



## Introduction to Immersive Realities for Educators

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## Introduction

### [How VR In Education Will Change How We Learn And Teach](#)

The ever-evolving nature of technology continues to influence teaching and learning. One area where advances have impacted educational settings is immersive technology. Virtual reality (VR) immersive technologies “support the creation of synthetic, highly interactive three dimensional (3D) spatial environments that represent real or non-real situations” (Mikropoulos and Natsis, 2010, p. 769). The usage of virtual reality can be traced to the 1960s when cinematographer and inventor Morton Heiling developed the Sensorama, a machine in which individuals watched a film while experiencing a variety of multi-sensory effects, such as wind and various smells related to the scenery. In the 1980’s VR moved into professional education and training. The integration of VR in higher education became apparent in the 1990’s, and continues to be explored within colleges and universities in the 21st century.



***Why does it all mean?***

**VR, AR, MR and What Does Immersion Actually Mean?** Terms such as "Virtual Reality"(VR), "Augmented Reality" (AR), "Mixed Reality" (MR), and "Immersive Content" are becoming increasingly common in education and are more user-friendly and affordable than ever. Like any other technology, IR is used to introduce, support, or reinforce course learning objectives not unlike a text, film, or field trip to a museum. The major difference is that learning can be much more immersive, interactive and engaging. While Augmented Reality or Mixed Reality is readily available on any smartphone in applications, such as SnapChat, Google Maps, or Pokemon Go, Virtual Reality requires more specialized equipment.

***There's never been a better time!***

By 2021, 60% of U.S.-based higher education institutions will intentionally use Virtual Reality (VR) to create an enhanced simulation and learning environment for students (Resnick and Morgan, 2017). In the wake of a global pandemic and solutions for distance education, the confluence of affordable consumer technology, educational resources, and plug-and-play capabilities, the time to begin considering how VR may serve your course learning outcomes has never been better.

The main motivations for the adoption of immersive reality technology in education are supported by research in improving student motivation, engagement, and outcomes. The primary obstacle for the average educator is the start-up cost of obtaining and being trained on the new technology, understanding how to leverage new and existing applications to support various coursework, and ensuring students have adequate access to both hardware and software. This resource aims to assist in removing those barriers in conjunction with making headsets available for educators and also training them. Students will use their financial aid monies to purchase the latest generation of headset, which is now quite affordable.

***What's the benefit?***

Pedagogically, virtual reality experiences can be appropriate for course material in which students benefit from 3D spatial representation where they can interact with the learning environment, construct knowledge, and engage in meaningful learning (Huang et al., 2010). Virtual reality continues to yield a variety of emerging classroom uses and best practices.

Many studies have been conducted that demonstrate a consistent positive correlation between use of the immersive technology and time-on-task (Huang, Rauch & Liaw, 2010; Johnson et al., 1998), increased enjoyment of learning (Apostolellis & Bowman, 2014; Ferracani, Pezzatini & Del Bimbo, 2014), and motivation (Cheung et al., 2013; Jacobson et al., 2005; Sharma, Agada & Ruffin, 2013), deeper learning and long-term



retention (Huang et al., 2010; Rizzo et al., 2006; Hussein and Nätterdal, 2015). They also assist with [online and distance education courses to reduce attrition](#).

Finally, in many instances, you will understand your own subject matter better, such as virtual tours of locations around the world, scans of the human body or virtual recreations of the galaxy, there are examples that cannot be seen in videos or photographs.

### ***What are the options for VR?***

While VR technology has been around since the 1960s, headsets have really only been commercially viable since 2013. There are two basic types of headsets- standalone and tethered. Tethered headsets act as a display for another device, such as a PC or video game console. Standalone headsets are all-in-one systems that have all necessary components to provide virtual reality experiences integrated into the headset. Here is a [list of both types of headsets](#). In addition, there are a number of devices that convert a standard smartphone (iPhone or Android) into a VR headset. These headsets use lenses and a head mount into which the smartphone slides. Here is a [complete list of VR sets for smartphones](#). With the barriers to adoption removed, higher education is on track to begin more broadly integrating the technology.

