XR@UM: Building a Community of Practice in Immersive Learning at the University of Montana

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Abstract. This iLEAD Extended Abstract illustrates the development of the University of Montana's (UM) interdisciplinary campus-wide Community of Practice (CoP) for Extended Reality (XR), including Virtual Reality, Augmented Reality, and Mixed Reality. The CoP was established to unite faculty, staff, and students to share and discuss the use of XR technologies for teaching, learning, and research happening at UM. The initiative, supported by the Office of Organizational Learning and Development, The Mansfield Library and the Vice Provost's Office on Educational Initiatives and Innovation aims to create a collaborative space for XR, fostering interdisciplinary exchange and promote the co-creation of immersive educational tools and experiences at the university. Here we describe the CoP's initial development during the Spring 2025 semester, focusing on strategies, projects, and events to support XR integration across UM. The CoP's efforts include as key components of its strategy inaugurating the Immersive Learning Research Network's Montana chapter, workshops, knowledge-sharing events, and core infrastructure. The UM CoP serves as a model for scaling XR adoption in higher education.

Keywords: Extended Reality, Community of Practice, Institutional Infrastructure, Virtual Reality, Innovation, Montana, North America, Drones, Geoscience, Pharmacy Science, Neuroscience, Ecology, Indigenous, International, Strategic Planning.

1   Introduction

Extended Reality (XR) immersive technologies such as Virtual Reality (VR), Augmented Reality (AR), and Mixed Reality (MR) are rapidly reshaping the educational landscape by offering new ways to engage learners and support experiential learning. Recognizing this potential, faculty at the University of Montana (UM) have initiated a Community of Practice (CoP) through the Office of Organizational Learning and Development (OOLD) and with support of the Vice Provost's Office on Educational Initiatives and Innovation. This CoP meets twice per month, uniting faculty, staff, and students from diverse disciplines to explore, share, and innovate in the field of immersive learning in XR. This paper highlights the strategies & outcomes of the CoP's early stages of development, focusing on selected projects and events occurring during the Spring Semester 2025. This group is also active in launching the Immersive Learning Research Network (iLRN) Montana chapter, seeking to contribute to and benefit from engagement with the global community.

1.1   The Community of Practice Model

Communities of Practice are collaborative structures that foster shared learning and innovation among professionals. According to Wenger [1], CoPs support knowledge sharing by bringing individuals together around shared interests and challenges. UM's XR/VR/AR CoP or "XR@UM" is supported and coordinated through OOLD and serves as a platform, or a "dynamic hub", for faculty, staff, and students to explore the pedagogical and research potential of extended reality, develop XR expertise, share project insights, and collaboratively address challenges in applying immersive technologies in teaching, research, and learning. Prior to the CoP's creation, faculty were operating in relative isolation on their XR projects within their respective department. Through workshops, discourse, and interdisciplinary collaborations, XR@UM fosters an environment where participants can explore immersive technologies together, consider best practices, and co-develop innovative scholarship applications. By leveraging UM's existing XR infrastructure and developing new partnerships, the

CoP aims to cultivate a sustainable ecosystem that empowers UM expertise to co-create and manage complex projects, supporting educators, students, and researchers to integrate XR meaningfully into their disciplines while contributing to broader institutional initiatives in immersive learning.

1.2   Forming a Community of Practice

Prior to the first session of XR@UM, it was necessary for each XR developer on campus, whether researcher, educator, student, or outreach coordinator, to create their own infrastructure for XR adoption, design, communication, and dissemination. The XR@UM collaboration kicked off with Pre-Session 1, where a shared system (SharePoint) was established to facilitate seamless resource sharing and communication. Using SharePoint allowed organizers to share schedules, agendas, reference materials, and co-editable documents for group collaborations. As organizers, we determined the CoP objectives for the semester would be to 1) identify XR users, developers and stakeholders and invite them to participate, 2) create lists of (a) current hardware and software utilized at UM and (b) current XR projects at UM, and 3) create events to increase XR enthusiasm and visibility on our campus.

