Virtual Reality as a Tool for New Build Familiarisation: An Experience Survey

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Abstract

Aims and Objectives: The aim was to examine the effectiveness and usefulness of VR as a familiarisation tool for staff of NFMHS during a new build relocation.

Background: Virtual Reality is beneficial in training across many disciplines. The core principle of an immersive virtual reality experience lies in the functionality of 360-degree image viewing. VR is explored as a tool for new build familiarisation of a new forensic mental health hospital in Dublin, Ireland.

Design: This study used an experience survey.

Methods: The study surveyed 58 staff of NFMHS after staff had an experience of 360 videos of the new hospital. The videos were viewed through a head-mounted device.

Results: The results highlight majority of the staff strongly agreed with VR as a tool for familiarisation. 88 Per cent of the staff stated that VR helped them to understand the new hospital structure better.

Conclusion: VR as a familiarisation tool to help staff understand a new hospital is highly effective and valuable. It also ensures staff engagement during the familiarisation due to the novel experience for staff.

***Keywords:** Virtual Reality; Staff Familiarisation; Hospital Relocation*

Background and Introduction

Virtual Reality (VR) has been hugely successful in many domains of human interaction. Virtual Reality can be assumed as an advanced interface that allows users to view and interact in real-time in three-dimensional (3D) environments generated by computers through multi-sensory devices (Kirner and Siscoutto, 2007). The user is immersed in a virtual world that replaces the natural world around them (Orlosky., *et al.* 2017). VR currently is used mainly in the gaming industry, medical education, industrial and sports training. Immersive Virtual Reality (IVR) technology has demonstrated positive educational outcomes related to its use and gained traction in educational and training settings [1,2]. IVR is expected to have widespread adoption within the classroom in the upcoming years. Moreover, the three-dimensional - visuospatial impact gives VR technology an upper hand in all aspects of training [3].

Jensen and Konradsen conducted one of the most recent systematic analyses to focus solely on I-VR through the use of HMDs [4]. The study found 21 quantitative and qualitative papers that concentrated on both learning outcomes in I-VR and subjective attitudes and perceptions of users in a systematic search of current literature published between 2013 and 2017. The analysis found that HMD was more effective in acquiring cognitive, psychomotor, and affective skills than less immersive technologies. Similar findings were also seen in a study by Makransky Petersen., *et al.* [5] which found that IVR has a more significant impact on science education and specific abilities development when offering simulation or virtual world representations. Moreover, the research also suggested that HMDs can improve both knowledge and skill development and maintain the learning effect over time [6].

The Central Mental Hospital in Ireland is one of the oldest forensic mental health units in Europe [7] and is moving to a purpose-built facility in Portrane, Dublin. The CMH is moving from the current location in Dundrum, Dublin, built in 1850 and structurally resembled the bygone era's Victorian asylum architecture. The new hospital's move brings vast opportunities and challenges to the management, staff and patient alike. One of the critical challenges in hospital relocation is the familiarisation of stakeholders to the new building. Hospitals are massive campuses with many different buildings, parking lots, and entrances leading to confusion both outside and inside buildings.

Familiarisation with the new environment is vital in smooth transitioning from an old building to a new facility. Good onboarding leads to early adoption and acceptance of new changes [8]. New building transition also brings about changes in the business process [9]. These process changes can be across the board and can affect all stakeholders. Therefore, within a forensic mental health setting, any change in the business process demands extensive training and familiarisation with the new normal.

Familiarisation of a new building can be done in many ways, such as desktop drawing, 3D plan and photographs. These measures are used when the building site is inaccessible. Of late, VR is utilized for this purpose, specifically in large industries and mobility-related companies. They use virtual consultations to conduct "in-person" sessions with a client and host a virtual tour of their home and its contents, which is matched with their new location. Moreover, such consultations simplify the process and reduce some of the stressors and uncertainties associated with long-range relocations by increasing adoption and learning the new environment.

