Breaking Barriers With Extended Reality (XR)

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What are barriers to learning?

I've found the following to be barriers to my own learning:

- Cost
- Time
- Location
- Disability
- Motivation / priorities
- Environment / distractions
1 -

- Resources - equipment, space, people, time to do
  - Safety
  - Location
- Time frame (too fast, different period, etc)
- Practicalities: can’t be simulated - or the only way to simulate lacks fidelity
What is 'extended reality' (XR)?
2 - Extended Reality (XR) is an umbrella term for:

- **Virtual Reality** - where users are immersed in a computer-generated virtual world

- **Augmented Reality** - computer graphics are overlaid on the real world, typical on the view from a mobile device - for example, Pokemon Go

- **Mixed Reality** - overlay of virtual objects in real-world where the 3D space is scanned so it can respond to the environment - for example, a moving hologram on a table which drops off when it gets to the edge
Does XR overcome the barriers we talked about?

3 - HoloLAB Champions has a free academic license

Aimed at teens or high school level chemistry it gamifies lab basics such as learning to safely to use the equipment, measure, etc.

Overcomes barriers such as:

- Motivation
- Safety
- Resources
4 - Nanome is available for free for personal use and $199 per annum for Pro Academic license

- In the SAMR model is this modifying or transforming a task?
  - Is it a new way to simulate?
  - Online collaboration overcomes barriers such as distance

Accessibility depends upon the specific application

- Most can be used seated or standing (room scale)
- Most have text and read aloud
- Virtual reality apps tend to need a degree of dexterity for the controllers
- Many Hololens mixed reality apps support voice recognition

My thoughts:
- XR can introduce new barriers - for example, some people suffer from VR sickness
• Building your own XR applications is possible, but requires skill and time

• XR is a potential game changer if you can find the right services or off the shelf software for your purposes

• There is a lot of XR development happening in the education / training sector - I believe it's not 'if', but rather 'when'

Questions?
Health & Safety Essentials for XR:

- Do not use if you suffer from epilepsy, vertigo or other health condition which may put you at risk when using XR equipment
- Warn about VR sickness (like motion sickness)
- Warn about potential for eye strain
- Clean devices between usage with wipes to remove makeup and reduce transmission risk of diseases
- Ensure there is controlled flat space for users without trips hazards
- VR can be particularly isolating for users and it's important that they are in a safe space

Essentials for a VR Setup:

- A good PC with SSD, 16GB memory and a good graphics card. When picking a graphics card select based on what software you expect to be using i.e. many gaming graphics cards are as powerful professional graphics cards but cost a fraction of the price, but they are not compatible with all software! Example: Gaming PC £1K - £2K, Pro Graphics PC £2K - £5K
- VR headset with controllers - buy the brand based on compatibility with the software you want to use. Typically about £1K. HTC Vive Pro seems to be most commonly supported. If purchasing getting the Enterprise version with Advantage not the consumer version.
'Quality of life' VR enhancements:

- Docking station for controllers
- Lighthouse stands
- Stand for headset

VR Apps used today:

- HoloLAB Champions
- Nanome
- Firefox (WebVR) to view Sketchfab models in VR

Things to check out:

- [https://gitlab.com/intangiblerealities](https://gitlab.com/intangiblerealities) - Interactive molecular simulation in virtual reality
- [https://veer.tv/landing/experience](https://veer.tv/landing/experience) - interactive (hotspot) 360° videos, with a hosting app for most VR solutions
- Nano SimBox [https://research.nanosimbox.io/](https://research.nanosimbox.io/)

Mixed Reality / Augmented reality setup:

- Many products available ranging in price
- Current leader is Microsoft Hololens
- Hololens 2 will be released shortly and expected to retail at approximately £3K

Hololens software from today:

- MyLab
- Holostudy

Other Hololens software

- Holocule
- HoloChemistry
- HOLOSChool - Chemistry

Most common solutions for building your own XR apps:

- [Unity](https://unity.com)
- [Open Space 3D](https://openspace3d.com)

Useful services:

- Veer
• Sketchfab