### ***You got this!***

While earlier versions of this technology required a great deal of technical expertise and training, the latest are all quite user-friendly and accessible for virtually all age groups. The latest and best headset, the Quest 2, sold five times the units expected and is already being used across the globe. Even if you have never used the technology, putting the headset on is all you really need to do to both use and learn how useful VR can be for you and your students. In the top trending questions about what VR is like, the best answer came back: “Just put it on, trust me!”

## **Immersive Realities Resources & Examples**

### ***Canvas Commons Modules***

General resources for both faculty and students to import into any course. The instructor section is automatically unpublished so students cannot view it. The two modules include how to get started with VR, sample assignments, resources applicable to all fields, and more.

- [Immersive Realities \(VR\) Resources- Lindenwood University](#)

### ***AR/VR Resources: Overview***



How is Virtual Reality generally being used in education currently?

- [VIRTUAL REALITY IN EDUCATION: AN OVERVIEW](#)
- [Virtual Reality Feels More Like Classroom Reality](#)
- [How VR In Education Will Change How We Learn And Teach](#)
- [VR, AR and AI will Transform Universities. Here's How](#)
- [Virtual Reality Advances Bring New Possibilities to Higher Education](#)
- [EDUCAUSE 2019: What Can a Virtual Reality Classroom Bring to Your Campus?](#)

### **Best Practices**

What are some of the best practices to consider?

- [Best Practices for Using Virtual Reality in Education](#)
- [Best Practices for Virtual Reality in Higher Education](#)
- [VR Best Practices \(K-12\)](#)

(See additional recommendations below in **Recommendations for Immersive Realities**)

### **AR/VR Examples**

What are some specific examples of AR/VR in the classroom?

- [Yale Humanities Course 'History of the Self from B.C. to VR'](#)
- [How Are Schools Using VR in the Classroom](#)
- [VR in Higher Education: with Examples](#)
- [Virtual Reality in Education: Benefits, Tools, and Resources](#)
- [A BEGINNING LIST OF THE BEST RESOURCES ON VIRTUAL REALITY IN EDUCATION](#)
- [The complete guide to virtual reality – everything you need to get started](#)
- [AR VR Edu Hub](#)
- [Sample VR and AR Lesson Plans](#)
- [How to Use VR for Education and Training? Best Examples Worldwide](#)
- [4 Inventive Examples of Virtual Reality in Education](#)
- [4 Ways to Use Augmented and Virtual Reality Apps in the Classroom](#)
- [5 Examples of Virtual Reality in Education](#)
- [5 Examples of VR Education That Helps Students Focus and Retain Information](#)
- [8 Inventive Examples Of Immersive Technology In Education](#)
- [9 Amazing Uses for VR and AR in College Classrooms](#)
- [25 resources for bringing AR and VR to the classroom](#)



- [Proceedings of the Virtual and Augmented Reality to Enhance Learning and Teaching in Higher Education Conference 2018](#)

### ***VR Examples by Field***

How does this relate to my discipline?

#### ***VR for Business Schools***

Various skills such as public speaking, interviewing, networking and engaging in business negotiations can also be improved through virtual reality experiences. (See: [VirtualSpeech](#), [STRIVR](#)).

##### *Additional Resources*

- [How VR Enhances the Business School Experience](#)
- [Teaching International Business Using Virtual Reality](#)
- [Fordham University business students have a new tool to prepare them for boardrooms: Virtual reality](#)

#### ***VR for Science and Health Science Schools***

Within STEM and healthcare education, virtual learning experiences can be implemented in courses where students learn visually and spatially complex topics such as in human anatomy, biochemistry, and molecular biology (Hoffman and Vu, 1997). In support of VR learning, Jang et al. (2016) found that direct manipulation of anatomical structures in a 3D VR environment was more effective than passive viewing. Similarly, astronomy courses may also benefit from the integration of VR given the importance of spatial thinking and reasoning within the discipline. Within healthcare, clinical skills training is another area in which VR can benefit trainees by providing them with opportunities to practice high-risk clinical procedures (Mantovani et al., 2003; Haluck and Krummel, 2000). VR has also been used to teach empathy through embodied patient experiences (Embodied Labs, 2018).

