Virtual Reality in healthcare and potential application to NHS library services

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A Change Of Perspectives - 2015

Patient Perspective experiences

Before 360-degree cameras

Playing role of patient with 180° 3D camera

Simulated training
Scenarios captured
In 360 degree
For VR viewing.

We have created
20+ scenarios

Seeing conditions from Patient Perspective

embodied labs

“It has virtually opened my eyes to how I understand what it is the patient needs to hear and the tone I use to deliver it ”

“I often forget how my actions and words could be interpreted by patients. I can become the patient and realise how it feels to be in their shoes”

These experiences provide a unique opportunity for healthcare professionals to empathise with their patients and improve the patient experience

“This is powerful. I have no doubt this will help us approach and take better care of ill patients”

“This virtual tool helps me to better understand how we can be more sensitive to the patient’s needs.”

Staff keyword feedback from over 150 users

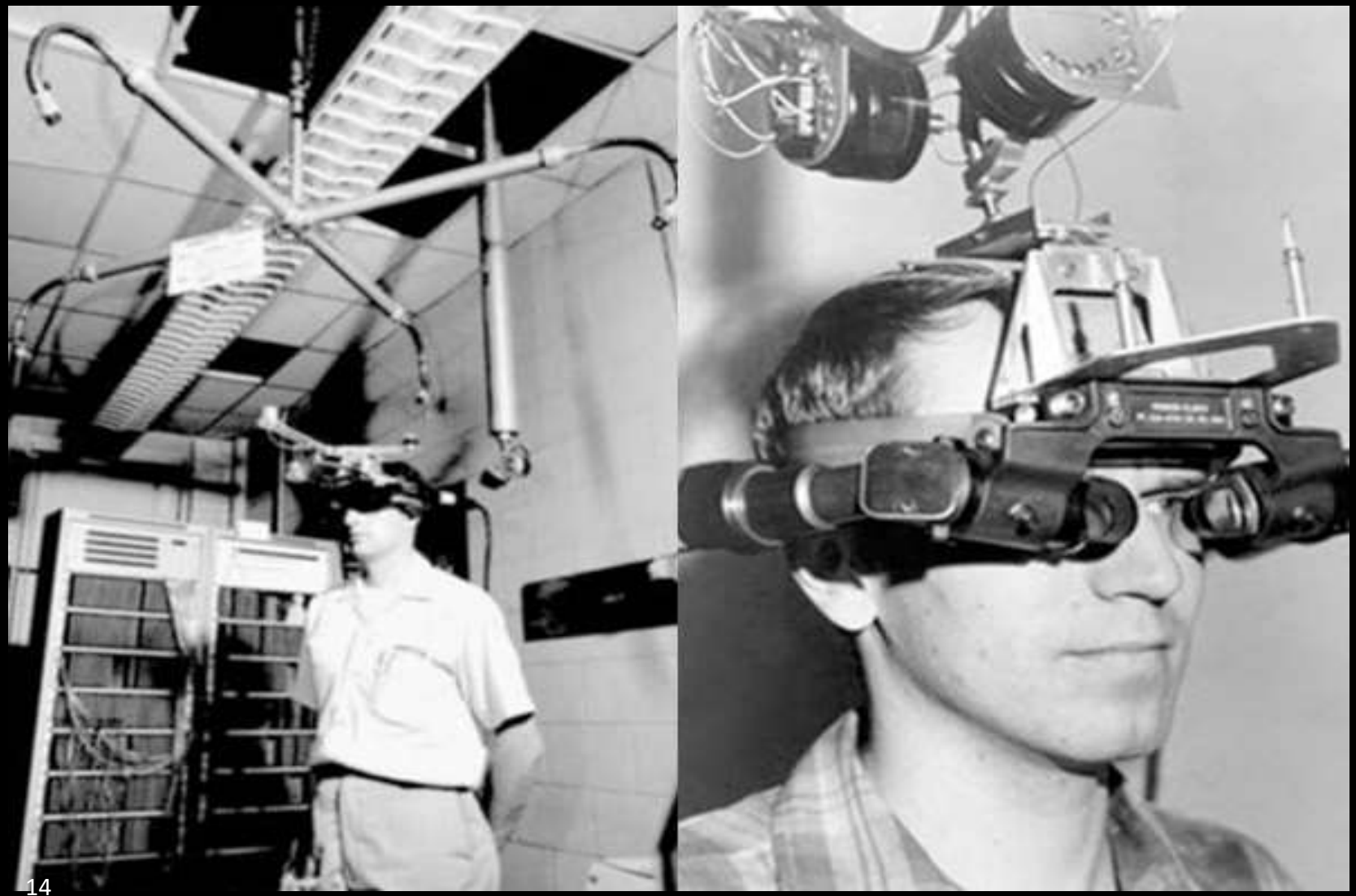
Working out best practices, implementing and evaluating VR as a tool in classrooms.

