

# BC XR LAB

## 2021/2022 EXECUTIVE REPORT



World One: XR Lab Virtual World Dedication - Michael Gelon, virtual worlds artist

[XRLAB@BELLEVUECOLLEGE.EDU](mailto:XRLAB@BELLEVUECOLLEGE.EDU)



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# EXECUTIVE SUMMARY

This report is written in June 2022 following two years of unprecedented challenges for Bellevue College and the XR Lab due to COVID-19. Most on-campus activities and regularly scheduled classes have been curtailed while much of the ongoing business and teaching functions of Bellevue College have moved to online virtual work environments. The impact of COVID-19 on the Lab continues has been significant but also has provided new opportunities for growth. While we have been unable to provide hands-on VR experiences for classes on campus due to these closures, we have created a virtual "home away from home" for online activities.

The XR Lab continues to be a high functioning organization pursuing a variety of projects, and will complete its fifth fully operational year within the college. A few of the highlights of the year since our last report include:

- XR Lab and student Capstone Team Projects collaboration (Computer Science & Digital Media Arts)
- Capt. Dick Nelms WWII B17 pilot cross-media project
- XR Hosted Events and Faculty Workshops
- The *Edge of Ed* podcast
- Allied Health T Building Virtual Tour
- Mozilla Hubs curriculum development and virtual classrooms
- Institutional Networking, NSF Grant, and Open Education Resources (OER)
- Visiting Scholar Program
- VR Student Club
- *Make a Bee Line to Bellevue College* Project
- Exploration and implementation of new XR technologies
- Winning Finalist: Unity Sponsored *EdTech Creator Challenge*

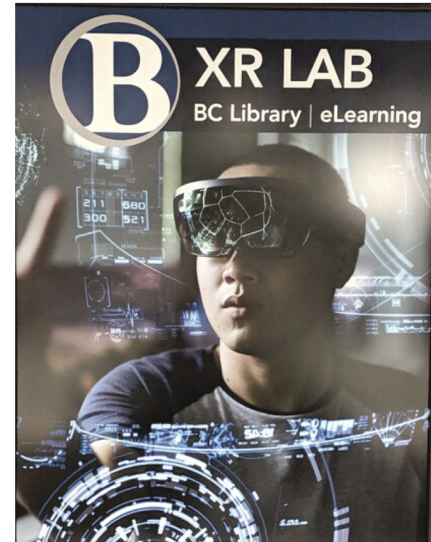
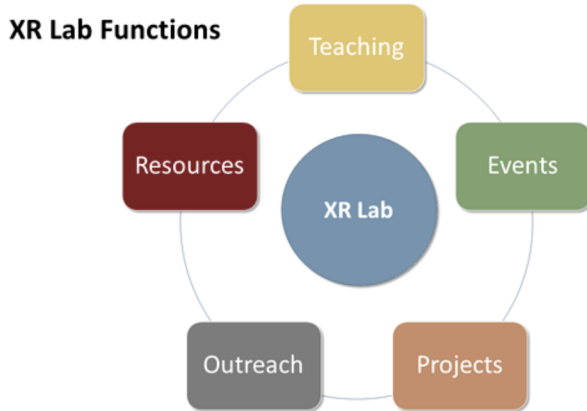


# Core XR Lab Mission & Functions

## Bellevue College XR Lab Mission

*To explore the equitable use of XR technologies for teaching and learning*

## Bellevue College XR Lab Functions



**Core functions of the XR Lab are the following:**

- 1) **Teaching:** VR classes, workshops, capstone projects, internships, mentoring
- 2) **Events:** Presentations, seminars, panels, guest speakers, game jams
- 3) **Projects:** Virtual tours, teaching environments, new XR technologies, videos
- 4) **Outreach:** XR Networking, schools, libraries, industry, visiting scholars
- 5) **Resources:** XR hardware & software, consulting, curriculum, WA State OER



# XR Lab Staff: 2022



**Leslie Citrisky:** Lab Assistant

**Raji Sundar:** Instructional Designer

**Ron Austin:** Administrator - Producer

**Larry Boykin:** Media Management

**David Wikstrom:** Sr XR Lab Tech Specialist

**Deigratia Daniels:** Visiting Scholar - Industry

**Maria Sanchez-Isaza:** Visiting Scholar - Media

**Sebastian Cochran:** Lab Assistant

**James Riggall:** Visiting Scholar

**Bruce Wolcott:** Faculty Lead

One of the unique features of the XR Lab is that all staff members are part-time participants. We have submitted a grant proposal to the National Science Foundation which would provide funding for a full time XR Lab administrator, but for now, we divide our needed lab tasks among Bellevue College faculty/staff, visiting scholars, part-time employees, as well as interns and work study students.