##### *Additional Resources*

- [Virtual Reality Science Lessons](#)
- [Virtual reality classroom applied to science education](#)
- [Can Virtual Reality Improve Science Education?](#)
- [Virtual Reality for Education in Google Cardboard- Science Apps](#)
- [K-12 Teachers Use Augmented and Virtual Reality Platforms to Teach Biology](#)
- [Teachers eye potential of virtual reality to enhance science instruction](#)

#### ***VR for Humanities and Social Sciences***

A variety of VR applications support foreign language learning, capitalizing on immersion as a way to promote mastery. Learners can engage in conversation using language software, and obtain real-time feedback to improve their word choice and



pronunciation (e.g. [Mondly](#), [House of Languages](#), [ImmerseMe](#)). Within humanities disciplines such as history and geography, students can explore architectural structures and landmarks using VR. (e.g. [Yale course: The Hero in the Ancient Near East](#)).

#### *Additional Resources*

- [VR and AR: Transforming Learning and Scholarship in the Humanities and Social Sciences](#)
- [VR & AR in Humanities Teaching](#)
- [Augmented Reality and Virtual Reality in Humanities Teaching](#)
- [Shakespeare-VR: Bringing Virtual Reality into Humanities Education](#)

#### ***VR for Arts, Media, and Communication Schools***

The Fine and Performing Arts and other media are ideally suited for VR adoption given the sheer number of existing applications and nature of the disciplines.

- [NYU's Tisch School of the Arts Uses Cutting-Edge Technology During Remote Learning](#)
- [Virtual Reality for Education in Google Cardboard- Visual and Performing Arts Apps](#)
- [Virtual reality in theatre education and design practice - new developments and applications](#)
- [Playing With Reality In The Performing Arts - AR, VR, And MR](#)
- [Teaching and Learning Design and Art in AR-VR Platforms](#)
- [VR in the Art Classroom \(with Google Cardboard\)](#)

#### ***Social Media Groups on Immersive Realities and Education***

Where do I connect with other educators to get ideas?

- [Educators in VR Facebook](#)
- [Educators in VR Discord](#)
- [New Educators in Virtual Reality- VR AR AI Blockchain](#)
- [VR Education](#)
- [VR & AR Educators](#)
- [VR & Education. Virtual Reality and Education. Realidad Virtual y Educacion](#)
- [Virtual & Augmented Reality for Education](#)
- [Horizon Art Museum](#)
- [Immersive Learning Resource Network](#)
- [Wander VR Travel Club](#)

#### ***AR/VR Developers***



Are there developers that can create content for me?

- [Show Me Virtual](#) – St. Louis-based Immersive Reality company
- [Top AR/VR Developers](#)
- [Top 10 Companies Working on Educational AR/VR](#)

## Recommendations for Immersive Realities

Immersive Reality technologies, including Augmented Reality (AR) and Virtual Reality (VR), are like any other technology used to introduce, support, or reinforce course learning objectives. As such, the assessment of learning associated with this technology does not need be any different either.

Virtual Reality is simply a learning tool or material, not unlike a text or a film or a field trip to a museum. It is a means for students to come in contact with course content, learning course concepts, and even apply them. Learning is certainly more immersive, and often better in some ways, but the way the learning is assessed should not necessarily be different from another assignment currently in use.

Assessing a VR assignment, such as visiting a refugee camp, the Great Pyramids of Giza, or dissecting a body can be assessed by having a class discussion, giving a quiz, writing a paper, completing a project, and so on. The same kinds of assessments instructors are currently using need not change, only the instructions on what and how to use the relevant VR app would.

Prior to developing a VR activity for the classroom, instructors can assess the availability of VR equipment and related resources at the institution. They can work with appropriate instructional support staff to become familiar with existing disciplinary applications of VR. ([Yale Center for Teaching and Learning Source](#))

### When to use virtual reality

Virtual reality is not appropriate for every instructional objective. There are some teaching scenarios when VR can be used and some when it should not be used. Pantelidis (1996) makes the following suggestions on when to use and when not to use virtual reality in education. Use or consider using virtual reality when

- a simulation could be used.
- teaching or training using the real thing is dangerous, impossible, inconvenient, or difficult.
- a model of an environment will teach or train as well as the real thing.
- interacting with a model is as motivating as or more motivating than interacting with the real thing.