In construction, a high-risk industry for employees, there has been a tendency to adopt VR applications to visualize more complex situations, identify dangers and improve training safety (Li., *et al.* 2018). VR provides a safe environment that is essential in the familiarisation process to reduce the risk and danger that many learning situations require (Bruzzone., *et al.* 2010; Jeelani., *et al.* 2017; Kwok., *et al.* 2019; Lombardo., *et al.* 2019; Squelch, 2001; Stapleton, 2004). Challenges such as these are now become more complicated due to covid.

VR enables the user to visualize the setting in a three-dimensional manner compared to commonly used familiarisation methods. Moreover, it does not demand user imagination to complete the cognitive comprehension of the new space. In a study by Araiza-Alba Keane., *et al.* [1,2], the researchers found support for the hypothesis that 360° VR videos are a valuable tool to teach targeted skills and using 360° VR videos is more motivating and engaging than using traditional learning methods. A VR program provides an immersive near to life value-added experience to the learner by mimicking the natural world and enabling virtual interaction [10]. Therefore, it is hugely beneficial in overcoming the challenges of time and distance.

Aims and Objectives

The study aim was to examine the effectiveness and usefulness of VR as a familiarisation tool for staff of NFMHS during a new build relocation.

Materials and Methods

Study design: An experimental survey design was adopted for this study.

Setting and sample: The study was carried in the National Forensic Mental Health Service, Central mental hospital. The sample of the study included the staff of Central Mental Hospital, Dundrum, and Dublin.

Sampling method: A voluntary response sampling was utilized for the study [11]. The VR experience was open to all staff across all disciplines.

Outcome measures: A 5-point Likert scale survey questionnaire was used to measure the sample's VR experience.

Method: The researcher captured VR videos of the new hospital two weeks before the study. A Samsung 360 camera was used for this purpose. The recordings were up to a minute long from one location. Care was taken not to have human interference during recording. The recording was then downloaded to the PC and then stitched together to enable a smooth transition from one video set to another. The location of the videos was predetermined and included all areas that needed staff access.

The VR experience was set up over multiple days as staff works different shift days. The area was set up near the cafeteria of the hospital and had two VR stations. Participants were provided with comfortable seating. Information on the VR experience was sent out through mail the previous day with venue and time. When the staff arrived at the stations, the process was explained and given an information pack. The information pack highlighted the contraindications and possible side effects of using Head Mounted Device (HMD).

Staff had to sign a consent form before experiencing VR. At the end of the experience, they were asked if they liked to participate in a survey by completing a questionnaire (provided in the information pack). The staff had a choice to participate or refuse the experience. Once it was ascertained there were no contraindications, the HMD device was set up and administered to the staff after prior explanation. The explanation included how to navigate through the content, but more importantly, the side effects of the HMD VR experience.

Results

The outcome measures of the study are discussed below. Descriptive analysis is used to interpret the findings.

Demographics

A total of 58 staff participated in the study. The majority of the staff who participated in the VR experience were Nurses. Other disciplines/roles included Consultants, Occupational therapists, and Chaplain. One staff did not specify the discipline.
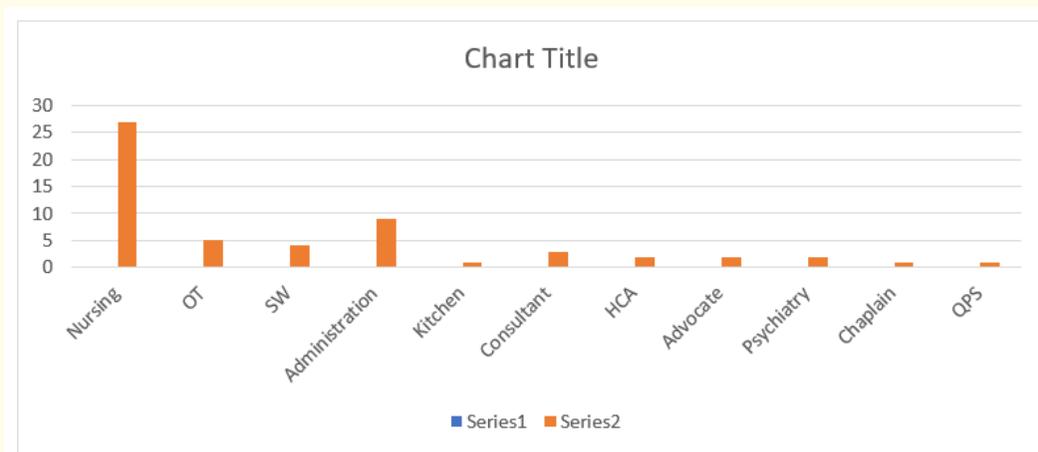

