Chapter 23
From Virtual Reality to 360° Videos: Upgrade or Downgrade? The Multidimensional Healthcare VR Technology

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ABSTRACT

This chapter aims to describe the multidimensional virtual reality tools applied to healthcare: in particular the comparison between virtual reality traditional tolls and the 360° videos. The VR traditional devices could differ in terms of specific graphics (2D/3D), display devices (head mounted display), and tracking/sensing tools. Although they are ecological tools, they have several problems such as cybersickness, high-cost software, and psychometric issues. Instead, the 360° videos can be described as an extension of virtual reality technology: they are immersive videos or spherical videos that give the opportunity to immerse the subject in authentic natural environments, being viewed via an ordinary web browser in that a user can pan around by clicking and dragging. The comparison between those two technologies stems from the question if 360° videos could solve and overcome the problems related to virtual reality and be an effective and more ecological alternative.

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INTRODUCTION

Among all the Virtual Reality (VR) technologies, a concurrent emerging trend are 360° videos, which are also known as immersive videos or spherical videos. This chapter will go into the advantages and disadvantages of the VR spectrum of technologies: it will highlight when VR potential ends and where those of 360° videos start. 360° videos could be a more innovative cheaper, ecological and realistic tool than VR devices: they take the opportunity to immerse yourself in authentic natural environments, being viewed via an ordinary web browser or mobile device where a user can pan around by clicking and dragging the environment. A 360-degree video is made up of a series of 360-degree images with a predetermined time interval between them. Each 360-degree image is a panorama taken with an omnidirectional camera or a combination of cameras to cover the entire horizontal field of view (i.e., 360-degree FOV). They could be an innovative smart and ecological alternative to VR tools because they could solve and overcome cybersickness problems, high cost of software and the use of VR 3D helmets.

BACKGROUND

In the last 10 years, VR technology has innovated the world of healthcare: it has been rendering the experimental and clinical fields, as well as assessment and rehabilitation settings, more environmentally friendly, appealing, and personalized (Cipresso et al., 2018). Although VR has great possibilities, it also presents some technical and psychometric limitations: first, when used, most VR systems must be connected to a computer and require an external tracking device. As a result, they are difficult to utilize for the cords that restrict the user's movements. Tethering also necessitates synchronization of the various peripherals (HMD, joystick, gloves, etc.) which necessitates a sophisticated technical setup that increases the system's latency. Moreover, it is challenging to create effective VR experiences since it necessitates the creation of 3D models and interfaces, the specification of user-environment interaction models, and the integration of external devices such as sensors and gloves. Furthermore, most of the times the development of VR environments needs information and engineering intervention because software needs to be customized each time, per each experiment, and this requires huge efforts and high cost in terms of development. Finally, psychometric problems regard the lack of literature about the test-rest and usability of VR tools: only few studies have looked at usability, demonstrating that those tools are actually usable, easy to learn, challenging and engaging, and devoid of major adverse effects (Borgnis et al., 2022; Freeman et al., 2017). These example barriers can be removed with the use of 360° videos. Although, how they are made, they do not allow proper interaction, by linking them together it may be possible to create this illusion: for example, with software like *Insta VR*, it is possible to allow navigation in any environment: by putting a *link* or a *hotspot* on a door it is possible to change the environment and give the appearance to change rooms. This feature has innumerable applications. In this way, a clinician could also create ecological testing or improve existing ones. For example, personality is traditionally assessed through self-reports questionnaire: the most famous is the Big Five questionnaire which assesses personality among five dimensions (extraversion, agreeableness, conscientiousness, emotional stability, and openness to experience) (Caprara et al., 1993). Cipresso and Riva (2015) have already proposed to assess personality using 360° videos, creating different situations where each component is posed either in multiple situations with a single choice or in only one situation with multiple choices. One example consists in immersing the user in a path in the forest with a crossroads, where he/she, through a narra-