A Place to Tinker and Transform: Our vision for the XR lab for health, well-being and education

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1. INTRODUCTION

This short paper presents our vision for our Extended Reality (XR) lab, a cross-faculty initiative for which we secured internal capital investment funding (£70K) from the University of Greenwich. The faculties involved are the Faculty of Engineering (FES) and the Faculty for Education, Health and Human Sciences (FEHHS), which will be working closely with the Faculty of Liberal Arts and Sciences (FLAS).

2. OUR VISION

The XR lab aims to be a platform for digital technology researchers to collaborate with fellow researchers, who may be experts in one or several subject topics or have specific technical skills to work on innovative XR projects. With this lab, our goal is to carry out transdisciplinary research going across the fields of health care simulation, transformative simulation (Weldon et al. 2023), health & well-being, psychological assessments and treatments, exercise and rehabilitation, leadership (Jameson 2022), professional development (Jameson et al. 2022), and community involvement (Markowski 2020). The XR lab intends to be a stimulating place for in-person and/or online experimentation, tinkering and play, yet also for focused and task-based research. It will serve as a place to attract postgraduate researchers as well as early career researchers internationally. The XR lab further aims to bring in expertise from artists and performative researchers from internal departments and external organisations.

2.1 The technological set-up

The lab's equipment has been bought with the following possible combinations of technologies in mind: Virtual Reality (VR) equipment, Augmented Reality (AR) portable equipment, adaptive virtual reality training (AVRT) equipment, Tesla suits for haptic and sensory interaction, physiological measuring equipment, cleaning equipment as well as recording facilities to capture telemetrics, video, and sound.

Part of the stationary equipment will be set up permanently in the psychology lab area at the main Greenwich campus. Portable devices are currently housed by the Greenwich Simulation and Learning Centre (GLASC) on a different campus. An online booking system, supported by the GLASC technical team, will allow lab users to book the equipment and the rooms. The technicians in the School of Psychology – where the physical XR lab will be situated – will allow the day-to-day delivery.

2.2 Inception of the lab

The cross-faculty initiative was born out of established working relationships and emerging pilot projects. The Institute for Lifecourse Development (ILD), with its structure of seven research Centres, facilitates regular activities and exchanges between researchers (e.g. talks, research cafes, review panels, and internal funding options), which allow for collaborations such as this XR lab one to emerge.

For example, Dr Weinel, Dr Weinel, Academic Portfolio Leader (Associate Professor) in Games,

and Dr Markowski, Research Fellow at the ILD, had been awarded £1996.72 internal ILD funding to buy VR headsets with the view to tinker with representations of visuals with music. They further submitted an ESRC application with external collaborators for practice-based research to educate about the history of rave music and to evaluate its impact.

Dr Gagliardi, a clinical psychologist and psychotherapist who works alongside Dr Markowski as a Research Fellow at the ILD, furthered explorations of VR in the assessment and treatment of psychological disorders (Gagliardi 2024). For this, Dr Gagliardi led an MRC funding proposal exploring AI and VR in the assessment and treatment of eating disorders. He further offered project briefs concerning the therapeutic context to 3rd year BSc Game Development students, to which students were able to respond with practical programming examples (Figure 1).

Figure 1. The making of a VR classroom for public speaking training and reducing anxiety.

Dr Markowski supported Professor Jorge Lopes Ramos from FLAS and ZU-UK, a disabled-led physical and digital performance theatre company, in transforming their mixed reality (MR) installation 'Good night sleep tight' (Dunne et al. 2018) into the UKRI-funded project 'Within touching distance', which investigates the use of MR and touch in scaling up the teaching of empathy in health care (Figure 2).

Figure 2. Credit: 'Goodnight, Sleep Tight' by ZU-UK

2.3 The structure of the lab

The diagram below depicts the two faculties (CMS and FEHHS) that have secured the funding for the XR lab (Figure 3).

By working closely with the Portfolio leaders for the BSc Games Development and the MSc Interprofessional Simulation, members of the ILD, FEHHS, and FES can reach students for practical collaborations. This allows for the exploration of project ideas, early tangible outputs, and increased experience for students, which, in turn, can further research ambitions and interest in postgraduate studies. The ILD offers its members to apply for competitive internal funding (up to £4000) together with collaborators, including members from FLAS and external partners. The ILD supports its members in developing external research funding applications with peer review opportunities and sharing of expertise.

2.4 Upcoming projects of the XR lab

Prof Jill Jameson, Lead for the Centre for Professional Workforce Development (CfPWD), has long-standing relationships with community organisations and the police force; she plans to use AVRT technology to explore collaboratively situations and training opportunities for police force members in crime reporting or stop and search activities.

