HOW IS VR USEFUL IN AIDING HEALTHCARE PROFESSIONALS PROVIDE INNOVATIVE AND PERSONALISED THERAPIES?

Unit 8 – Who in the World Creative Research Essay

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In a previous creative research essay, I stated that “In Production Arts for screen, we are in the business of creating entire worlds from our imaginations. We design sets, environments mainly for entertainment purposes rather than informational purposes” However my perspective has now changed. I have been seeking ways to combine my personal interest in the existence of Art Therapies with my creative practice within my course. I discovered the possibility of this link after typing “virtual reality art therapies” into a basic search engine. Within my course I learn about all the different ways we can use new and upcoming creative technologies to help us when designing for media that appears on screen. This media includes traditional technologies such as mobile phones, television, and cinema. In more recent years virtual reality devices have become more popular and available for the public to use. This means that we now understand this technology better and understand how to utilise it for different functions. Just like phones have evolved beyond just communication devices, they are also used for entertainment, education and even as a global positioning system. Screens are a versatile piece of technology that have been adapted in to be used in different situations. For example, from simple square television display screens to interactive screens. It is evident that all technology evolves beyond its original intended function, and it is my belief that technologies such as Virtual Reality headset can and will evolve to be a core part of healthcare.

It would be very useful to explore both the evolution of healthcare as it relates to psychological therapies and what Virtual reality technology is and it’s uses. I found an article by EMJ *(The Era of Immersive Health Technology*). In the article Topics such as immersive health, augmented reality and rehabilitation are discussed in relation to mental health. In this creative research essay, I would like to use a variety of sources to explore the question: How is VR useful in aiding healthcare professionals provide innovative and personalised therapies? Firstly, definitions for a few key terms must be established.

Therapy is defined by the Online Cambridge dictionary as “a treatment that helps someone feel better or grow stronger and especially in relation to an illness” *(Therapy – Oxford Dictionary)*. In this essay I will be referring to therapy as it pertains to mental illness treated by healthcare services and their trained professionals. Examples include looking at Virtual Reality (VR) therapies within the NHS.

Figure 1 :META Occulus Quest 2 VR headset - Currys Product Image

VR currently has many uses in many different sectors. Examples include entertainment as gaming consoles, education to simulate field trips and in the military it is used to enable trainees to prepare for going into dangerous environments with minimal risks *(Virtual Reality applications)*. It can also be used to treat survivors of battlefield trauma / PTSD. VR is major development in technology. Virtual Reality headsets use stereoscopic lenses and position them between your eyes and the screen so that it gives the illusion that what you are seeing is in fact three dimensional *(How Do Virtual Reality Headsets Work?)*. These lenses simulate how our eyes work, each of our eyes receives to different pieces of information and two different views of an object and our brains piece the information together to give us depth perception. Another aspect of VR headsets that make them so much like reality is how they allow their users to look around and discover their environment. This is because unlike traditional screens, content is not displayed on a single screen but rather it is projected all around the user. For this reason, VR headsets provide an active experience, the user must move their body to get the most out of the experience. VR headsets utilise a combination of technologies to make the user feel like they are genuinely inside the virtual environment. To understand where and what you are doing, most up to date VR technology use six degree of freedom system to track (6DoF) the users head *(How Do Virtual Reality Headsets Work?)*. Gyroscopes are used to measure the orientation and angular tilt of an object, so when the users head turns, the display can change the images generated to match their new view of the environment they are in *(Gyroscope Sensor Working and Its Applications).* Accelerometers are used to measure the acceleration and change in velocity of the user *(Toolkit-accelerometers)*. VR headsets also provide stereo audio. Sound can be increased or decreased to simulate distance to an object or to better simulate the atmosphere of an environment. The equipment also comes with handheld controllers and their design varies between make, model and brand. Although most are still very much similar and come in the form of two controllers with buttons and joysticks. *(see Figure 1 "Currys Product Image" for reference).* This raises concerns as to whether VR is as accessible as it claims because not everyone can hold and maintain their grip o such controllers, especially if their have limited upper arm strength.

