE 1 *Table of Topics for Undergraduate Class*

Topics
Crime Scene Search Techniques
Crime Scene Photography
Documentation and Evidence Recovery
Crime Scene Sketching
Biological Evidence: DNA
Fingerprints
Impression Evidence
Trace Evidence
Firearms Evidence
Deaath Investigations

TABLE *2* *Table of Topics for Graduate Class*

Topics
Photography/Sketching
Crime Scene Search Techniques
Presumptive Tests and Chemical Enhancements
Latent Fingerprint Development
Evidence Collection and Packaging
Physical Evidence/Serological Evidence
Trace Evidence
Firearms and Toolmark Evidence

Results

Two participant groups were utilized un dergraduate CRJU486 (n=25) Juniora and graduate class (CRJU524 (n=3). VR analysis was shown using the Oculus Metaquest stand alones and hand controllers. Introduction of the fully digital capstone activity was introduced in the fall of 2023 using Playposit's Playlist feature: 360 videos, online videos, 360 crime scenes and Microsoft forms. The playlist was utilized for both undergraduate and graduate crime scene courses; completely digital. (1) notes that inclusion of a capstone in the LMS is for accessibility.

Students were given a brief safety demonstration and introduction to the VR headset fitting and controls. At the end of the demonstration they had to sign a waiver. The scenario was introduced. The students were instructed to search and collect evidence, document using photography. The time was limited to 90 minutes for the undergraduates and two hours for the graduate class. Questions that the students had to answer which correlated with the learning outcomes is:

1. What search tecnique was best utilized for this scene?
2. How many overalls, mid-range and close-up photographs were taken?
3. Identify the bloodstains in the scene?
4. What sketching technique was best utilized for this scene?
5. How many bloody fingerprints did you identify in the scene?

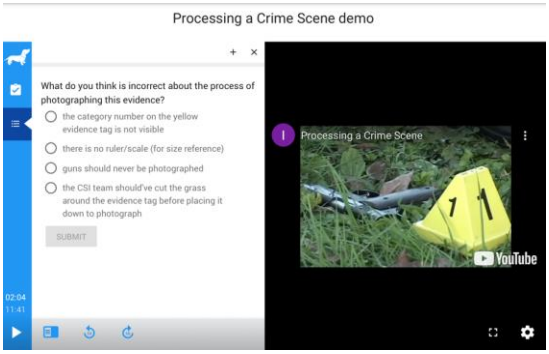

FIGURE 1 Undergraduate Virtual Crime Scene Processing demo.

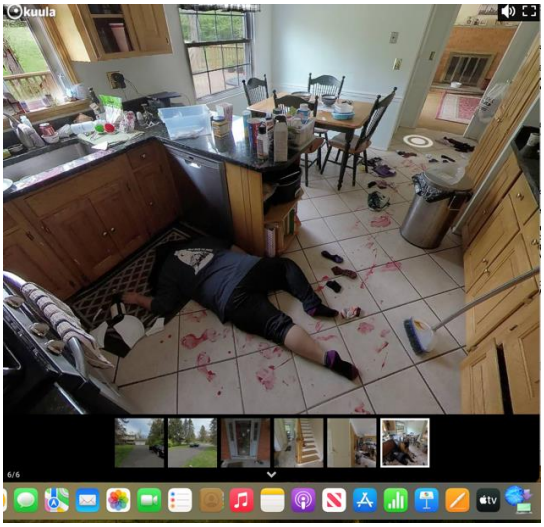

FIGURE 2 Graduate Interactive VR crime scene.

The topics covered in the undergraduate and graduate syllabi are listed in **TABLE 1 and 2.** Both syllabi covered

classes that were 15 weeks long. The undergraduate class was held three times per week for an hour and the graduate class was held once a week for 2.5 hours. VR content implemented in the classes included 360 YouTube videos, online content, fully immersed VR experiences with headsets, VR apps on mobile devices.

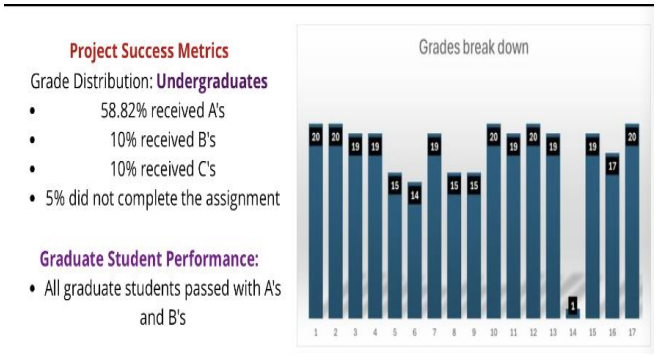

FIGURE 3 Grade Distribution of Undergraduates and Graduate Student Performance.

