



Building an XR Collaborative: Strategies for Sustainable Immersive Learning Support at an R-1 Institution

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Abstract. At the University of Arizona, faculty are innovating to include XR content in their courses across the curriculum. A lack of centralized support, including funding, technical advice, and pedagogical expertise, makes implementing XR expensive, inefficient, and unsustainable. A consortium of members from units across campus have come together to form the XR Collaborative to begin to address these challenges and create a comprehensive and collective vision for our campus.

Keywords: XR Support, Higher Education, Immersive Learning.

1 Introduction

Virtual reality, augmented reality, and mixed reality technologies - sometimes collectively referred to as Extended Reality (XR) - are poised to revolutionize education by increasing student engagement, interest, and achievement of desired learning outcomes [Di Natale et al., 2020]. At the University of Arizona, numerous faculty are innovating to include XR content in their courses. However, a lack of centralized funding and comprehensive university support for immersive learning makes implementing XR expensive, inefficient, and unsustainable. To address these challenges at the University, CATalyst Studios (UA Libraries), University Center for Assessment, Technology, and Teaching (UCATT), and Office of Distance and Continuing Education (OCDE) came together to:

- Identify and address immersive learning and design needs of faculty and staff.
- Increase student access to fully immersive experiential learning opportunities and upskilling.
- Generate strategic direction for future institutional investment and support for XR.

We anticipated our efforts would reveal pent-up interest in XR technologies, as well as requests for centralized funding, equipment management, staff upskilling, and educational development. One year into the process of assessing the campus XR ecosystem, we were surprised to learn that equipment is not what folks need. Instead, we found the notion of a consortium or collaborative to be key. Collective use of distributive resources and facilitation of communication among key players is a sustainable organizational model that continuously reveals needs and efforts while it builds understanding, facilitates implementation of projects, and generates ideas.

This presentation will discuss the approach, success, and future directions of the XR Collaborative at the University of Arizona and how we have been able, with limited funding, to bring together users across the campus to create a community of practice.

1.1 XR Collaborative

Our primary goal was to bring people who are either working in or have an interest in XR together to start building a community. As part of this effort, we formed a listserv, created a Microsoft Teams channel, and hosted a monthly meeting with 15-30 attendees. Our first meeting in December 2023 included 22 invitees. By December 2024, our membership had grown to 67. In other words, XR Collaborative membership more than tripled in one year's time.

Table 1 shows this growth, with the blue bars representing membership by college in December 2023 and the red bars representing membership by college in December 2024. Our members now come from 11 of the 17 colleges on our campus (not counting College of Medicine-Phoenix, Graduate, or Honors colleges).

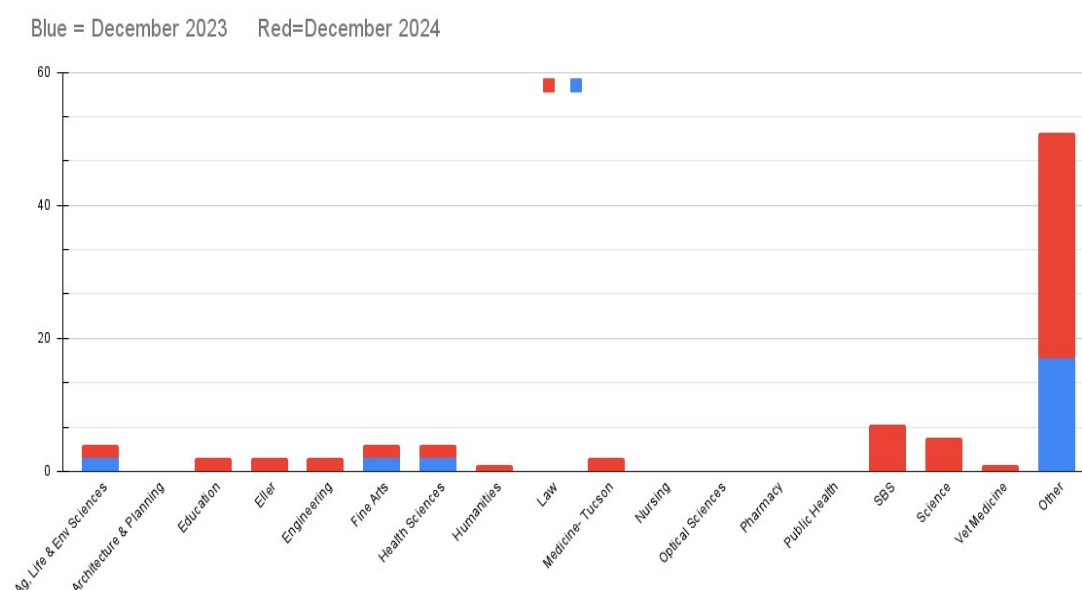


Fig. 1. XR Collaborative Membership, by College.