The name for this form of therapy is Virtual reality exposure therapy (VRET). Most studies conducted on VRET are based on Emotional Processing Theory (EPT) ***(Alpert E.)***. According to Cohen at al EPT is most effective when more than one trauma response is targeted. These response categories are cognitive, emotional, behavioural, and physiological. However, most therapies work by only targeting one of these 4 categories. EPT works by changing pathological trauma related responses Exposure therapies are a form of psychological treatment that helps people to face their fears. By exposing them to their fears slowly and

over time, patients can become systematically desensitised to the trigger. “Trigger” as described by Crystal Raypole of Healthline.com is used to describe “something that affects your emotional state, often significantly, by causing extreme overwhelm or distress”. A trigger affects your ability to remain present in the moment. It may bring up specific thought patterns or influence your behaviours stimulus has on them until eventually the stimulus produces little to no negative/ unwanted reaction. This form of therapy has been found to be useful for phobias, panic disorders, social / generalised anxiety disorder and post-traumatic stress disorder (PTSD) *(What is exposure therapy?)*. PTSD is a mental health problem that often develops in individuals who have experienced a traumatic event. This could be a natural disaster, physical abuse or being in a war or conflict *(Vianez et al.)* although there are many experiences that can cause this condition. VRET was found to work well for Veteran PTSD patients because it fully engages patients in similar way to how they felt in the traumatic moment. They cannot avoid the situation; they must face the cause of the stimuli. However, unlike when they are alone and are triggered, they have a trained psychotherapist to facilitate their treatment. Vianez et al describes the VR environment as a “ecologically valid, highly interactive, and multisensory virtual environment”. This means that unlike traditional talk (dialectical behavioural therapies) the patient can be more than mentally stimulated. Combining as many senses as possible allows the same feels that arose at the traumatic event to be brought up again and better targeted. Sounds may be a major emotional trigger. VRET has the benefit of control over the stimuli. Unlike the original traumatic event the headset can be turned off, removed or the projected environment can be changed to suit the patient’s needs. In their report, Vianez et al mentions the VR system used for their studies. The intended outcomes of this therapy include showing the client they can face their fears and reduce their emotional response to the stimuli so that during later exposure they are equipped with new beliefs mental tools to better cope with the situation. It is important to note that from a non-medical perspective, VRET only treat the symptoms of disorders, without a proper medical examination it is impossible to know the true extent of the changes in a patient’s psychological disorder. But decreased negative symptoms are good indicators of overall symptom reduction. As the patients / study participants were war veterans, they used VR environments related to their experiences. The virtual Iraq and Afghanistan environments were developed by the Institute for Creative Technologies at the University of Southern California. They developed it in such a way that allows the psychotherapist / clinician to alter the VR environment in real time to fix what the patient can recall.

One interesting finding was that participants noted how important smell was to their memories. They suggested it for better simulating reality in risk assessment sessions. This is understandable because our five senses are very important in how we understand our environment. This now raises the question on how we can make VRET therapies even more immersive. This can be done using a range of accessories. Cameras specifically designed for VR can be used to capture real world spaces *(Software Testing Help – VR Controllers and Accessories)*. These cameras work by capturing between 180-360^{o} and can maintain a consistent perspective and depth of field when viewed through a VR headset. Other accessories

include hand controllers, foot controllers, VR suits, haptic gloves, VR chairs, VR shoes and VR treadmills. This extra equipment is specifically designed to be compatible with VR.

I was also curious as to whether VR therapies have been considered and studied in relation to personality altering mental health conditions their symptoms. Examples of personality disorders are: paranoid personality disorder, narcissistic personality disorder and obsessive-compulsive disorder *(List of Personality Disorders)*. For people who suffer from positive symptoms such as auditory, sensory, and visual hallucinations, VR therapy can help them to differentiate between what is a hallucination versus what is reality. In theory this could sound counter intuitive considering they already live in a reality that is altered. But I believe it could be beneficial. For example, for patients with visual hallucinations, an exact replica of an environment that is affected by their delusions could be built and discussed with their therapist. For example, if patients see a figure in their hallucinations, that figure can be built in VR and confronted in that safe digital space. This uses the VRET theory. *(The cutting edge of Schizophrenia Research Joshua Hwang)*. Patients can also learn skills to manage their negative symptoms by doing everyday tasks that they are unable to complete. For example, "games" can be developed to help them cope with everyday life. A person experiencing symptoms of depression might struggle with seemingly simple things such as cleaning one's living space. A VR therapy game can be developed to simulate tasks such as dish washing, clothes folding or food preparation. Perhaps if they see that they can complete the tasks in a simulation, it may give them the motivation to complete tasks in their life.