The XR Lab Team meets once a week to assess progress. Tasks are divided up into the following categories: administration, project development, networking, teaching, advising, curriculum development, inventory management/maintenance, events hosting, XR technologies exploration, VR Student Club, and social media. Members divide their work time between a blended on-campus and online engagement.

This staffing structure provides maximum flexibility and adaptability to a constantly changing technology landscape.

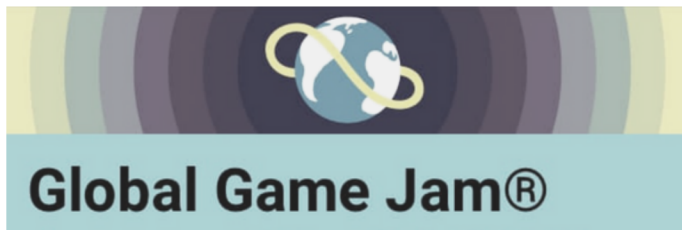


# XR Lab Events

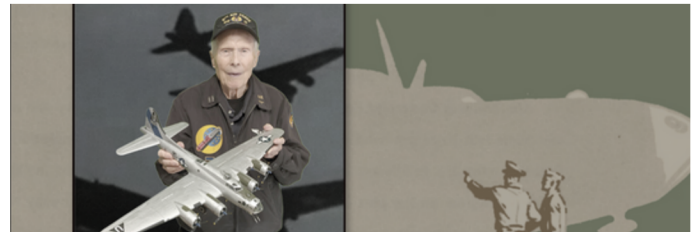
During the challenging 2021-2022 pandemic school year, the XR Lab has constantly sought out strategies for keeping the facility active. Our aim is to identify ways in which we can find a virtual "home away from home" that coexists with the XR Lab campus space. Surprisingly, the coronavirus has reinforced the importance of developing virtual teaching, collaboration, and home-based work spaces. These augment our on-campus presence, leading to new pathways of development.

We have developed methods for integrating instructor-driven virtual reality headset experiences into live and pre-recorded Zoom and Teams sessions, and have participated in a variety of public virtual events. These include the Global GameJam, Captain Dick Nelms Memorial Day event with the Veteran's Office, an XR presentation for the eLearning Month of Microlearning, and a VR presentation for the Evergreen Council on Problem Gambling.

## BC Global GameJam - 2022



## Capt. Nelms Veterans Event



## eLearning Center Month of Microlearning Event



Visiting Scholar Deigratia Daniels: Introduction to XR Workshop Session

# XR Teaching Moves Into the Metaverse

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One of the major developments in the virtual reality domain in the past two years is the emergence of the *metaverse*. Mark Zuckerberg, CEO of the social media company *Facebook*, now renamed as *Meta* says, “I believe the metaverse is the next chapter for the internet.”

The metaverse is a global virtual environment made up many shared three dimensional spaces where people gather to socialize, work, learn, and be entertained. To prepare for the coming communications shift, many major software and hardware companies are competing to develop their own extended reality (XR) systems to support this emerging domain: Microsoft, Adobe, Google, Nvidia, Mozilla, Meta, Apple, Hewlett Packard, SONY, Valve, Samsung, among others. This development path is clear, and fast moving.

The XR Lab is working to ensure that Bellevue College remains informed about metaverse technologies, and is focused on their equitable use for teaching and learning.

*V-learners felt 3.75 times more emotionally connected to the content than classroom learners and 2.3 times more connected than e-learners. Three-quarters of learners surveyed said that during the VR course on diversity and inclusion, they had a wake-up-call moment and realized that they were not as inclusive as they thought they were.*

Scott Likens, Daniel Eckert - PwC Labs

After reviewing numerous shared virtual worlds environments, the XR Lab has chosen to explore *Mozilla Hubs* as a metaverse platform for educational uses at Bellevue College. *Mozilla Hubs* was created by the company that owns the widely used Mozilla Firefox browser. During the 2021-2022 several Mozilla Hubs teaching projects have been launched by the XR Lab and Bellevue College faculty.