Meetings were held bi-weekly throughout the semester. Session 1 served as an introduction, featuring icebreakers to foster connections among participants. Following this, attendees were assigned homework to contribute to the shared documents in SharePoint by listing their software and hardware capabilities, inputting relevant research funding opportunities (RFPs), and identifying XR communities at other institutions. Session 2 focused on defining the vision for XR@UM, using a deck of cards as an analogy and brainstorming tool to identify common themes (i.e. suits), structures and issues (i.e. card values) that exist within XR framework development. In Session 3, participants presented their current work, promoting knowledge exchange and identifying potential sharing of resources. Session 4 featured a recorded webinar and an innovation workshop, both led by University College Dublin Fulbright Scholar, Dr. Fun Man Fung. Session 5 included a demo from VictoryXR, providing insight into their growing XR applications. Following this, organizers stepped back to assess the needs of the group before planning the remaining sessions to ensure agreement on the direction of and the collaborative efforts toward shaping the future of XR@UM.

2   Extended Reality at the University of Montana

2.1   Faculty-Led XR Projects

Under the leadership of Dr. Bursztyn (Geosciences), Dr. Holick (Pharmacy/Neuroscience), and Dr. Richter (Vice Provost's Office of Educational Initiatives & Innovation), the XR@UM CoP began by assembling others on campus known to be working on or with XR, including Dr. Colman (Ecology), Bart Bauer and Jeremy Crowley (UAV office), Dakota LaJeunesse (Crow Tribe), Jeremy Jeffay (student), Michael Cassens and Cory Macague (Game Design) and university leadership (Table 1). The first move for this hub of interdisciplinary collaboration required sharing and showcasing the variety of XR teaching and research projects that highlight the breadth and depth of XR applications already happening at the University of Montana.

This collective of staff, students and faculty demonstrate in their work some of the value that immersive virtual reality and extended reality can provide within higher education (Table 1). For example, integrating storytelling with virtual patient scenarios in healthcare aims to improve both cultural humility in healthcare professionals and reduce disparities in healthcare outcomes in Indigenous populations [2]. Or, at the intersection of technology and cultural equity, is the project that involves the preservation of Blackfeet ecological knowledge and cultural heritage while immersing people in their 18,000-year-old cultural perspective [3]. In tandem, a geoscience effort aims to foster inclusive and accessible "field" education by bringing the mapping environment into the classroom through immersive virtual reality [4]. Immersive virtual environments and experiences like these facilitate the development of learning environments grounded in the same learning theories as experiential, place-based education, including the related concepts of discovery-, inquiry-, and problem-based learning [5].

There is a rapidly growing body of work documenting the transformative experiences of XR in higher education, particularly with respect to place- and discovery-based, experiential, and embodied learning practices [6-13]. Evidence suggests that the direct connections fostered through relevant locations and real-world problems are critical for student engagement in the learning process [14,15].

Table 1. XR Community at the University of Montana.