Interestingly, our Teams channel and listserv have not generated the conversation we anticipated; simply providing the space to post information was not sufficient to create collaboration. Rather, our meetings, and their structure, worked to bring people into productive conversation. Yes, people were encouraged to share their work, but our meetings were also specifically designed to provoke discussion on what people did not know, where they were coming up against barriers, and pleas for help from others in the collaborative, and we clarified that folks could show up regardless of where they were in their XR journey.

To this end, meetings have and continue to follow a consistent format. To start, we open the floor so new members can introduce themselves and share their experiences and goals. This is immediately followed with a five-minute meet-and-greet so participants can extend their introductions and talk about XR interests with a person they do not know (or know well). Then, we create one more opening for sharing with a request to post to an online resource board, analogous to the old community rideshare boards, their XR needs or resources they are willing to share. Then, and only after that connection work is done, do we introduce a guest speaker from our campus community doing work in XR. Speakers are asked to share their work, resources they have used, where they found the help they needed, and other steps in their journey to getting where they are today. Additionally, presenters are asked to share what they can contribute to the community, be it gear, information, or help, and where they are stuck and how they could use help. Finally, we end each meeting with “Announcements, Rumors, Declarations and Shoutouts,” which people have robustly used to highlight successes and awards, share new exciting collaborations, inform folks about upcoming events of interest, give updates about projects they are working on, and frequently to offer advice to each other. Our next hour is reserved for mingling. Guest speakers so far have presented on projects that use a variety of pedagogical approaches:

- Paul Gignac, Associate Professor of Cellular Medicine & Director of Physician Assistant Anatomy, shared processes for creating virtual anatomy models with matching 3d printed “bone boxes.” For graduate students new to his laboratory, Professor Gignac has designed accelerated training modules in XR visualization skills for research.
- Jackie Maximillian, Associate Professor of Environmental Science, described the use of virtual and augmented reality so that students who are not located in Tucson or are unable to gain physical access to field sites for other reasons may immerse themselves in doing environmental field research in the Santa Cruz River. Gathering and analyzing data about learning is central to Professor Maximillian’s evidence-based approach to teaching.

- Jay Sampson, Business Development Lead in the John and Doris Norton School of Human Ecology, described the creation of the Terry J. Lundgren Center for Retailing whose mission is to expand knowledge and innovation in retailing and branding. Use of XR technologies in this space support students' authentic practice of retail marketing skills as well as research in this discipline. Collaborative connections facilitated 3d scanning facilities in the Center and partnership with a team of undergraduate students in the University's AI Core to combine XR and AI to invent augmented reality, computer vision, and agentic LLM structures. The AI Core students are mentored closely using constructivist teaching strategies.

1.2 Internal Interviews

To make visible and document not just XR resources and activities but also the context of XR work at the University of Arizona, we interviewed thirteen people working with XR. Each interview lasted 45 minutes and was recorded over Zoom. Following the interview, auto-generated transcripts were lightly edited for clarity and used for a thematic analysis. Interview participants were asked if they would be willing to let us share their responses in a non-anonymized way, for example in a website or written report. We developed an interview instrument designed to understand what is motivating participants to use XR, the benefits and barriers they have encountered, and future goals and technology needs. Questions are included in the appendix.

Some of these interviews resulted in invitations to speak at upcoming XR Collaborative gatherings. Analyses are forthcoming and will reveal themes, future project development, XR equipment acquisitions, and recommendations to senior leadership.

1.3 Initiatives Cultivated and Efficiencies Gained

One of our questions was how we leap the gap (Figure 1) between the early XR tech adopters and people-- particularly instructors-- curious about XR, but without enough knowledge or equipment to get started?