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## XR Lab Pavilion: Shared Virtual Lab Space in Mozilla Hubs



# Mozilla Hubs Teaching Environments

The Mozilla Hubs shared virtual worlds application has many features that make it ideally suited for educational purposes. Listed below are reasons we decided to explore this environment for teaching and learning.

## Mozilla Hubs:

- Is free - no cost barrier for users
- Can be displayed within a browser, and accessed using a link
- Environments are multi-user (up to 24 concurrent avatars)
- Is easy for instructors as well as students to learn and use
- Provides numerous world creation templates for building environments
- Can be displayed on multiple display platforms: VR, phones, computers, tablets
- Supports multiple in-world media formats:  
MP4, video cams, audio, images, PDFs, whiteboards, web documents, 3D models
- Can be embedded in Canvas CMS pages within courses
- Provides numerous Mozilla security and privacy features

## Wei Geiger: Mandarin Chinese Course - Virtual Classroom



Bellevue College instructor Wei Geiger's virtual classroom in Mozilla Hubs contains video, an interactive whiteboard, Chinese signage, and areas where student avatars can gather.

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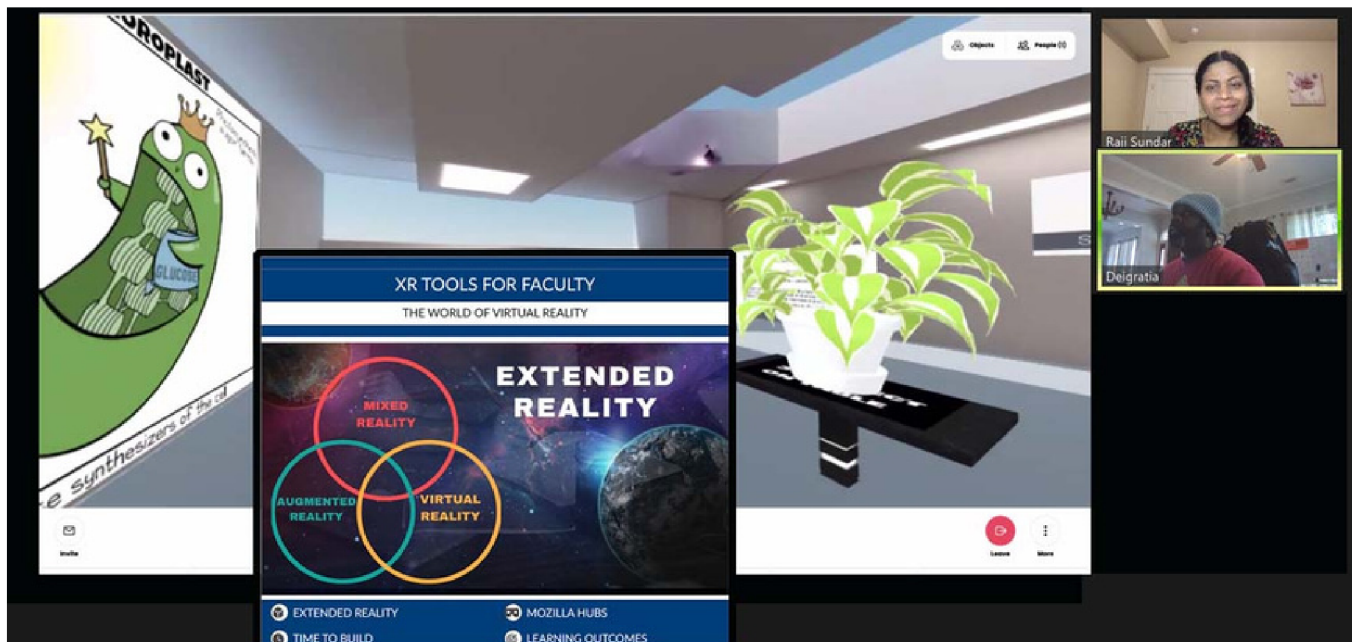


# Mozilla Hubs Curriculum

As the XR Lab became increasingly involved with Mozilla Hubs, we decided to create a curriculum for Bellevue College faculty to teach them how to make use of the program for their classes. Interested faculty are paid a stipend of \$300 to learn Mozilla Hubs, and to implement the program for one or more class sessions. This curriculum was developed to help them get acquainted with navigation, using media, creating interactive experiences, and developing lesson plans that make use of multiuser 3D environments.