Figure 1

Experience

Table 1 below outlines findings from the survey.

	SA+A	SD+D	SA+A%	SD+D%	Neutral%
I have used VR before	22	31	39.29	55.36	5.36
I enjoyed the VR experience	55	1	94.83	1.72	3.45
The visuals were clear	54	1	93.10	1.72	5.17
I would like to have more VR experience	50	2	86.21	3.45	10.34
I think it is much safer to use VR in orienting a building site	37	5	63.79	8.62	27.59
I felt discomfort when using the system	2	51	3.45	87.93	8.62
VR will aid in training before moving to Portrane	47	3	81.03	5.17%	13.79
I was successful in navigating through the videos	52	1	91.23	1.75	7.02
I got clear instructions about using the system	57	1	98.28	1.72	0.00
VR can be used to promote the mental health of patients	43	3	74.14	5.17	20.69
VR helped me to understand the new hospital structure better	51	3	87.93	5.17	6.90

Table 1: Key: SA: Strongly Agree, A: Agree, SD: Strongly disagree, D: Disagree.

88 Per cent of the staff stated that VR helped them to understand the new hospital structure better. Seven per cent of the staff were not sure if VR helped them in the process. Only 5 per cent of staff felt that VR did not have any added value in understanding the new hospital structure. The usability of head-mounted devices was an area of concern. However, only less than 2 per cent of staff found it challenging to navigate, and more than 90 per cent of the staff did not find any difficulty navigating through VR headset. More than half of the staff who had VR experience had it for the first time and had never used VR before.
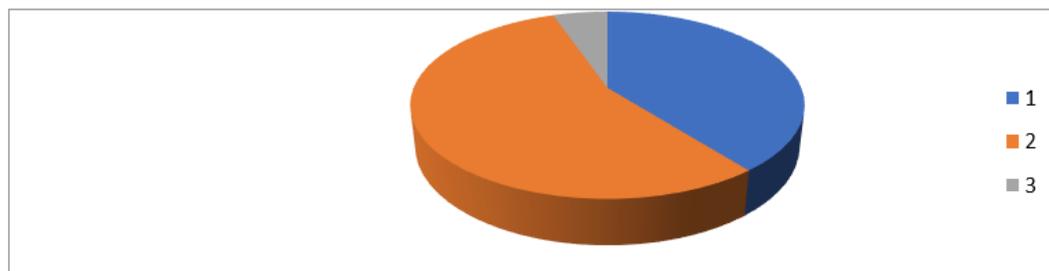

Figure 2

Ninety-five per cent of staff stated they enjoyed the VR experience. Among the rest, 3 per cent were not sure, and only 1 per cent of staff stated they did not enjoy the experience.

Visual clarity was stated to be very good by nearly 94 per cent of the staff, and only 2 per cent stated it was not clear. That is one of the disadvantages of non-tethered HMD, where it is difficult to assess the user's visual clarity.

The majority, 86 per cent of the staff stated, they would like to have more VR experience and only 3 per cent disagreed with the idea of more VR experience. Ten per cent of the staff cohort were not sure if they liked to have more VR experience.