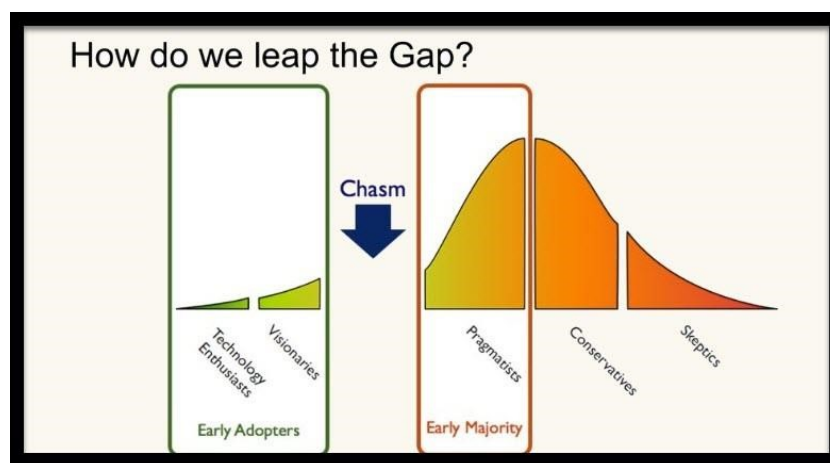


Fig. 1. How do we leap the “Gap” (courtesy Randall Rode, Yale University, 2024 [PowerPoint Presentation]). Graphic of a bell curve with a chasm between Early Adopters (Technology Enthusiasts and Visionaries) and Early Majority (Pragmatists). Further to the right on the adoption curve are Conservatives and Skeptics.

While we still have a long way to go to cross the chasm, our collaborative approach has connected partners across campus and yielded some early successes:

- Following Jay Sampson’s first presentation on the Lundgren Center, he began working with the AI Core (a campus-based facilitated group of student developers whose founder, Ash Black, is also an XR Collaborative member). The result is a digital twin of the new consumer sciences lab complete with an LLM-trained digital avatar that provides tours and answer questions about the space.
- Thanks to connections established during our monthly meetings, the AI Core found shared office space within the Health Sciences Design Lab.
- A staff scientist in the Office of Research, Innovation, and Impact collaborated with the Visualization Specialist in University IT Services (UITs), after connecting during our XR Collaborative meetings, to develop a virtual MRI tour for neuroimaging students, with plans to expand this into an immersive educational experience for training researchers.

- Environmental science professor Jackie Maximillian, PhD, announced her intention to respond to the NSF 23-624 solicitation for Research on Innovative Technologies for Enhanced Learning with support of XR Collaborative members, who learned about her work through her presentation to the group.

These are just some of the exciting projects that have arisen from the XR Collaboration, highlighting how it is possible to bring people together using a methodology that focuses on points of connection.

1.4 Made Equipment Available and Expanded XR Education Opportunities

The collaborative has also seen success with our goal to expand access to immersive technologies and help develop virtual literacy on our campus. New projects stemming from the XR Collaborative include:

- A School of Art professor shared his grant-funded VR classroom facility with a professor of practice in health science design to teach a course in data visualization and VR development.
- The Center for Digital Humanities donated equipment to the library's CATalyst Studios to support volumetric capture and 3d scanning. The Center's team of graduate students further supported CATalyst to install the volumetric capture system and is training students and staff to make this service available to the wider campus beginning in the Fall 2025 semester. The Center for Digital Humanities also donated two 3d scanners to augment the scanning capabilities in CATalyst Studios. Note that Provost Investment grant funds are being used to supplement the software license that makes broadcasting and recording possible.
- A Vertically Integrated Project (VIP) debuted in Fall 2024, centering XR and AI development for interested students. This course was co-taught by 3 members of the XR Collaborative and is continuing each semester.
- UCATT and the Norton School have collaborated to install a photogrammetry station available to anyone on campus. With this system, one can translate material objects into 3d digital objects.

1.5 Tactical Visioning Meeting

In November 2024, the XR Collaborative held a visioning meeting to explore what community members see as next steps to move the University of Arizona from an experimental to a tactical phase of XR adoption as describe by Randall Rode and colleagues (Figure 2).

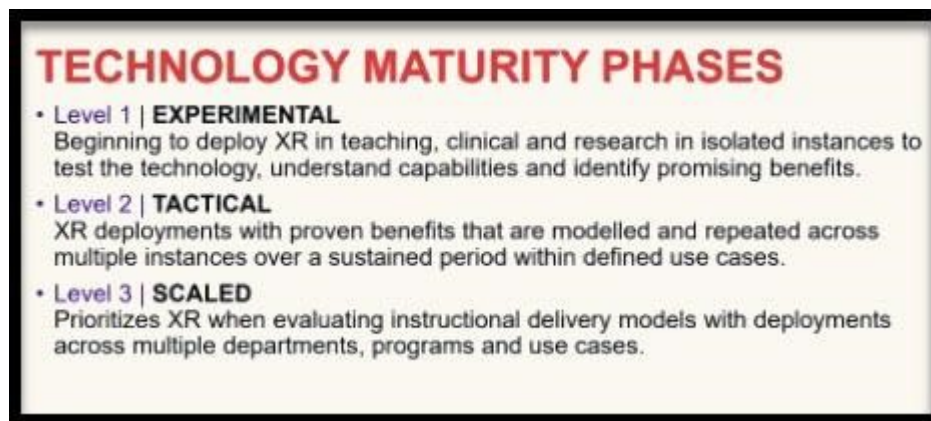


Fig. 2. Technology Maturity Phases (courtesy Randall Rode, Yale University, 2024 [PowerPoint Presentation]). Level 1: Experimental - beginning to deploy XR in isolated instances to Level 2: Tactical – XR deployments with proven benefits that are modeled and repeated across multiple instances.