-Synchronization
-Technical Facilitation
-Appropriate Debriefing

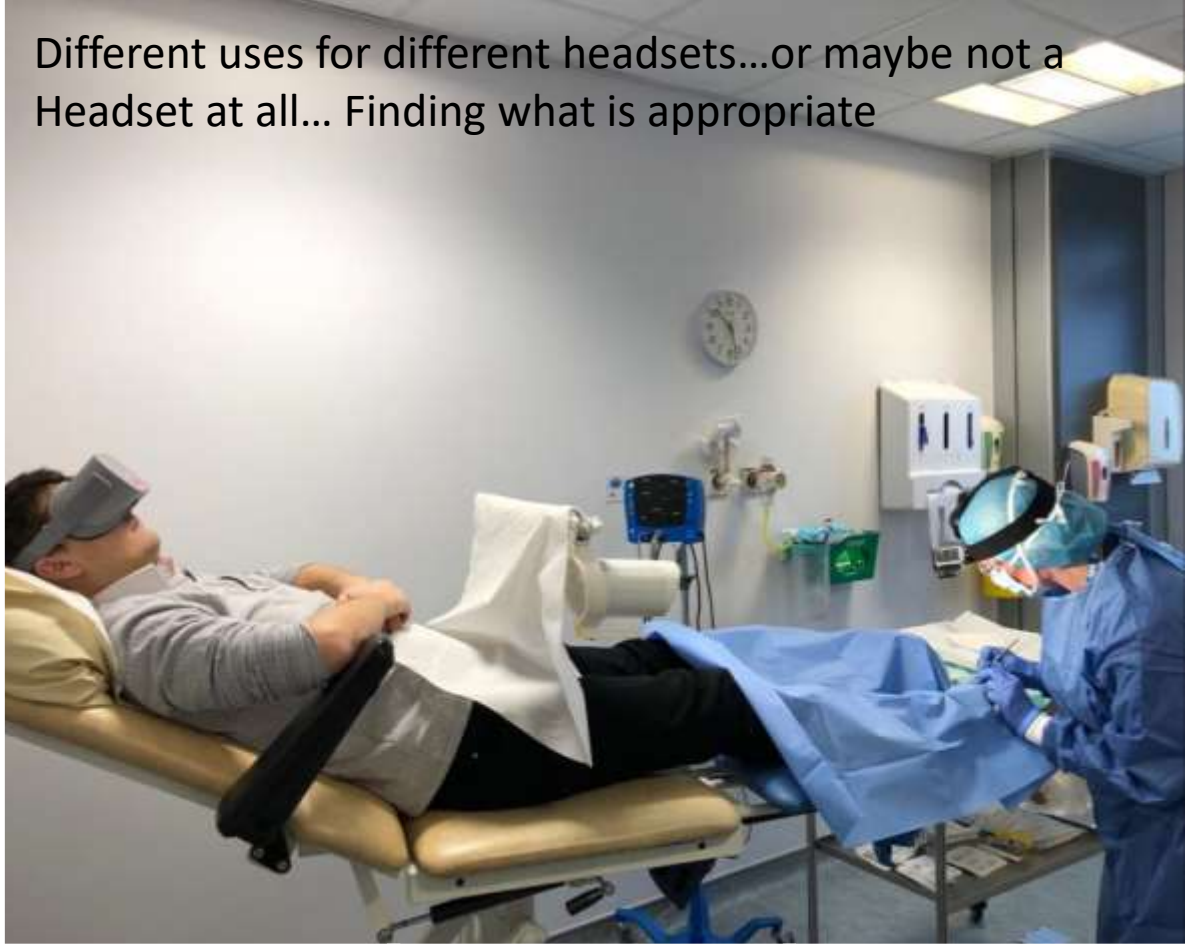
We created a control system for early use of VR in classrooms

VR Tech is changing rapidly and there are lots of options, but VR isn't new…

Sword of Damocles 1966



Different uses for different headsets…or maybe not a Headset at all… Finding what is appropriate



VR hardware & ‘delivery platforms’

Entry level → Mid level → High level (Cost/complexity) →

Google Cardboard

£5-20
(not including phone)

Google Daydream

Samsung Gear VR

£30-£100
(not including phone)

Oculus Go

£199

Oculus Quest

£399

Oculus Rift S

£399

HTC Vive Pro

£750

Mobile driven →

Stand Alone
£199-399

PC driven
£1-2k →

App & social media →

Hi end gaming
& experiences →

VR ‘Content’