- travel, cost, and/or logistics of gathering a class for training make an alternative attractive.
- shared experiences of a group in a shared environment are important.
- the experience of creating a simulated environment or model is important to the learning objective.
- information visualization is needed, manipulating and rearranging information, using graphic symbols, so it can be more easily understood.
- a training situation needs to be made really real.
- needed to make perceptible the imperceptible.
- developing participatory environments and activities that can only exist as computer-generated worlds.
- teaching tasks involving manual dexterity or physical movement.
- essential to make learning more interesting and fun.
- needed to give the disabled the opportunity to do experiments, and activities that they cannot do otherwise.
- mistakes made by the learner or trainee using the real thing could be devastating and/or demoralizing to the learner, harmful to the environment, capable of causing unintended property damage, capable of causing damage to equipment, or costly.

### **Pedagogical Considerations**

- **Consider course learning objectives and whether virtual reality can help students achieve desired outcomes.** If students can benefit from immersion and interaction with 3D representations related to course content, VR may be an appropriate activity.
- **Start small.** The goal is to get students familiar with the technology at first and build from there. You may want to consider requiring students to watch a short 2-5 minute documentary or a short exploratory app that has them navigate one room. Include low-stakes introductory assignments that allow students to familiarize themselves with the hardware and software, especially if requiring for those online or not using the equipment in the lab.
- **Design or identify a VR activity that aligns with course objectives.** Identify VR applications that relate to course content in a meaningful way. Consider the placement of this activity within the course schedule. For example, a VR experience might either precede or follow discussion of the material during a typical class session depending on instructional goals. Consider scaffolding assignments just as you would with other projects. Is fully integrating into a course, begin with short, introductory experiences that are less than five minutes and on-rails. Build to those that allow them pre-exploration of an environment, and finally longer documentaries or educational resources it takes 15-20 minutes. If requiring an app that is not free, make sure to include it in the initial instructions to the class and the syllabus.





- **Make plans to measure student learning, aligning assessments with learning goals and activities.** Some options include a pre-assessment prior to the VR experience and a post-assessment after, traditional quizzes, tests in addition to student reflections on their VR learning experiences. Depending on the VR application chosen, a student might also obtain feedback in real-time while participating in the VR experience.
- **Allocate time and resources for students to learn how to use VR.** This can include providing students with opportunities to become accustomed to using VR software.
- **Clearly articulate the goals of the virtual reality activity to the students and how it will help them achieve learning outcomes prior to the start of the activity.** Emphasize that the VR technology is a tool to support their learning. Generally, VR is used to reinforce or further explain topics already covered in class through lectures, readings, and videos. Once students have an understanding of what will be covered, VR will give them a more engaged experience to understand it more thoroughly. Exceptions include anatomy and physiology applications with assessments built in.
- **If you are teaching a class on campus and want to require a VR assignment** be sure to give a span of a week or two depending upon how many students are in the class given the limited number of headsets available in the labs
- Alternatively, You can require an assignment if using mobile apps or smart phones.
- **If you are teaching a class online** consider widely available apps. Google Cardboard is a good option with many free apps. Alternatively, speak with your dean about requiring all students in the school to purchase Quest 2 with financial aid.
- **Consider alternatives for students that suffer from VR sickness.** VR sickness is common in first time users and can be minimized with shorter introductory experiences. Instructions are provided below, but adjusting the headset straps and distance between lenses also helps. Students that wear glasses should also remember to use the spacer. An alternative would be to use Augmented Reality (AR) on a smartphone instead of a VR app. If a required assignment, try to avoid anything longer than 15 minutes if on-rails, or an app that guides the users view through an experience.

### **Assignment Considerations**

There are many ways that you can integrate VR into assignments, though the same considerations can be used as any other multimedia element. Use apps to supplement, not replace. Here are some examples to consider.

- **Beginning-** *Requires no background for the instructor*
- **Discussions:** Have students find an app relevant for the content covered in class that week and share with the group in a live or virtual discussion.



Students can discuss their experience and whether or not they found it useful for better understand the subject matter that week. Discord is a good alternative platform to consider for such discussions. This approach allows the instructor to leverage students to find appropriate apps for the class.