The visioning session generated new ideas for the Collaborative moving forward but also motivated members to begin some initiatives of their own. Key topics were how to grow visibility for the XR Collaborative and/or its members and how to increase access for instructors and students to immersive technology and support. For example, several participants agreed to host and manage an institutional website to showcase XR projects happening on campus, both giving visibility to instructors who might find inspiration for their own courses, and to represent structural support for XR innovation for those who fund and support campus initiatives.

Discussions and thought exercises during the visioning session revealed differing views on centralized or distributed support tactics. Some members of the XR Collaborative with positions in or connections to upper

administration advocated for an XR Center that acted as both a "restaurant" where anyone could come to sample an XR experience and as a "kitchen" where developers and visionaries could create content. Other members who were actively involved in XR development advocated for elaborating on a distributed collective method of work and support. How would--even could--a collective managerial approach support a Center, secure and administer funding, make decisions? Outcomes of the visioning session will be included in a report to our provost who provided financial support for this work. The report will be used to inform future directions of XR at our institution, including an Immersive Pedagogy Fellowship (below).

1.6 Immersive Pedagogy Fellowship

The XR Collaborative will sponsor the first cohort of the Immersive Pedagogy Fellowship for instructors, including instructional designers, graduate students, post-doctoral fellows and faculty members, in Fall 2025.

Fellows will design a curricular opportunity and use awarded funds to purchase XR equipment, existing immersive study materials, and/or work with student developer teams at AI Core and Center for Digital Humanities to prototype experiences. This structure came about because of recommendations and partnerships made possible by the Collaborative weekly meetings. Projects developed as a result of this fellowship can be used to develop the identity of the XR Collaborative, be featured on an XR website, promote emerging practices for teaching and learning with XR to internal and external audiences on campus and to our campus marketing teams, and to inspire others to consider the ways in which immersive experiences might fit their objectives.

1.7 Future Projects and Final Goals

The University of Arizona's XR Collaborative has demonstrated that a collective approach is effective for organizing Early Adopters. The: a) deliberate pathways for communication, b) the specific focus on people's needs and barriers they are hitting up against, and c) the dedicated time within our meeting structure for simply talking informally to one another worked to create a true collaborative. We are still a relatively new collaboration on campus; however, several short-term and long-range goals have emerged out of the XR Collaborative:

- Develop a system for the management and distribution of acquired XR technologies.
- Create and host a collaborative XR Summit to showcase work, advertise the Immersive Pedagogy Fellowship, and generate interest and understanding of immersive pedagogical tools across the institution.
- Host a series of XR technology "petting zoos" of technological options for campus partners, including headsets, cameras, software and more.
- Provide recommendations to senior leadership for the future development of XR technologies and programming on the University of Arizona campus.

We will achieve these goals by intentionally centering the needs and efforts of humans who do the work, use, and benefit from XR on our campus. Our experience thus far indicates that collaborative action by the people who work in XR is a pragmatic solution for a large university with many different types of XR needs, initiatives, and ideas to grow instructional uses of XR in ways that are effective, evidence-based, low cost, and sustainable.

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Appendix

Table 2. XR Collaborative Interview Protocol.

1. Tell us about your work with or interest in XR.	- How is this work/interest supported? e.g., Current operations/activities - How did you come to be working with XR?
2. What is driving you to want to work with XR? What do you consider to be the benefits of XR learning?	Could you tell us about a particular experience or idea that motivates your work/interest?
3. Is there something you would like to do with XR that you are not doing now?	Would you like to tell us what you would like to do in the future (near or far term)?
4. Do you have a hardware/software wish list at this moment?	What would you prioritize on this list? Why?
5. What do you see as barriers to using XR technology in education? What challenges have you experienced?	- With regard to XR and education, are you aware of or have you experienced equity and accessibility issues? - What thoughts do you have about how to overcome or mitigate these issues?
6. One aspect of the XR collaborative project is to facilitate connections, resources, and support. Are there aspects of what you do or provide that you would like to highlight as available to UA community members?	
7. Is there anything that you would like people to know about your work/interest/experience with XR that we have not talked about?	