Entry level → Mid level → High level (Cost/complexity) →

360 image / photo sphere

https://goo.gl/maps/UxAGRNJeczj

https://goo.gl/maps/mU5nUP1yTDr

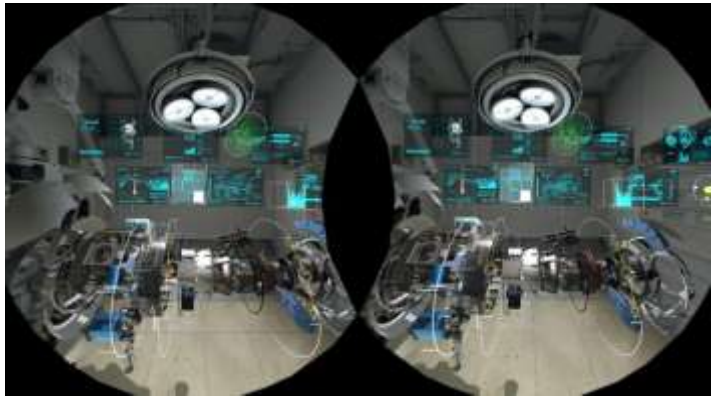
360 video

https://www.youtube.com/watch?v=6uG9vtckp1U

CGI Objects

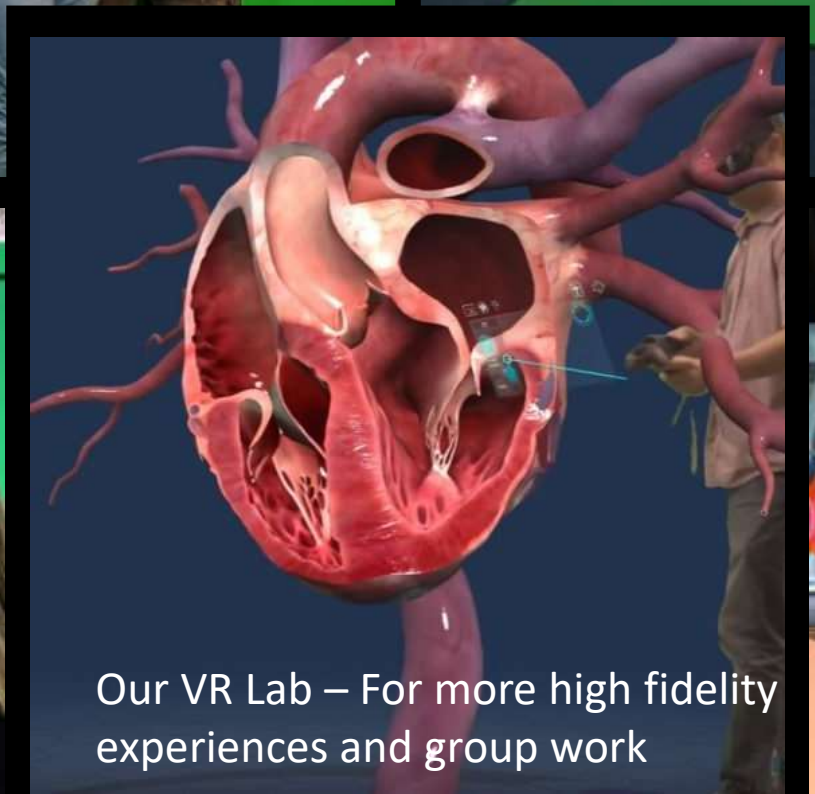
See ‘Exhibit’ In Cardboard app

CGI environment



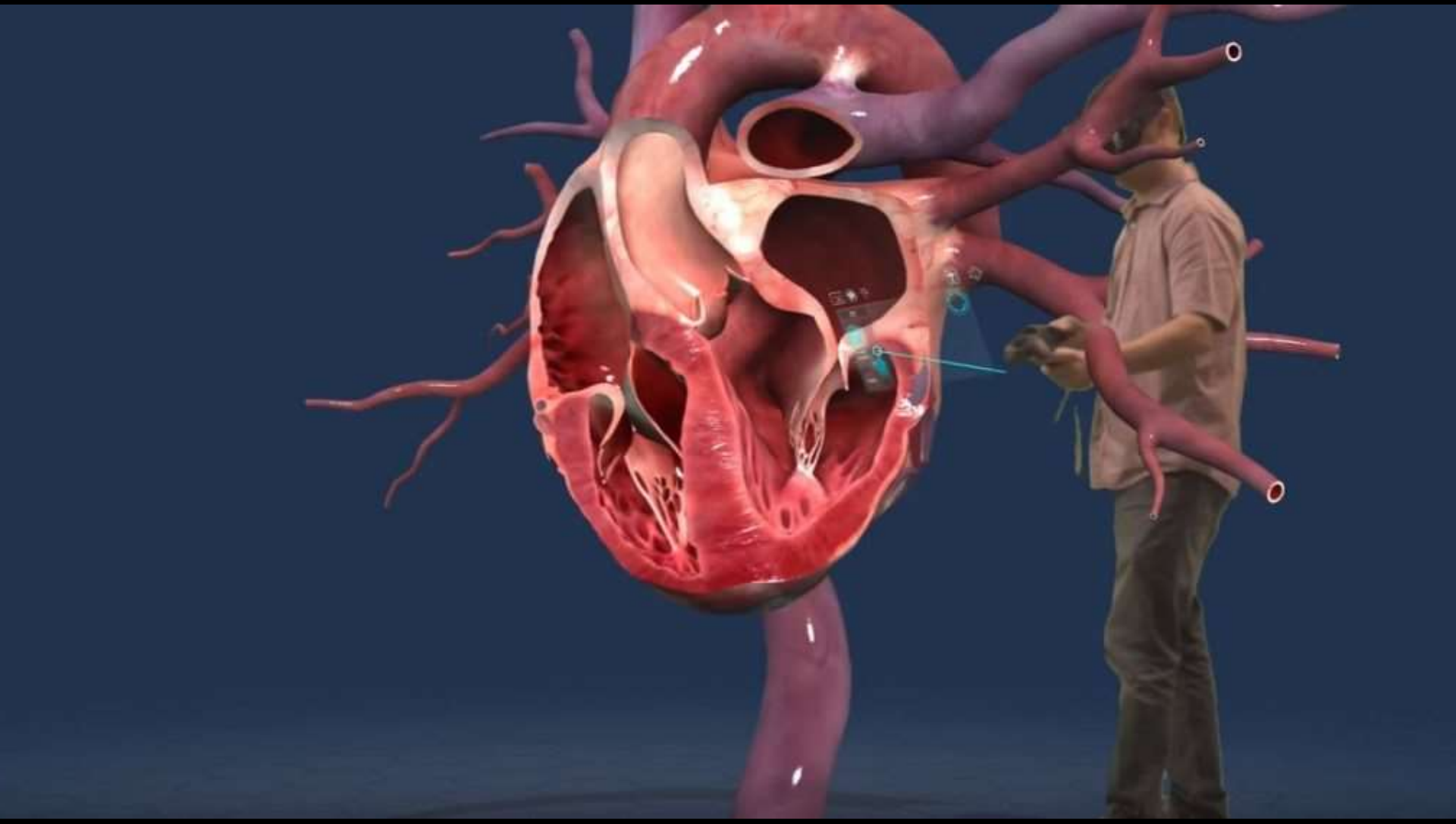
SteamVR Robot Repair

Interactive 360 Video allows user to jump between perspectives



Our VR Lab – For more high fidelity experiences and group work

Sharecare VR with mixed reality output (using greenscreen to overlay the virtual image with the real)



VR Patient Intervention – Very rewarding but must be appropriate and care taken (hygiene, comfort, effects, ethics, research)

Relevant Limitations

- Headsets need to be centrally located with an appropriate booking / loan system, which allows users to explore the platform in their own time
- Staff ‘champions’ need to familiarise themselves with the technology (and importantly it’s limitations) in order to have technical confidence to then drive ideas and uptake in their own areas. This role is vital as they bring an authentic voice to genuine opportunities.
- Battery life on the Oculus Go and mobiles phones used for Samsung Gear VR and Google Cardboard is limited and the devices have to be regularly recharged.
- The halo effect is another issue we have encountered. Few participants for various studies have had a negative experience of using VR in some other context and therefore have developed negative reactions to the use of VR headsets.
- Novelty effect towards a new audio visual modality might also be at play and should be considered when taking participants’ feedback into consideration
- Limited funding has restricted every department or team having their own equipment.
- Suitable experiences need to be curated.
- Hygiene – headsets need to be cleaned (wipes) between different users)

Application In Libraries

Within the context of libraries, VR as a route to learning is fairly untapped, yet offers an ideal location for staff access and engagement

- Staff education & information
  - Virtual anatomy / Reference
  - Healthcare processes *(virtual clinical environments, patient condition perspectives)*
  - Explanation & narrative experiences *(journey of cells, birth process, living with cancer, notes on blindness)*
- Staff and public wellbeing
  - Meditative environments/exercises
  - Anxiety reduction
  - Creative pursuits *(3D art, Visualising music)*
  - Virtual locations *(Google Earth)*

Virtual Wellbeing

- Oculus Go £199 - Ideal for narrative and information experiences. Links to mobile phone to make navigation easier. Is good for passive or sit down experiences, such as 360 videos or meditation.