	Discipline	Immersive Experience Focus	Description
U s e r s	Health Sciences	Anatomy, Physiology, and Pathology Nano First Life	Visible body uses AR to project various physiological systems, VR of inside the cell, VR experience of evolution
	Computer Sciences	Model real world scenario (wildfire) in iVR	Developing a simulation in VR from real data for modeling wildfire in forested landscapes
	Geosciences	Replicate real world practice (field mapping) in iVR	VR to simulate geological fieldwork experiences (removes logistical, financial, and physical barriers). Simulations integrate measurement interaction with georeferenced high-resolution rock samples.
	Ecology	Experience diversity of environments and biomes through iVR	AR use for species identification VR 360 field trips
D e v e l o p e r s	Cultural/ Language preservation	Preserve and teach indigenous language and culture	VR immersion of cultural practices and ways of knowing;
	Game design and interactive media	Develop virtual environments, situations, games, experiences	Game design and development, coding, graphics, interaction and UX
	Blackfeet Eco Knowledge	Develop culturally centered immersive experiences such as a buffalo hunt, camp	Indigenous elders and cultural knowledge keepers leading in partnership with UM immersive designers
	Empathy Project	Create virtual indigenous healthcare experience to increase provider empathy	VR immersion of first-person storytelling VR software of the indigenous healthcare experience
I n f r a s t r u c t u r e	Vice Provost Office of Educational Initiatives and Innovation	Hosts UMOnline and The Montana Futures Forum in support of campuswide innovation and quality XR learning initiatives in collaboration with key stakeholders	Cultivates design-based learning experiences, hosts UM campus dialogue with Montana experts & innovation events about emerging tech with online forums, webinars, tech meetups & playgrounds
	Library (information sciences)	Multimodal literacies and scholarly community engagement, coordination, Technology and software host/managers	Houses, supports, and instructs in use of XR hardware, software, student information services, and faculty support mechanisms
	Autonomous Aerial Systems	Training for drone use, digital twin generation. volumetric capture for immersive simulations	Teaches a drone certification course and provides support (both technological and intellectual) for university and public projects requiring drones, aerial imagery, etc.
	Information Technology	XR systems interoperability, security, and technology infrastructure services	Technical support for software and equipment
	XR Student Group	Student co-creation of eXtended Reality experiences	Promoting access and opportunities for student engagement

2.2   Participating in the Emerging Global and Interdisciplinary Field of Immersive Learning

Building capacity for immersive learning at the University of Montana through XR@UM has required sustained effort and strategic planning as the CoP was conceived not as an insular initiative but as an embedded node within the expanding interdisciplinary global movement toward immersive learning research, teaching, and professional practice. From the outset, we recognized that meaningful engagement with the broader global immersive learning community was essential, so planned to contribute to and learn from the larger conversation. By intentionally connecting with this global network (including iLRN) we set out to strengthen and accelerate our ability to establish a healthy, dynamic, multimodal set of practices to grow university XR activities and expertise. Partnerships with experts from across the disciplines creating quality immersive learning is the goal.

To achieve this, XR@UM adopted a strategy of leveraging existing university infrastructure (e.g., SharePoint, library resources) while tapping into iLRN's virtual campus, media capabilities, and audience. This dual integration gives the CoP the potential to host webinars, game jams, interdisciplinary forums, and co-creative interactive events as part of the global network while using these events internally for building capacity. For example, the university's Montana Futures Forum hosted their first set of live and online webinars with iLRN's Zoom accounts and posted through iLRN socials and forum to the public. Internally, the recorded links found on iLRN's YouTube channel were shared via both MS Teams and SharePoint environments. XR@UM encouraged

members to join iLRN and participate with the iLRN: Montana chapter. Through such integrations, the internal university efforts and the global efforts of iLRN are aligned, creating local and global synergy. This positions XR@UM as both a contributor to, and a beneficiary of, the international immersive learning community. Further, by prioritizing low-cost, high-impact activities, XR@UM ensures that more students, faculty, and practitioners gain firsthand experiences in immersive co-creation and interdisciplinary collaboration. XR@UM aligns with the University of Montana's Vice Provost Office of Educational Initiatives' strategic plans, emphasizing innovation, high quality experiential learning, and the thoughtful deployment of emerging technologies. Our approach, rooted in ethical engagement and purposeful design, ensures that immersive learning at UM is not only sustainable but also a meaningful contributor to the evolving global discourse on immersive education. By fostering relationships that extend beyond institutional boundaries, XR@UM strengthens its role as a bridge between local academic efforts and the international community.