- **Quizzes:** Have students find an app relevant for the content covered in class that week that is not among those the instructor provides the class. Students then input into weekly quiz and write a short reflection on their experience and whether or not they found it useful for better understand the subject matter that week. This approach allows the instructor to leverage students to find appropriate apps for the class.
- **Supplemental Experience Assignment:** Watch a lecture in class or online and complete the associated readings. Have students search for and find an app that provides further engaging insight into that topic covered and assess through a standard assignment.
- **Reflective Essay:** Have students find an app relevant for the content covered in class that week and write a reflective essay about their experience. This approach allows the instructor to leverage students to find appropriate apps for the class.
  
- **Intermediate-** *Requires some familiarity with VR*
- **Exploration Assignment:** Watch a lecture in class or online and complete the associated readings. Have students visit the site that were covered in an app such as Wander and identify what they learned about the site that might not have been explicitly discussed in the lecture or seen in static pictures of the site/work.
- **Supplemental Experience Assignment:** Watch a lecture in class or online and complete the associated readings. Select an application that provides further engaging insight into that topic covered and assess through a standard assignment. [Sample VR Assignment.](#)
- **Gamification:** There are two approaches: 1) **Structural Gamification** where the content of the class does not change but activities you are already having students do generate points or allow them to "level up," such as completing so many readings, quizzes, apps, reflective essays, etc. and 2) **Content Gamification** where you take the actual content of the class and make it a game, such as Socrative, Jeopardy, murder mystery, etc. [LinkedIn Learning Course.](#)
- **VR and Education Assignment:** For students interested in using immersive realities in their own teaching, consider some of the following assignments for instructional technologies: 1) **Design a course syllabus that integrates VR:** Identify applications that students would use to teach a given topic and explain why they selected them; in what order would they be recommended; consider how the apps are appropriate for different demographics and the background



of the student population; how would you support the use of the technology with other learning materials, such as readings, videos, quizzes, etc.; 2) **Design a VR Assignment:** First, identify a reading, documentary or lecture that would precede the watching of an application to further understanding; next, select an application that students would watch first and then get further understanding by flipping the supporting materials to after it is watched. Provide pre-packed examples or limit choices to well-produced sites/works.

- **Advanced-** *Requires extensive familiarity with VR*
- **Live Virtual Classes in VR:** Using virtual classroom software, hold a live class in VR and grade students on participation or presentations.
- **Record a VR Experience:** Using VR cameras and software, record a lecture, exhibition, performance, or event for students to experience, then build in an appropriate assessment, such as a quiz, essay, or paper.
- **Re-Create a Work of Art:** Using [one of these applications](#), recreate a famous work of art and export for viewing by the class/instructor; or share in a discussion thread.
- **Design and Build and Exhibition:** Using relevant software, curate and build an exhibition in a virtual exhibition space.

### Technological Considerations

- **Decide which type of hardware to use and/or determine the type(s) available at the institution.** There are two common categories for VR/360 hardware devices: Dedicated PC Headsets and Mobile.
  - PC Headsets: These headsets are wired to PCs limiting the deployment for classroom use and also require PCs with a minimum of GPU (Graphic Processing Units) available. Hand controllers, along with positional tracking, allow for a more interactive and immersive experience. Permanent studio installations are a common approach.
    - [HTC Vive](#) - Typically the most expensive solution, this device offers highly precise motion tracking, and works natively in the SteamVR platform.
    - [Oculus Rift](#)- Owned by Facebook, and offers a simple desk setup. Works within the proprietary Oculus software platform.
    - [Oculus Quest 2](#)- Most recent all-in-one headset that does not require a computer to operate.
    - Others: There are more and more dedicated PC headsets coming on the market from Dell, HP and other manufacturers. These offer a range of features at a range of prices.
  - Mobile VR: Offers a lower cost 3D experience compared to full PC based VR, making it more accessible to a larger audience, especially if required phones are already owned. Generally this is a less immersive



experience because it does not allow for positional or hand tracking without additional hardware, nor has the graphical processing power of PC.