- Oculus Quest £399 - Latest headset that is high medium end, completely independent from other hardware. Needs space to operate as it is a motion tracked headset (2.5m x 2m). Great for arts, creative, reference and compatible with wellbeing experiences.

Suggested experiences: Oculus Go

- Nature Treks VR *£5.99* https://www.oculus.com/experiences/go/1723271804396968
  Fantastic use for anxiety, distraction and promoting calm… simple nature scenes
- Notes on Blindness *Free* https://www.oculus.com/experiences/go/1015802351839289
  Very powerful narrative perspective told from someone who became blind
- The Missed Spaceflight *Free* https://www.oculus.com/experiences/go/1231174300328686
  This is an absolute hit with our younger users for distraction etc…. It's a sit down experience
- Human Anatomy VR *(free & paid version £29.99)*
  https://www.oculus.com/experiences/go/1658650407494367
  Entry level anatomy experience which is quite useful for showing potential of mobile VR
- VR Health Portal *Free* https://www.oculus.com/experiences/go/1911839442198299
  This has a number of simple experiences and games that have been created to help physical & cognitive well-being
- Guided Meditation VR *Free* https://www.oculus.com/experiences/go/929143807179080
  Meditative scenes with guided voice over which has been very popular here for relaxation and distraction
- That Dragon, Cancer *Free* https://www.oculus.com/experiences/go/1086522398130218
  Extremely powerful immersive experience that really makes one reflect and think about perspectives

Suggested experiences: HTC Vive, Rift, Quest

- GoogleEarth *Free* https://store.steampowered.com/app/348250/Google_Earth_VR/
- ShareCare VR *Free* https://store.steampowered.com/app/730360/Sharecare_VR/
  Virtual Anatomy which we use with our trainees and healthcare staff
- Tiltbrush *£14.99* https://store.steampowered.com/app/327140/Tilt_Brush/
  Immersive art
- The Blu £6.99 https://store.steampowered.com/app/451520/theBlu/
  Underwater exploration – very detailed, immersive and therapeutic
- Beat Saber £15.47 https://store.steampowered.com/app/620980/Beat_Saber/
  Most fun, exercise intensive game I've ever played

Evaluation of VR interventions

- Primarily there are two types of VR interventions in healthcare- technical and non-technical (clinical communication).
- In our VR evaluation techniques review (in progress), we discovered that over 90% of the VR in healthcare interventions focus on technical skills
- Within literature there is a lack of consistency in research designs as most studies are one-off, use different VR devices and employ variety of different interventions. VR is a difficult TEL tool to evaluate (Feinstein & Cannon 2001). Different VR devices deliver different experiences that are healthcare context specific, which can make it challenging to formulate an evaluation design that can be replicated across a variety of different interventions.

Evaluation methods

- The evaluation methods for VR interventions can clustered into two groups- **learning/skills outcomes** (efficacy of intervention) and **usability/feasibility/acceptability** (user experience of intervention)
- **Learning/Skills outcomes measurements**- Often use domain specific skills based on metrics provided by individual VR systems such as Immersion Lap VR or Eyesi. Often researchers design their own user skills/competencies assessments. However, validated scales such as the manual skill assessment using ESCAPA (Rahm et al. 2016), GRS Objective Assessment of Arthroscopic Skills (Chang et al. 2016), OSATS questionnaire (Nickel et al. 2015), the Oldenburg Burnout Inventory questionnaire (Pan et al. 2016), and Abelson et al.'s (2015) Bedford Workload Scale and NASA Task Load Index scale are used

Evaluation methods

- **Usability/Feasibility/Acceptability**-Majority of the studies design their own user opinions and perceptions of the VR experience surveys. Some clinical communication studies have used validated scales such as Marc Hassenzahl's AttrakDiff2 for UX assessment (Albrecht et al. 2013b) , NEO big five personality inventory questionnaire (Pan et al. 2016) and Profile of Mood States questionnaires (Albrecht et al. 2013b).
- Within general VR literature often HCI based validated scales are used to evaluate VR such as Nielsen's interface evaluation heuristics (Nielsen 1995), user presence (Sanchez-Vives & Slater 2005; Sutcliffe & Gault 2004b) and Witmer & Singer's (1994) presence questionnaire. These can also be used within healthcare VR context

Any Questions?

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