

IMMERSIVE LEARNING: ENHANCING STUDENT ENGAGEMENT USING 360° PHOTOGRAPHY AND UNITY SIMULATIONS IN UNDERGRADUATE MEDICAL SCIENCE COURSES

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Student engagement is a crucial factor that can influence both the student learning experience and student success. However, in response to the recent COVID-19 pandemic, learning for tertiary students had been affected as many universities introduced fully online learning. This shift to online learning has had an adverse effect on engagement for many students. Immersive online learning modules, including interactive simulations, have potential to enhance motivation and engagement. This study aimed to compare existing online standard module lessons (2D virtual laboratory spaces) with platforms and conditions that apply immersive virtual learning environments (360° photography and desktop *Unity* 3D immersive simulations) and evaluate the effects on the student learning experience and performance.

Novel virtual learning environments were created to pilot within a third-year undergraduate pathology course, at the University of New South Wales. The study was conducted using a multimodal approach with two different pathology undergraduate cohorts from 2022 to 2023. Each cohort was randomly divided into two groups to trial a different learning environment. In 2022, we compared an existing online standard module (developed using a HTML platform, *H5P*) with a 360° laboratory space. In 2023, we compared the existing standard online module with an immersive 3D *Unity* laboratory simulation. Student engagement and performance was assessed across all learning environments using pre- and post-simulation knowledge/transfer tests, and Qualtrics feedback surveys. Qualitative and quantitative data obtained were used to compare factors such as student motivation, engagement, and confidence within the different learning environments.

In feedback surveys, students reported being engaged and immersed in both the 360° environments and in the 3D *Unity* simulations. However, students also reported navigation issues within the virtual learning environments in addition to reporting cognitive overload. Quantitative data revealed an increase in performance on knowledge/transfer tests regardless of the learning environment type, but the level of improvement between each group was not significantly different. Further data revealed an overall improvement in understanding of content for all learning environments, but there was a greater increase with the standard module groups. This could be attributed to possible cognitive overload experienced within the new virtual learning environments. As reported in this study, despite the engaging/immersive properties of the 360°/*Unity* environments, newly developed learning simulations may overload or distract the learner.

Therefore, further work is required on immersive learning environment factors that promote student engagement and motivation. These promoting factors could also be incorporated into face-to-face learning so that key elements for student engagement are aligned in all learning environments.

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