- [Google Cardboard](#)
- [Samsung Gear VR](#)
- [Google Daydream](#)
- **Search VR platforms such as those included below for VR software applications with content that aligns with course objectives.** All platforms described below have searchable marketplaces for finding available software. They differ in the number of titles offered and hardware compatibility. Some VR applications are only available directly from the developer.
  - [SteamVR](#) - Traditionally used as a video game platform. Has become the largest repository of VR software applications, both from established and independent developers. This platform is all open to many types and brands of dedicated PC VR devices.
  - [Oculus Platform](#) - Owned by Facebook. Also offers a wide assortment of software, but is only available for use with Oculus VR hardware.
  - [Windows VR](#) - Compatible with Dell, HP and other VR devices. This platform is newer and still being developed.
- **In the event that it would be more appropriate to create original VR content for an activity, consider the following:**
  - Creating a 360 Video
    - 360 video cameras ([Gear 360](#), [GoPro Fusion](#), [Ricoh Theta](#)) allow for full 360 degree capture of video in most any environment, enabling the viewer to look in any direction. However, unlike traditional VR, the 360 experience can be flat and lacks freedom of movement. Use established best practices as described in the information source linked below:
      - [Better Practices for 360 \(Facebook\)](#)
      - [How to Shoot a 360 Video \(Wired\)](#)
  - Creating an object (asset) from scratch
    - Programs to create assets from scratch are available for all skill levels ranging from beginner ([TinkerCad](#), [Sketchup](#)) to advanced ([Autodesk Maya](#)). Yale also offers a number of 3D content creation tutorials on Lynda.com (See: [Modeling Training and Tutorials](#)).
  - Scanning existing objects (assets)
    - A wide variety of scanners are available that can capture real world objects digitally. These can range from small, affordable attachments on a mobile device to high-end, highly precise instruments.
    - Assets can also be created from real-world objects using photogrammetry which is a technique used to create 3D objects using a series of 2D photographs ([Agisoft Photoscan](#), [RealityCapture](#)).



Lynda.com offers a course on how to capture 3D objects with a traditional still camera via photogrammetry (See: [3D Scanning with a Camera](#)).

- Moving from 3D Print Models to VR Experiences
  - In most cases, the digital models used for 3D printing may also be used in a wide variety of VR applications. Some are plug-and-play and other solutions require 3D and programming knowledge. In many cases, viewing an object in VR will give a better understanding of what the object may look like when finished printing. Additional annotation elements can also be added depending on whether the software is used to enhance instruction, or create further instructional elements with the proper software development.
    - As an example, the website [Sketchfab](#) showcases a variety of 3D objects viewable in VR through a web browser.
    - [Unity](#) is a popular development platform for a variety of VR applications (See: [Unity 3D Essential Training \(Lynda.com\)](#)).
- [GitHub](#) For those looking to develop their own applications, this site has millions of developers that create and share software for free. You can copy and paste code from Python, HTML, etc.

## Getting Started

### Instructions for Requisitioning Headsets

The first step to adopting new technology for your class is to first try it yourself. In order to support instructors at Lindenwood University, headsets are available for check out.

**Check Out:** Headsets can be checked out from the Makerspace in Butler hall for two weeks at a time. In order to ensure availability and to reserve a headset, please email [bperkins@lindenwood.edu](mailto:bperkins@lindenwood.edu). When picking up the headset, please provide your name and email address. The Makerspace worker will walk through the set-up process to associate with your smartphone. [Instructions for setting up the Quest 2.](#)

**Return:** Upon return of the headset to the Makerspace, the worker will disassociate the headset from your device and you will be sent a survey to complete about your experience to help us better serve the University population as a whole as we move towards more widespread roll out in the coming year.

*For technical support:* each VR headset has a helpline to troubleshoot any issues using the devices.



*Checking headsets out & technical support:* Michael Feters [mfeters@lindenwood.edu](mailto:mfeters@lindenwood.edu) in the Game and Media Lab and Brandon Perkins [bperkins@lindenwood.edu](mailto:bperkins@lindenwood.edu) in the Makerspace are resources to check out equipment and to answer questions about their use and applications.

*For ideas on assignments and pedagogy:* Kristen Norwood [knorwood@lindenwood.edu](mailto:knorwood@lindenwood.edu) in the Learning Academy is an excellent resource for talking through how to best leverage the technology with regard to pedagogy.