This Mozilla Hubs curriculum was developed for delivery via the Bellevue College Canvas course management system by visiting scholars Deigratia Daniels, a VR simulations engineer in Atlanta Georgia, and Raji Sundar, a Bellevue College instructor, who received credit for her Master's program in instructional design from Purdue University for her development work on this project.

## Mozilla Hubs Curriculum: Deigratia Daniels and Raji Sundar



Visiting Scholars Raji Sundar and Deigratia Daniels created a hands-on orientation workspace as part of their Mozilla Hubs XR Tools For Faculty Canvas-based curriculum.

# XR Lab Projects: Virtual Worlds

One of the main activities of the XR Lab is exploration and application of newly emerging technologies as they apply to teaching and learning at Bellevue College. Since the on-campus facility has been closed until late Spring Quarter 2022, we have explored the idea of building virtual worlds locations to create a "home away from home" in the metaverse for our activities. Shown below are several XR Lab virtual environments with a specific goal of demonstrating case studies for shared cloud-based 3D social spaces.

## XR Lab Virtual Lobby: Teaching Space for XR-Related Workshops



## XR Lab Virtual Reality Art Gallery: Features Northwest Artists



# XR Lab Projects: Cross Media Prototype

World War II veteran Captain Dick Nelms flew 35 combat missions over Europe during 1944, piloting the iconic Boeing B17 Flying Fortress airplane. He was 22 years old at the time, and decades later at 98, relates a living history of that pivotal time period.

The XR Lab completed four projects using a cross-media approach to represent Captain Nelms' historic narrative: a website, video documentary, and virtual exhibit in VR and AR. The goal is to make this information available as an open educational resource.

## XR Lab Cross-Media: Captain Nelms Flying Fortress Projects



### DICK NELMS B17 PROJECTS

1	2	3	4
<b>Movie</b>	<b>Video Clips</b>	<b>VR Experience</b>	<b>AR Experience</b>
A 17 minute documentary focusing on Dick Nelms, along with the collaboration with the XR Lab.  To be viewable online (Vimeo / YouTube) and BC website. Potential to be screened at local film festivals - online or in person.	Excerpts from the 17 minute documentary, and additional stand alone clips.  Potentially viewable from Museum of Flight website, Bellevue College website, and museum kiosks.	VR experience for headset, phone, and headset. Created within web-based Mozilla application.  Viewable from Museum of Flight website, museum kiosk, headsets, visitor's phones.	VR experience for headset, phone, and headset. Created within web-based Mozilla application.



## Capt. Dick Nelms B17 Flying Fortress Virtual Exhibit



# XR Lab: Cross Campus Collaboration

In addition to developing virtual worlds projects, the XR Lab has been involved with a variety of projects using XR-related technologies to support departments and programs across the Bellevue College campus. These projects highlight the fact that virtual reality isn't just about using headsets to experience 3D dimensional spaces, but using appropriate applications and approaches to best support specific communication needs.

## Allied Health Program: T Building Orientation Tour



This tour of the Allied Health Program in the Health Sciences T Building, provides an overview of 360 degree classroom photos that are annotated with graphics, videos, and pictures of activities.

## The Edge of Ed Podcast



The Edge of Ed Podcast features interviews with educational pioneers using new teaching methods, and is run in partnership with the eLearning Center.

## Interior Design Prezi Preview



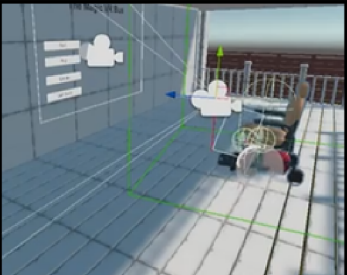



The XR Lab collaborated with the Interior Design department to identify the Prezi presentation app as a portfolio program

The XR Lab along with the Computer Science and Digital Media Arts continues to build upon a successful capstone project concept that was initiated in Winter/Spring 2021. This concept puts students who are working in capstone project teams in contact with clients where they must complete 6 month project-based solutions for real-world scenarios.