2.3 CoP Outcomes

Participants in the CoP worked collaboratively on four documents to identify and inventory the collective goals, concerns, intellectual and technological resources, and opportunities relating to XR at the University of Montana. The goals, or collective vision, included imagining a world in which XR was a fundamental part of the university structure, including facilities, software development pipeline from student to instructional tool, dedicated resources (personnel and funding), and articulated policies. From a more attainable perspective, the goals list included seven action items as follows: 1) co-create a map of UM XR activity and infrastructure, 2) create a support structure for grants and find collaborative funding opportunities, 3) create a training method for XR adoption in the classroom, 4) promote and highlight the work being done on campus, 5) student-generated XR programming for use for teaching/learning, 6) share examples of UM innovation with the public, and 7) build a community and common identity for faculty and staff involved in XR on campus.

CoP outcomes from the semester demonstrate how action items 1, 2, 4, and 6 were addressed. Participants co-wrote an inventory of equipment (including quantities and where it is housed), what the equipment is being used for and whether or not it is available for use by others. Within the same document, participants are documenting their intellectual resources (XR experience and expertise each bring to the university community). Five opportunities for XR funding, project proposals, or competitions were identified and shared in an RFP document that includes a full description of the opportunity, important dates, and links. Participants presented how they were using XR in their work as well as the challenges they were facing with respect to XR integration, and the Montana Futures Forum is hosting and recording participants' presenting the work they are doing. Finally, to inform the long-term vision with respect to resources (infrastructure and human), equipment storage and distribution, and other access, accessibility, and privacy/technology sharing, participants co-wrote a list of concerns that need to be addressed as the broader UM XR community becomes established.

2.4 Challenges

Expanding from an XR CoP to a sustainable productive XR community on a university campus presents several challenges, including securing funding and institutional support for hardware, software, and infrastructure. Faculty and staff will need training to sustain innovation and to integrate XR effectively into their teaching and research, requiring time and professional development resources. Additionally, interdisciplinary collaboration can be difficult to establish, as different departments have varying levels of interest, technical expertise, and priorities, and may value the implementation of VR differently based on their specific educational and research goals. Ensuring accessibility and inclusivity is another hurdle, as not all students have equal access or desire to use XR technology. Lastly, sustaining engagement over time requires ongoing advocacy, clear goals, and a supportive network of students, faculty, and external partners to drive innovation and adoption.

3 Broader Impacts of the CoP on XR Design and Education

The XR@UM CoP can serve as a model for immersive learning initiatives at other higher education institutions. Key contributions include:

1. **Interdisciplinary innovation:** By bridging disciplinary silos, the CoP fosters the exchange of diverse perspectives, enabling innovative XR applications that address complex educational challenges.
2. **Capacity building:** Faculty development workshops and peer mentoring within the CoP equip educators with the skills and confidence to integrate XR into their pedagogical practices. Initiating the iLRN: Montana

geographic chapter is a means to extend and amplify the expertise and impact of immersive learning at UM and across the state.

3. **Cultural and ethical considerations:** Projects emphasizing Indigenous knowledge and cultural competency underscore the importance of ethical design and inclusivity in immersive learning environments [16].

4. **Research and evaluation:** The CoP facilitates research on the efficacy of XR interventions and interdisciplinary shared concerns, both contributing to the growing body of literature on immersive learning.

4 Conclusion

The University of Montana's Community of Practice exemplifies how academic institutions can move quickly to cultivate the transformative potential of XR in teaching, learning, and research. By focusing on low-cost, high impact mechanisms inviting everyone at the university to share & learn together, the spark of co-creation and capacity for expertise in design, development, and application of immersive learning is rapidly multiplying. Through meaningful partnerships and connections with the global interdisciplinary network of scholars and designers, these efforts may be amplified. Sustaining purposeful design and support from faculty and university leadership, interdisciplinary collaboration and a commitment to equity are key to continued success. The UM@XR CoP not only advances XR innovation but also serves as a replicable model for fostering immersive learning ecosystems for iLRN chapters around the world. Continued investment in initiatives like this is thought essential to prepare learners for an increasingly complex, fast-paced and digitally interconnected world.

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