VR technology used to familiarise a building site was seen as a much safer option by 64 per cent of the staff, and only 9 per cent of staff thought otherwise. However, 27 per cent of the staff remained not sure.

The majority (81%) of the staff opined that VR could be used to train staff before moving to the new build in Portrane. Fourteen per cent of the staff were not sure if VR should be used in training before the move, and only 5 per cent of the staff thought VR should not be used in transitional staff training.

Of the total staff who had the VR experience, only 3 per cent stated they felt discomfort when using it. The staff was constantly asked if they were experiencing any discomfort. In one instance, the experience had to be stopped as the staff suffered from VR vertigo. Moreover, this highlights the need to have a pre- VR experience questionnaire and nonverbal signage to communicate with the organizer when the HMD is used.

Clear instructions are critical in any form of experience. Both verbal and nonverbal instructions are necessary, especially if the person is experiencing the technology for the first time. During this VR experience, almost 98 per cent of staff stated they got clear instructions in using VR.

Only 5 per cent of the staff disagreed with the idea of using VR to promote the mental health of the patients. However, a majority, 75 per cent of the staff, felt VR should be used to promote mental health. There was nearly 20 per cent of the staff who were not sure about the use of VR in promoting mental health.

Discussion

The 3-dimensional spatial orientation of a VR video helps understand new places better and is currently used in limited settings. Learning from other onboarding and familiarisation experiences suggest, VR can be used effectively in new site orientation. Covid-19 has also challenged any of the normal familiarisation processes, and VR promises to address those effectively. This study aimed to understand the experience of staff in using VR as an orientation tool. The majority of the staff of NFMHS stated that VR could be used in the familiarisation process, which is reflected in the study by Zenner, Makhsadov., et al [12]. Moreover, Czarnek Strojny., et al. [13] also found that VR also ensures staff engagement in the familiarisation process due to the novelty of its experience. This study highlights multi-sensory VR's potential in employee training, communication, education, and related scenarios focusing on user interest.

Moreover, a study by Araiza-Alba Keane., et al. [1,2] also found evidence to support the hypothesis that 360° VR videos are a valuable tool for self-directed learning. Self-directed learning is vital in organizational change management [14] especially when there is a facility transition.

Capturing 3d videos and combining them into a strip that follows the building design is crucial when using VR videos for familiarisation. In this study, the researcher initially created a location script aligned to the building's floor map. The time duration for each location's videos differed for each other and was based on the visual complexity involved in the visuals, i.e., corridors, offices and entrances. The adequate time duration for each location was necessary for the participants to familiarise themselves with the new build, particularly in the initial part of the VR experience, when the participants are getting used to the VR experience.

The researcher used a stable tripod to capture the 360 videos; care was given to keep the height the same for all video capture. A height of around 150 cms was adopted for this VR experience. A study by Keskinen, Mäkelä., et al. [15] suggests that a height of 150 cms is comfortable for both sitting and standing participants. Higher or lower heights can cause a negative experience for the user.

This study employed a voluntary sampling technique, which can introduce sampling bias. However, given the nature and purpose of the intervention, a voluntary sampling technique was deemed appropriate.

Conclusion

Eighty-eight per cent of the sample in this study found VR video to be effective in understanding a new building, and 81 per cent of the sample also suggested that VR can be used for new build familiarisation. Onboarding using technology would need further exploration to address any shortcomings. Therefore, more detailed studies should be undertaken to enable VR as a proper training tool in the facility onboarding. There is no evidence of VR being used in a forensic hospital familiarisation. Therefore, it would be interesting and valuable to study the usefulness of VR in new build familiarisation.

VR is used widely in the delivery of mental health therapies on a one-to-one and group basis. CBT and DBT's can be enhanced using VR and other immersive technologies such as augmented reality and MR. Staff strongly support the idea of introducing VR as a tool to promote mental health among the patient population of NFMHS. Moreover, this should also be part of an extensive study exploring VR's possibilities as a therapy delivery tool within a forensic mental health setting.

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