Key takeaways (**FIGURE 3**) include a strong performance indicated by high percentage of A's for the undergraduates. The balanced distribution across grades reflects fair assessment and engagement. Low non-completion rate highlights overall participation and completion of assignments. Exceptional performance of graduate students underscores the effectiveness of VR integration (2).

FIGURE 4 Authors Presenting the Innovation Unleashed: EdTech Tools, VR, Forensics, Oh My! at the OLC Innovate Education Reimagined in April 2024. The acceptance of the presentation suggests positive feedback by external peers. Left: Darlene Brothers-Gray, right: Wendy Velez-Torres Photo by Conference Participant.

Discussion and Conclusion

The authors attended the OLC Innovate 2024 Conference where peers from around the country provided positive feedback regarding VR & Playposit (**FIGURE 4)**. Numerous inquiries were made as to how to implement these techinquires into courses.

For students to learn the techniques that are required to perform the position of Crime Scene Investigations, they must learn the hands-on practical application from processing mock crime scenes for physical evidence (5). The VR & Playposit activities (**FIGURE 1** and **FIGURE 2**) complement respectively the former. Students are able to obtain and perform the student learning outcomes. Additional real-world experiences were available from utilizing the VR and playposit was able to capture the knowledge that they were learning in each scenario (6).

Research conducted by (9) reveals that more empirical work needs to be conducted regarding the immersive technologies in higher learning. Even though there are to using virtual reality in the classroom, the preference still seems to be face-to-face (9). Adverse implications associated with immersive technology use in higher education include equipment cost and motion sickness (9).

Implications of the study demonstrated effectiveness of VR integration in enhancing student learning and comprehension (7). The findings indicating that VR greatly intensifies scholar commitment by providing an immersive, collaborative, and practical learning experiences (7). Scholars demonstrated higher levels of contribution, a greater appreciative of complicated perceptions, and enhanced rentetion of comprehension (7). Consequently, the research validates the use of digital assessments, such as Playposit in measuring student understanding and critical thinking skills. It also encourages further exploration and adoption of VR technology in higher education contexts (3). Using videos with students requires passive involvement from the audience. Interactive videos, however, allow you to take video content and add questions to each video, which turns a passive experience into an active one. Participants will gain practical, concrete insights into the following:

Participants will be able to describe the steps needed for VR implementation.

Participants will learn the pros and cons to using VR in your classroom. Accessible alternatives and formats will also be discussed.

Participants will identify sources for finding VR content.

Participants will learn how to harness Playposit to design effective digital assessments.

Participants will have a copy of the materials, along with alternative formats to the materials(ie. transcripts, audio, etc) and will have an opportunity to discuss how they can use the steps to fit the needs of their institution. Content during this session will be presented in multiple ways throughout the presentation and the tool used for the presentation tests high for accessibility and UDL standards.

Benefits of using Playposit with crime scene investigations are it can be used in-person or online classes. There is no limit to the number of video lessons an instructor can create. Video lessons can be used for multiple class sessions. Videos can be graded and put in the instructor's digital grade book. Istructors can track student information. Students can re-take the assessment questions. Instructor's can add multiple videos on one bulb (a bulb is a video lesson). Instructors can copy any premade bulb and adapt it to their own needs.

There is a diverse range of content available for various courses and subjects (2). Structured process ensures faculty and students can easily access and utilize VR technology for educational purposes. Collaboration between faculty and instructional technology team facilitates effective integration of VR into the curriculum.

Accordingly, the adoption of virtual reality into the education system has augmented and transformed traditional instruction and education (8). In contrast to traditional learning environments, students found the learning environments to be more appealing, motiviating, and collaborative. VR was able to afford a more tailored and collaborative learning to their own needs. Thus, the students had a positive change in societal, and perceptive growth.

Peer evaluations and student feedback indicate that the students like to have the virtual hands on in crime scene investigations (5). Therefore, the benefits of having virtual reality in the classroom is 1) facilitates deeper interaction with complex concepts, 2) provides hands-on training to build proficiency and confidence, 3) encourages exploration and stimulates critical thinking.

A conceivable limitation is no virtual Reality Lab/Space? No Problem! With Playposit playlists, you do not need a lab. Students do not need virtual reality glasses. All they need is an internet connection. Subsequently, there is a lot of 360 content freely available on the internet. With playposit, you do not have to limit yourself to Virtual Reality content. One can add multimedia content and all students need is the link! Accuracy and biased interpretations are additional limitations (9). There is a fabricated sense of practically (9).

All in all, videos are shown to be a powerful, useful tools used to reach different types of learners subsequently, on-topic videos can help students engage with the subject matter on a deeper level.

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