VR immersion: An Experiential approach to teach Accessibility and Inclusion in Computing Education

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Abstract

In this paper, we present teaching material and resources designed as part of a research project aiming to investigate how computing educators operationalize the delivery of Virtual Reality (VR) based lessons to teach accessibility and inclusion in an undergraduate IT Professional Practice course in an Australian research-intensive university. The material, first employed across seven, 2-hour applied sessions in Semester 1, 2024, was offered to 390 students by a teaching team of 15 staff members and it has been iteratively refined and offered to 2350 students by 87 teachers over four semesters since then. In post-lesson interviews, educators perceived mixed impacts on student learning highlighting enhanced engagement and awareness alongside challenges related to uneven student reception and relevance. They commended the VR team's clear planning and hands-on support for enabling smooth in-class delivery.

CCS Concepts

• **Applied computing** → **Interactive learning environments**; • **Social and professional topics** → **Computing education programs**; • **Hardware** → **Emerging technologies**; • **Human-centered computing** → **Accessibility**.

Keywords

Virtual Reality, VR Integration, Computing education, Accessibility, Inclusion, Human-centered computing

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1 Introduction

Preparing computing students to design accessible and inclusive technologies is a growing priority in computing education [1]as it promotes equity, innovation, and human-centered design in the technologies that these future IT professionals will design, develop, implement, and/or manage [2]. However, traditional teaching methods often struggles to convey the lived experiences of people with disabilities (PwD) with different physical, sensory, cognitive abilities in a meaningful and impactful way [3]. This limits the student-designers' ability to create or understand the importance of inclusive technologies that respond to PwD's real-world experiences.

Virtual Reality (VR) offers a promising way to address this gap by providing students, a first-person perspective [7] of a PwD through an immersive simulation to better understand the real-world barriers PwDs face, and how these barriers shape their technology use and accessibility requirements. Such experiential learning activity can potentially strengthen students' empathy [3], awareness and critical thinking that are considered the key attributes for ethical and inclusive technology practice for future IT professionals [4].

In this context, we present an **experiential teaching approach** and **teaching material** for an immersive VR-based lesson designed for an IT Professional Practice course, addressing a key limitation i.e. the lack of practical guidance [6] to support educators in teaching accessibility and inclusion through VR experiential and reflective pedagogy [8]. **Methodologically**, the teaching material was drafted by the lead researcher (first-author) in collaboration with the course and curriculum leads (co-authors) as a part of a larger research project, exploring the sustainable delivery of VR-supported learning in computing education. The teaching material was offered to nearly 390 students by a teaching team of 15 staff members over seven, 2-hour classes in Semester 1, 2024 and it has continued to be employed in teaching across 4 semesters to date.

2 VR-based Experiential Teaching Approach

In our experiential teaching approach, students are immersed in **VR simulation** using a head-mounted display, that offers a first-person perspective [7] on the challenges faced by PwDs such as a person with dementia [9]. This combined with a **post-VR reflection exercise** prompts students to reflect on accessibility needs and the social impact of technology designed for people with diverse needs.

2.1 VR Implementation Planning & Training

The lead researcher arranged to borrow 20 **HTC Vive** [1] headsets from a university VR lab for two weeks to support 7 classes of 60-90 students each during the 'VR week', as well as setting up, testing,

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[1] https://www.vive.com/au/

charging, transporting headsets between classes to enable safe and efficient logistics handling. These To build the teaching team's capability in supporting VR use, the lead researcher ran a **hands-on training session** to familiarise staff with VR equipment and delivered a unit briefing covering the VR learning approach and key teaching guides and forms a week prior to the VR implementation.

3 Teaching Material

The teaching materials that we designed for VR lesson delivery are described below and we will be sharing these through an online repository with computing educators as ready-to-use resources.

3.1 VR Lesson Plan & Reflection Exercise

The VR-based lesson plan will provide educators a clear overview of the VR lesson, outlining **pre-class** preparation, including VR setup, then introducing the VR lesson with a video [5] explaining the lesson rationale, **running procedure** (for cycling students through VR stations), and facilitate group discussions and whole-class debrief using a custom **reflection question set** to connect their observations to learning objectives of inclusive and accessible technology design in IT professional practice.

3.2 VR Simulation Experiences

We used publicly available, open-source VR simulation [9] to ensure easy access and low-barrier adoption. We will share a curated list of these simulations to support teaching in accessibility and inclusion.

3.3 VR Access, Use & Troubleshooting Guide

This educator guide includes practical guidance on accessing, setting up, and operating the VR headsets, including login and activation, running the VR simulation, basic troubleshooting, and classroom management procedures. It also outlines sanitization, charging and equipment-handling guidelines to ensure safe and efficient use of VR during setup, teaching and packup.

3.4 Safety, Comfort and Ethical Protocols

This resource contains important guidelines related to VR use such as trigger warnings, voluntary participation, 2D alternatives for those unable to participate due to health or comfort reasons, physical safety protocols, and psychological support resources.

3.5 VR equipment check and inspection form

We designed this form to track VR headset retrieval, return, and handover between classes, as well as to record and manage any hardware or software issues that arise. In addition, we will share how we used an online communication channel for teachers to exchange tips, tricks, and strategies for effective VR use.

4 Evaluation

While the analysis of the post-hoc interviews with the 13 consenting teachers [P1-P13] on the VR intervention is ongoing, a preliminary analysis reveals that educators reported mixed reception among students: many felt the VR activity boosted students' empathy and awareness [P1, P9, P13], while others noted that some students found the scenario less relatable, struggling to connect it to professional contexts [P10, P11] or were distracted by technical issues [P5, P6]. Several educators [P1, P13, P6, P9] emphasized how much they benefited from clear planning, instructions, and structured activity flow provided by the VR team [P11], describing the support as *'hands-on*' and *'highly effective'*. They also reported their self-efficacy transform from feeling they were *'not trained for it'* [P1] to feeling *'a lot more confident with the headset'* [P2] as the classroom delivery evolved into a *'well-oiled operation'* [P11] by the end of the sessions. We also plan to conduct a follow-up study with educators to examine how their VR-supported teaching practices have evolved over semesters, complemented by student feedback to provide deeper insight into the VR lesson's learning impacts.

5 Conclusion

This VR-based teaching approach offers a practical bridge between theoretical concepts and applied learning in teaching computing accessibility and inclusion to future IT professionals. To extend these benefits across the computing education community, the discussed teaching materials will be demonstrated at the conference through an online repository, providing educators with ready-to-use and adaptable resources for integrating VR into their own courses.

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