



## Extended Reality and Open Education

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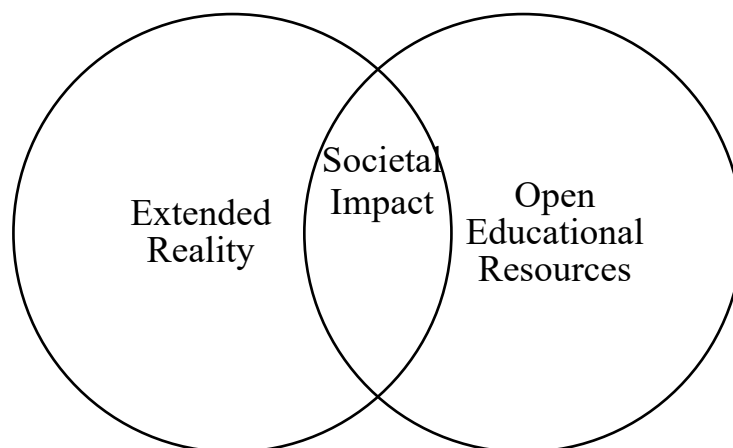
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**Abstract.** This paper will outline a current PhD research proposal that seeks to understand how universities could engage more with the open education movement by sharing extended reality (XR) and demonstrate a commitment to societal impact agendas. This research study is positioned at the intersection of XR pedagogical practices and open educational resources. UNSW Sydney has been chosen as the case study to assess the pedagogical implications of extended reality experiences in higher education. UNSW Sydney is a member of the Group of Eight universities in Australia and has a well-established team within the Pro Vice-Chancellor Education (PVCE) portfolio that creates extended reality content for courses and facilitates virtual reality experiences for students in a designated classroom. The evaluation of XR experiences on student learning will provide the evidence to support the wider intention of this research study to investigate the how universities could engage more with the open education movement by allowing XR content to be shared.

**Keywords:** Open Education Resources, Virtual Reality, Knowledge Sharing, Societal Impact, Extended Reality.

### 1 Background

This study will build on the well-established body of research on the open education movement and through a qualitative research methodology involving interviews with Australian university leadership, this research will inform how universities could accomplish societal impact agendas through the sharing of course materials, initially in the form of XR resources. An analysis of strategic and operational plans, policies relating to the intellectual property rights of course materials will provide additional evidence to answer the proposed research question. This research lies at the intersection of XR content as a pedagogical practice and open educational resources as a driver for societal impact. It is an attempt to offer a way forward for universities to engage more fully with an open education agenda and demonstrate a commitment to advancing society through the sharing of knowledge.



**Fig. 1.** Intersection of extended reality content and open educational resources in higher education.

Universities operate under conflicting paradigms of commercial imperatives and societal benefits, which fuels the debate of whether higher education is a public or private good. Government priorities have led to universities being compelled to generate revenues in the face of diminishing government funding. Intellectual property rights have allowed universities to leverage their exclusivity over information resources to gain competitive advantage and accomplish their commercial imperatives [1]. The democratisation of access to information and knowledge through the internet and more recently AI technology has altered this paradigm and led to a reimagining of the societal benefits of a university education [2]. Universities now face increasing pressure to demonstrate their societal impact while achieving the Australian government target of 80% of people attaining a tertiary education by 2050 [3]. Universities have begun seeking ways to validate their continued relevance in this environment and this study is proposing an open access strategy for XR content that aligns with the United Nations (UN) sustainability goal of a quality education for all [1].

## **2 Literature Review**

### **2.1 Open Educational Resources**

Open educational resources have been defined as “materials offered freely and openly to use and adapt for teaching, learning, development and research” [4]. This includes complete courses, learning resources, textbooks, videos, software, and any other tools or methods that help people access knowledge [5]. A key recommendation of the United Nations Educational, Scientific and Cultural Organization (UNESCO) 2012 Paris OER Declaration was to “Promote and use OER to widen access to education at all levels, both formal and non-formal, in a perspective of lifelong learning, thus contributing to social inclusion, gender equity and special needs education. Improve both cost-efficiency and quality of teaching and learning outcomes through greater use of OER” [6]. In 2015, UNESCO established 17 sustainability goals that all member states have agreed upon. The goal of the fourth sustainability goal (SDG 4) is to ensure inclusive and equitable quality education and promote life-long learning opportunities for all by 2030. It has been proposed that open educational resources have a major part to play in achieving this milestone and the stakeholders could encompass academics, teachers, parents, government agencies, universities and others with an interest in sharing knowledge [7].

The Australian Productivity Commission has made a recommendation to the federal government that explicitly aligns with the OER Declaration of 2012 and SDG 4. It states, “increase the transparency of teaching performance by requiring universities to provide all lectures online and free” [8]. It argued that offering open access to course materials for students, peers, and the broader public would generate significant social and economic benefits. These include promoting higher-quality teaching, enabling prospective students to make more informed enrolment decisions, and supporting lifelong learning for individuals who do not require formal accreditation or who cannot afford university study [8].

The Commission acknowledged that universities may oppose such measures due to financial concerns, intellectual property issues, and fears of reduced enrolments. However, it contended that open access to teaching materials is consistent with existing requirements for publicly funded research to be openly available [9]. It also emphasised that a university education encompasses assessment, feedback, staff-student engagement, and the wider social experience not simply access to course materials.

The Commission further challenged universities’ claims to intellectual property ownership, suggesting that the government, as the primary funding provider, could mandate that institutions maximise the public return on this investment [8]. This study will explore these claims in greater depth and examine whether university leaders support the Productivity Commission’s position.