Dr Markowski, Dr Weinel, and Professor Jameson are currently preparing a PhD opportunity to explore VR visualisations and body movements for relaxation and meditation. This will build on previous VR audio-visual work related to altered states such as Weinel (2021) and Deere (2022). They expect to use VR helmets and Tesla suits to capture body data.

Professor Sharon Weldon leads the simulation research group, which is a part of the CfPWD. Her primary research interest is transformative simulation, which uses simulation as a vehicle to innovate systems and challenge mindsets and perceptions (Weldon et al 2023). XR technologies will be considered to design simulations that bring the lived experience of service users or patients to the forefront, thus changing the perspectives of healthcare leaders and decision-makers on healthcare delivery.

Dr Gagliardi and Dr Markowski plan to secure ILD funding to conduct focus groups with a third-sector charity working with people with disordered eating to elicit opinions and reactions on using VR to educate about and assess eating habits. The participants shall have hands-on experiences with VR.
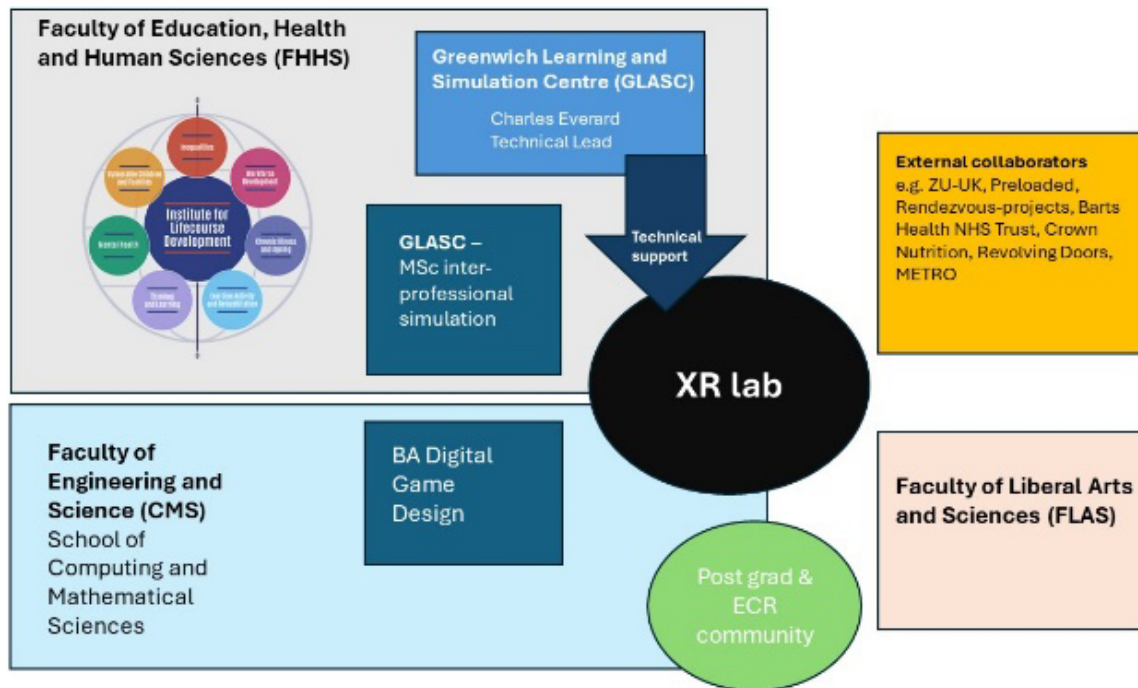
Figure 3. *XR lab structure*

Prof Fernando Naclerio, who leads the Centre for Exercise Activity and Rehabilitation (CEAR), has expertise in conditioning and strength training and its relationship to nutrition. His research area attracts PGR students globally, and PhD opportunities are planned to investigate the use of technology in carrying out and maintaining exercises and educating in nutrition. This is likely to involve exergames (Kappen et al. 2019) but could also develop applications in visualising exercise and nutrition relationships. In collaboration with the ILD Centre lead for the Centre for Thinking and Learning, Prof Sandhiran Patchay, they will investigate the application of VR for gait visualisation and exercises. Furthermore, Professor Patchay plans to use AR for the safe delivery of experiments concerning falls.

The XR lab is open to be visited by any researcher in FEHHS and CMS. When someone has a research idea, they can discuss it with the core members of the XR lab, who will advise on how to develop the idea and which funding opportunities are suitable.

Furthermore, the XR lab team plans to hold a yearly internal event to showcase the XR research carried out, reflect on knowledge created and experience collected as well as attract more collaborations.

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