**I. VR Simulations.** Computer Science capstone teams worked on the following interactive virtual reality projects:

- **Faculty Lead:** Pete Ophoven (Computer Science)
- **Industry Client:** Jeff Rayner, CEO of MXTReality
- **XR Lab Advisor:** David Wikstrom

			
<b>ASL VR Learning</b> Lead: Ivy Tran	<b>VR Ski Simulator</b> Lead: Amber Dulz	<b>Wheel Chair Simulator</b> Lead: Ken Evans	<b>Consumer Simulator</b> Lead: Ivy Tran

**II. Virtual Classroom Environments Project.** Digital Media Arts capstone teams

- 1) Virtual Bangladesh Market - for Global Health Management
- 2) Intercultural Communication Environment - for the English Language Institute

**Faculty Lead:** Craig Jones ( Digital Media Arts)

**Faculty Clients:** Miranda Kato, Ahmad Ghashmari, Ethan Anderson

**XR Lab Advisors:** Bruce Wolcott, Maria Sanchez-Isaza



**Virtual Bangladesh Market**

**ELI International Meetup Space**

Team Leads: Honoura Betcher, Brandon Reeves

In past years, the XR Lab has participated in events hosted by academic groups such as the Champions in Higher Education for XR (CHEX), Educators in VR, the Virtual World Society, the XR University of Michigan VR Summit, and San Jose State University based librarian's group VCARA. These organizations and their events provide an essential way to keep up-to-date in the quickly changing mixed reality technology environment in higher education.

More individual contacts have been made with other colleges and universities who are exploring the use of virtual reality technologies for teaching and learning. These contacts have both been local to the Northwest region, but also with institutions across the US and Canada. These institutions include the University of Washington (Seattle, Tacoma, Bothell), Central Washington University, Portland Community College, Everett Community College, University of Houston Clear-Lake, Duke University, and Yale University. Since Spring of 2020 these network contacts have been less active due to COVID-19, but as on-campus XR activities rebound, we will see these relationships be reinitiated.

We have remained engaged over the past two years with several colleges in the Northwest (Oregon and Washington), and continue to build relationships and bridges with other institutions as well. Metcalf's Law states that the strength of a network increases exponentially with additional participants. Networking is an inherent feature of XR technologies, and we will continue to explore this capability.

## Nigerian XR Educators



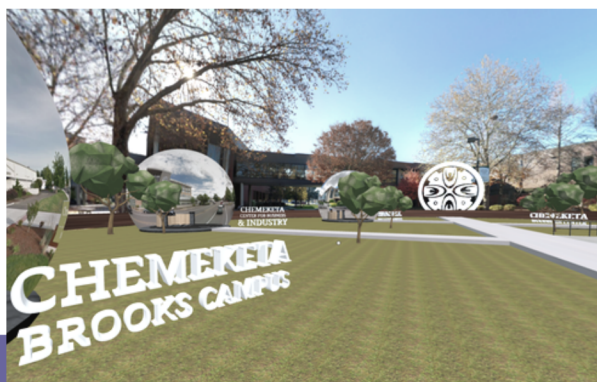
## Virtual Assisi: Hubs Club



## VCARA Librarians AltSpace



## Chemeketa College VR Tour



An important foundation for the XR Lab is the role of student initiative and engagement with running the facility. Active participation on the part of students either as part-time hires or work-study employees is vital to the Lab's success. We're always on the lookout for highly motivated students who 1) have a passion for virtual reality technologies, and 2) proactively participate in the day-to-day operations of the facility. We've had great success so far using this formula for new team recruits.

One of the primary responsibilities of our student team members running is the organization and activities of the Virtual Reality Student Club on campus. They promote the club's events, and host weekly gatherings. Surprisingly, the pandemic did not affect the enthusiastic participation of the VR club's participants. XR Lab assistants Sebastian Cochran and Leslie Citrisky made innovative use of Discord, a free chat application that supports text messaging, streaming video, and shared applications to set multiuser game environments for VR for online club gatherings. XR Lab Tech Lead David Wikstrom hosted a well attended virtual Game Jam event with Bellevue College students from RISE.