The sustainability of investment for universities to adopt an OER policy has been recognised as a barrier to increased adoption. Downes [10] has provided three models for consideration. The Institutional Model recommends OER initiatives be funded from the universities operational budget and are seen as realising societal impact mission statements. The Partnerships and Exchanges Model would allow for the sharing of OER resources across institutions while the Governmental Model proposes OER initiatives be funded by government agencies to meet their educational aspirations. An OER initiative can be considered sustainable for an institution if it helps recruit new students, enhances accountability for public funding, supports its public service mission, or strengthens its reputation; however, these benefits are generally uncertain, intangible, and offer limited immediate financial gain [11].

The financial implication for universities is not the only barrier for adopting an OER policy. Bossu and Tynan [12] recognise that there are academic concerns over control of intellectual property, reputational concerns over the quality of educational materials and as Plotkin [13] states, “a reluctance to give away the crown jewels”. The 2007 report by the Organisation for Economic Co-operation and Development (OECD) reviewed the impact of

the OER movement on higher education and considered how sustainable cost–benefit approaches for OER projects could be further developed. The report highlighted six reasons why institutions might engage in creating and sharing OER [14]:

- altruistic motivations
- making effective use of public funding
- reducing content development costs
- showcasing the institution to attract prospective students
- providing potential students with a preview of paid course content

This study will add to the open education movement research by providing the perspectives of leaders in higher education on the implications for universities to allow free access to course materials, initially in the form of extended reality content.

## **2.2 Extended Reality**

Extended reality (XR) serves as an umbrella term that encompasses virtual reality (VR), augmented reality (AR), and mixed reality (MR). It represents a myriad of experiences that merge real and digital environments using immersive visual, auditory, and tactile elements [15]. Virtual Reality, as a subset of extended reality, has the advantage of creating a fully immersive experience that can replicate real-world environments with lower risk and lower logistical costs [16].

This study will add to the body of research that has investigated the learning affordances of extended reality experiences in a higher education context and the constraints associated with XR development. There are many studies espousing the benefits to student learning of extended reality experiences in a higher education context and the pedagogical constraints of traditional methods of instruction.[17], [18], [19], [16], [20], [21], [22]. There are, however, conflicting studies on whether extended reality experiences lead to greater student outcomes. While a greater sense of presence was observed, the results indicated a lower level of learning occurred compared to a desktop version [22], [23]. The UNSW case study is designed to fill the gap on whether the self-efficacy of students in understanding the course material and assessment requirements improves after an XR experience, rather than explicitly identifying improved learning outcomes using extended reality content. The variables associated with a cohort of students would render such a study inconclusive and a student’s perception of their ability to understand the course material after an XR experience is a valid form of evaluation.

The initial case study at UNSW Sydney will provide answers as to whether the investment in extended reality in higher education is justified when it comes to the student experience. Creating XR learning materials for university courses is often expensive and labor-intensive, especially when the resources are used by only a limited number of students. These challenges have hindered the broader uptake of XR in education [24], and several studies have noted the practical difficulties institutions face when implementing such technologies [25]. At UNSW Sydney, the PVCE Media and Immersive team have created applications that are used in courses of study and this research study aims to address the costs associated with XR development across the higher education sector by proposing an open access agenda so that universities are not replicating XR resources and a much larger number of learners benefit from the investment.

There have been attempts to realise an OER agenda for XR content with the Educause XR Community group, based in the United States, conceptualising an XR library of resources that aims to “democratise transformative XR technology and ensure equitable access” [26]. An Open XR for Education Framework has also been envisaged to support the development and sharing of XR content [27].

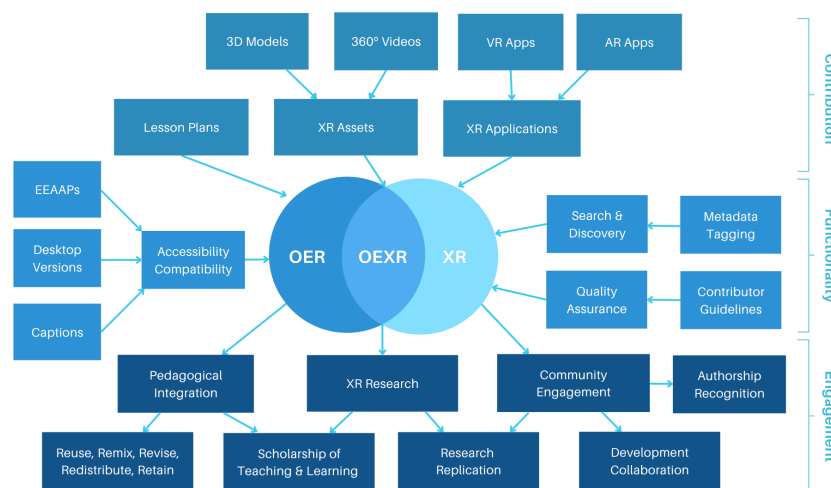


Fig. 2. The OEXR Library Framework [27].

An OER XR library has been developed by the Educause XR Community group through a National Science foundation grant but at present there are very few resources available which indicates a lack of participation by universities and a limited trajectory for sustainability. The community group recognises the need for “ongoing commitment of support from institutions able to dedicate resources to creating a community good” [26]. While the creation of a framework and a repository are all steps towards XR content being made freely available, the desire for universities to participate in this open agenda is the gap this research study is seeking to fill.

### 3 Conclusion

This research study is an attempt to understand the complexities of how universities could engage more fully with the open education movement through the lens of extended reality content developed for a higher education context. The evidence this study will produce could inform a broader consideration from universities to adopt the recommendations of the Australian Productivity Commission and the 2012 Paris OER declaration. Given the current climate of skepticism for the higher education sector this study offers universities a vision to recapture their position as bastions of knowledge and to demonstrate their commitment to advancing all of society not just the fortunate few.

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