## VR Applications & Other Instructional Resources

### ***How do I find educational applications (apps)?***

Educational resources and applications are widely available in most fields and disciplines now and most are free. Apps can be downloaded from the appropriate “store” associated with your device. There are several ways to search for apps for various headsets, including the Oculus Store for Oculus, Rift, Go, Oculus Quest, Oculus Quest 2, and VR/Go. If using any headset aside from the Oculus Quest or Quest 2, go to the **Oculus Store** on your computer, download the app and then connect the link to your headset. In Quest or Quest 2, the Oculus Store can be accessed and downloaded directly in the headset. There are categories in each store that will assist. Start with “*Education*” and then use more specific terms such as “Museum and Culture.” If using Google Cardboard or a headset for a smartphone, apps can be found in the **App Store** on your smartphone by searching “VR” and the topic of interest. Most are free but may contain ads.

### ***What apps are out there?***

An initial list of educational applications, their compatible devices, cost, and descriptions are included below to get you started exploring what may be best for your area. Apps are continuously being developed. If you do not find what you’re looking for, more will be released soon. Additionally, newer devices, such as the Quest 2, will not have as extensive a library as older headsets.

***Apps are designed for specific headsets, so ensure that the app is compatible with your headset before purchasing!***

## Educational Applications Database



A list of educational applications can be found here in a document that is continuously updated. Apps are released on a weekly basis and, therefore, new additions will be made as their relevance for each field is reviewed.

### [Educational Applications Database](#)

The database includes general educational applications relevant to a range of disciplines and then specific examples for different areas.

## Recording in VR

There are three user-friendly ways to stream, record, or cast your experience in Oculus to hold a class live or record a session and share at a later date with a class.

### [How to Stream with Oculus Quest 2 and Quest Streaming](#)

#### **Considerations**

A good option if holding class live or through Teams. Once you open the [casting page on Oculus](#), everything you experience in the VR headset will be cast live to the desktop or through Teams if you prefer. If presenting, convert PowerPoints to PDF and upload to Oculus for ease of use. Note there is a short lag between applications, much like opening a website or application in a classroom podium. If you want to record the live session for students to view at a later date, use [Screencast-O-Matic](#) or other screen-capture application.

### [How to Use Livestreaming with Oculus Quest 2 and Quest](#)

#### **Considerations**

Livestreaming is useful to leverage social media to engage students live. You can create a “room” in Facebook so that only your class joins to watch you live on their device, smartphone or PC. If you are uncomfortable using your personal account, create another just for your teaching/instruction.

### [How to Record Video Capture and Screenshots in Oculus Quest 2 and Quest](#)

#### **Considerations**

A good option for recording lectures to be viewed by online classes or demonstrations for hybrid or flipped classrooms. Recording happens in the headset and then can be shared via Facebook or connect with the Oculus Link to a PC and download. If recording an experience or lecture for a class, download and then upload to a third-party platform, such as YouTube so it can be embedded in Canvas and watched on a mobile device.

## *Faculty Instructions for Using Wander in Oculus*



**ADA Compliance:** Wander can be played sitting or standing.

First, create your avatar, which is how you will appear to others. Next, make sure to purchase and [download the Wander app](#). Be sure to power your headset up completely or your microphone will be faint to others. After familiarizing yourself with the functionality, start starring locations to be used in a multi-player session and classes later. When ready for class, the instructor should log on ahead of the class and create a room in the first location. If visiting multiple sites, or using a collection, star the locations ahead of time for easy access so you can easily move through sites as you lecture.

### **Setting Up Multi-Player Rooms**

In Wander, click on the Multi-Player icon and then “Create Room.” You will then see all of your friends who are logged on and invite them.

If you make the room “closed,” students will need to be “friends” on Facebook with the instructor and only those can join the session and no one else can.

If you create a room without modifying it as “open/closed,” anyone in the area will be able to join. In this instance, inform students to start at your first location and they can “follow” you.

**ADA Compliance:** Wander can be played sitting or standing.

First, create your avatar, which is how you will appear to others. Next, make sure to purchase and [download the Wander app](#). Be sure to power your headset up completely or your microphone will be faint to others. Familiarize yourself with the functionality and visit a few locations around the world. If the instructor has set a time to join the rest of the class synchronously, follow the instructions below.