I will now explore real world examples of how VR therapy has been used to provide personalised and effective therapies / medical assistance. NHS Oxford health talk about how they have helped patients learn how to cope with their fear of height. In a YouTube video Natasha Browne, a cognitive behavioural therapist at Oxford Health foundation holds conversations with another healthcare professionals as well as patients in order to get a first-hand account of their experiences of VR Therapy *(VR Therapies OXFORD HEALTH)*. Polly Hasleton of Oxford VR expresses that one of the reasons VRT works so well is because "in the back of our mind we know it is not real". This gives us confidence to face our fears knowing there are no real-world consequences. The video also features an NHS Oxford patient Anne, who recalls feeling the exact feelings of being in an elevator when in an elevator simulator. To quote Anne "bit by bit I started to feel more confident and proud of myself for facing the scary thig even though it wasn't dangerous". She also mentions being told to try and assign the skills she used in Virtual Reality to real life and notes how it has helped her.

Although VRET has many benefits, just like any other healthcare treatment, it has its pros and cons which must be equally studied. One con is that patients may not want to step into the scenario again as highlighted in Vianez et al's findings. The thought of having to step into the environment could be very overwhelming and even debilitating for some. This means that even though the therapy could be overall highly effective, the people who may need it

the most will not be able to participate. Another consideration when integrating VR into healthcare is that older generations might be more sceptical to take part in something they do not understand or seems “too high tech”. However, I have found video documentation proving that VR creates positive experiences in the lives of elderly people beyond formal psychological therapies. In a video by Upworthy on YouTube, we follow the story of a couple called Laura and Leo. They are struggling with both wanting to accept that they are incapable of travelling as much as they used to when they are more mobile. *(VR Takes This Elderly Couple Back To The Places They)* Visited a long time ago) A musical therapist exposes them to places they wish they could see again through very realistically rendered VR environments. They become overwhelmed with joy as they recall their memories together and are no longer concerned about what they cannot do. Another Negative is that scientists have not extensively studied long term effects of VR on our brains. A study conducted on rats by neuroscientist at UCLA looked at how the rats brain functions changed when placed in an altered reality environment vs a real world space. *(Brain’s reaction to Virtual reality)* They found that the hippocampus would send random signals when in the virtual world. This was surprising because on the outside the rats seemed to be behaving completely normally. These finding are significant because in the function of the hippocampus is to form new memories and create mental maps of environments. The rats brains were doing their best to function normally but were also unsure of where they were. The hippocampus uses spatial and sensory ques to create maps but that is not possible in VR. These disturbances in our normal brain function effect our ability to learn, create memories and use our imagination for complex problem solving. This could I mean that current VRET are not effective long term, or they are simply a placebo. Placebo meaning patients think they are being cured, which in turn actually creates the feelings that would arise when they are genuinely “cured (What Is the Placebo Effect?). Mayank Mehta, the lead researcher in this study, notes that for some individuals the act of literally walking or completing a task engages the hippocampus and act of performing rhythmic actions helps repair memories. Perhaps one way to take this fact into consideration is by incorporating VR accessories such as VR treadmills so that patients can also receive the benefits of somatic experiencing therapy.

In conclusion VR therapies are useful in aiding healthcare professionals provide innovative and personalised therapies because it combines many traditional tried and tested forms of therapy with new and engaging technology. It helps many different people who suffer from various mental conditions to feel safe and supported in their recovery and treatment. Although this is still a very young area in medicine and it should be studied further to avoid causing any long term effects to patients.

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