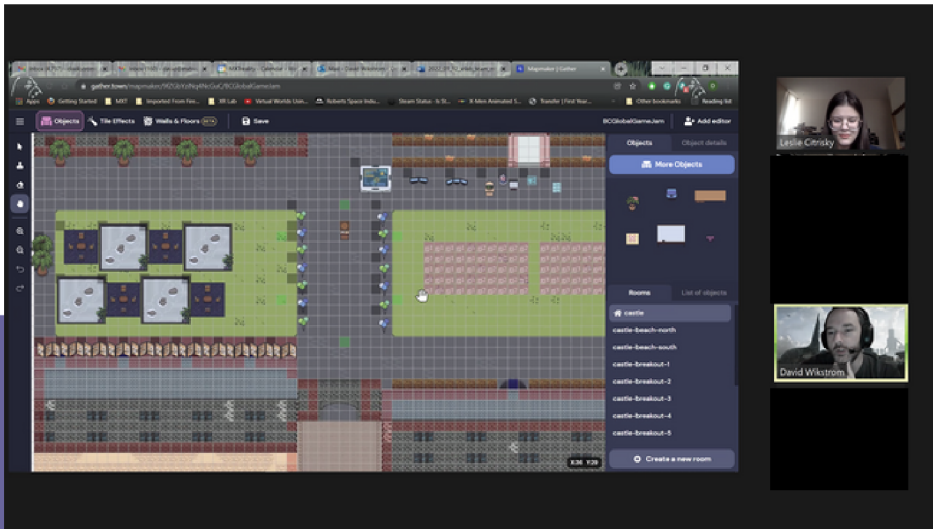
## VR Club members use VR Gear



## VR Club Collaboration



## Leslie Citrisky and David Wikstrom monitor GameJam 2022



# ADAPTING TO COVID-19

As with the rest of Bellevue College, the XR Lab has made its own adjustments to the realities of COVID-19. The biggest change for the Lab was the fact that faculty and students could no longer visit the streaming classroom or studio spaces. This was a big change from pre-pandemic academic quarters of Fall 2020 and Winter 2021 where over 3500 visitors both on and off campus participated in Lab hosted events.

In response, the XR Lab Team remained active by exploring the use of the Discord messaging app for its meetings as well as VR Student Club events. Student and faculty collaborations took place via Zoom, Microsoft Teams, Discord as well as within shared immersive virtual reality spaces like Mozilla Hubs, Engage, and AltSpaceVR.

During normal operations, the Lab brings in groups of faculty and students for learning experiences using virtual reality headsets. For classes, headsets are cleaned after every individual use with sanitary wipes, but this cleaning procedure is inadequate for the COVID-19 virus.

After researching COVID sanitation procedures used by other higher ed virtual reality labs, we developed a quarantine process which involves using protective gear, Lysol cleaning wipes, and a UVC light sanitation device called the CleanBox. We are revisiting these methods as COVID recedes to maintain safe practices.

The XR Lab checks out individual headsets to students for projects at home. When returned, headsets are cleaned and placed in quarantine.





The XR Lab is making plans to continue our current roles and projects for the upcoming academic year in 2022-23. Shown below is a brief overview of several areas of development that we have in the pipeline.



The XR Lab along with Digital Media Arts has submitted a grant to the NSF to "...create a regional virtual, augmented, and mixed reality program that serves as a training and resource hub for community and technical colleges in the Pacific Northwest." Confirmation of this grant won't take place until Fall 2023.



The XLab Team will continue to explore emerging XR hardware and software, specifically in following areas: shared networked 3D teaching environments, motion capture, drone mapping, augmented reality, 360 photography, and streaming media podcasting.



Part of the core mission of the XR Lab is to engage students in a variety of XR Lab projects and essential tasks: equipment maintenance, Student VR Club hosting, software testing, events support, and project development. We recruit work study students such as Sebastian Cochran, holding a homemade EEG device.



Virtual reality classes will be hosted by instructors on numerous display platforms - VR headsets, laptops, desktops, smart phones and tablets. These experiences can be networked to engage many participants in virtual worlds. We also plan to teach the Virtual Reality 5 credit course in the reopened XR Lab theater space.



The XR Lab Visiting Scholars Program invites individuals with a variety of XR-related skills to participate as advisors and presenters. Here, veteran VR engineer Deigratia Daniels conducts a workshop for BC instructors in a Mozilla Hubs virtual theater space from his home in Atlanta.



One of the XR Lab's goals for the coming 2022-2023 year is to host public virtual events in venues such as ConinVR's conferencing environment, which provides a theater facility and networking spaces for participants as shown in the screen capture on the left.



In April 2022, the XR Lab met with Open Washington Network administrator, Boyoung Chae. She offered the XR Lab specific areas on the OER website to publish XR curricula along with related links to virtual teaching spaces available on an open source basis.