## ***Student Instructions for Using Wander in Oculus***

### **Joining a Class**

There are two ways your instructor may set up a session in Wander to explore the world.

**Joining via a Room:** If your instructor has created a “room,” be sure to “friend” them on Facebook prior to the class time and then click “Follow.” You will then be able to see everything the instructor does and see all of your fellow classmates’ avatars for the session.

**Joining via Location:** If your instructor has not set up a room, and will instead begin class at a specific location, enter Wander and search for the location (e.g. Pantheon, Great Wall of China) and you will be able to see everyone there and others “nearby.”

## **VR Champions by School**

Faculty in each school to contact about their experiences with VR and brainstorm ideas about how you might use the technology in your own class can be found here in

[\*\*VR Champions by School\*\*](#)

**FAQs**





***Will I have support?***

Yes, in addition to the staff in the Game and Media Lab and Makerspace, there are VR Champions in each school who will act as a go to for what they have found works in their fields. Additionally, the Learning Academy will also support questions regarding pedagogy.

***Who do I contact for help?***

*For technical support:* each VR headset has a helpline to troubleshoot any issues using the devices.

*Checking headsets out & technical support:* Michael Feters [mfeters@lindenwood.edu](mailto:mfeters@lindenwood.edu) in the Game and Media Lab and Brandon Perkins [bperkins@lindenwood.edu](mailto:bperkins@lindenwood.edu) in the Makerspace are resources to check out equipment and to answer questions about their use and applications. *For ideas on assignments and pedagogy:* Kristen Norwood [knorwood@lindenwood.edu](mailto:knorwood@lindenwood.edu) in the Learning Academy is an excellent resource for talking through how to best leverage the technology with regard to pedagogy.

***How much time do I have to put in to preparing a class using VR?***

None whatsoever. You need not even use the technology yourself. You can import this module into your class without changing anything. If you do decide to select specific applications that align with topics covered in your class, set aside time prior to the term starting to explore and see what's out there if those provided in this module are insufficient. You can do something as simple as have students find their own relevant applications that align with course material that you can have discussions on or have them write reflective papers about. See the **Assessing Student Learning for Instructors** section in the module.

***Do I have to start teaching in VR?***

Not at all. Nothing about how you run your class or teach needs to change. If you do want to learn how to have an entire class brought together in VR, there are several in the **VR Applications & Educational Resources** section of this module.

***Do I have to buy my own headset?***

No, the university has headsets for all instructors to check out in each school to experience the technology. You may want to purchase Google Cardboard which starts at \$6.99 to use with your smartphone. If you do decide to purchase your own, the latest generation and best headset is the Quest 2 that starts at \$299.

***Will students need to purchase a headset?***

Students on campus can use headsets in either the Gaming and Media Lab or Makerspace. However, for wider use, and even in face-to-face classes, you may consider initially requiring Google Cardboard for the class as most students own a smartphone. Some schools at Lindenwood will begin requiring students to purchase the Quest 2 headset starting Fall 2021.

***Am I expected to find a way to use this in every class?***



Absolutely not. As with any other tool, some will be applicable to certain classes and subjects, while others will not. However, if you need help finding relevant applications for a specific class, resources are provided below.

**What are the most common issues with this technology?**

In the past, the issues related to the cost of materials and start-up time for training. There is also the consideration of VR sickness, which is a type of motion sickness that occurs in a small portion of the population. Most often, this can be solved by adjusting the head straps and distance between the lenses. However, some users will be unable to take advantage of the technology, and thus Augmented Reality is recommended if you have a required assignment.

**What about ADA compliance?**

Most applications can be played seated and, therefore, issues with mobility are not a concern. However, do check and make sure that the application you're using can be subtitled, such as those in Google and You Tube.

**Are there any examples of other classes/assignments that use VR?**

Yes, several examples are included in the **Additional Immersive Realities Resources** section in the module, as well as best practices for using VR in higher education.

**Do most of my students already use this technology?**

No, while they certainly are aware of VR, students surveyed at our institution confirmed that only a few own headsets currently. This will be a new experience for them, as well. They are all certainly very familiar thanks to the ease of integration with smartphone technology.

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