

Chapter 1

Considerations for the End–User: Standards, Collaboration, and Participation

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ABSTRACT

The development of efficient and effective virtual reality (VR) rehabilitation systems requires an intimate understanding of function, disability, and the end-user. This chapter presents three aims: 1) provide an overview of United States and international rehabilitation legislation and initiatives related to rehab technology; 2) examine types of rehabilitation therapy (occupational, physical, and speech) and the importance of on-going inter-disciplinary collaboration with computer engineers; and 3) expand knowledge of factors that influence end-users participation in VR rehabilitation, which includes user-technology match, and device compliance. Consideration of these aims will help computer engineers and researchers create VR rehabilitation systems through a collaborative and user-centered approach that meet international standards of practice.

INTRODUCTION

New technologies are being developed at a rapid speed, however only 5-15 percent of people with disabilities (PwD) have access to devices that can assist in participation in life and the rehabilitation process (World Health Organization [WHO], 2011). There are many confounding factors that interfere with the successful adoption of technology such as lack of research, inefficient collaboration, cost-containment, and mismatch between users and technology. Assistive technology (AT) is the most frequently term used in the rehabilitation domain of practice which encompasses any “product, device, or equipment, whether acquired commercially, modified or customized, that is used to maintain, increase, or improve the functional capabilities of individuals with disabilities” (Assistive Technology Act of 2010). Products and devices may include low-tech items such as page-turners or pencil grips to high-tech devices such as eye-gaze enabled communication devices or robotics. Virtual reality (VR) is included under the

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umbrella of AT, however; it remains an emerging medium in healthcare. It entails real-world simulation through human-computer interaction (Holden, 2005). VR is most frequently available in rehabilitation settings through the use of commercially available gaming systems such as Kinect and Wii. Apart from these gaming systems, many healthcare providers are virtually unfamiliar or uncomfortable with VR technology. Additionally, organizations are often hesitant to invest in costly technology, which do not have proven benefits for patients. Computer scientists and engineers are experts in VR technology design, but are often unfamiliar with an intimate understanding of function, disability, and end-users. It is for these reasons that the development of efficient and effective VR rehabilitation systems requires interdisciplinary collaboration consistent with social responsibility and international initiatives for PwD.

Overall, the term ‘assistive technology’ will be used in this chapter in order to gain the broader perspective of AT standards, users, and collaboration. First, an overview of United States and international rehabilitation legislation and initiatives related to AT will be explored. Next, we examine the users of AT and discuss barriers to device compliance. Lastly, the importance of on-going inter-professional collaboration (IPC) among AT stakeholders will be reviewed. Consideration of these aims will help AT research teams create VR rehabilitation systems through a collaborative and user-centered approach that meet international standards of practice.

NATIONAL AND INTERNATIONAL STANDARDS ON DISABILITY

United Nations estimates that over 1 billion people worldwide live with one or more disability involving physical, sensory, intellectual, or psychological impairments. Those with disabilities have higher incidence of poverty and inherently restricted access to education, work, community, and technology (United Nations [UN], 2011). Understanding national and international initiatives and legislation in regards to assistive technology may guide computer engineers and researchers in ways to focus the global technology needs for PwD.

American Disability Legislation

In the United States, several laws ensure the rights of PwD and the development of technology. Rehabilitation Act was passed in 1973 and mandated that, among other things, research, innovative technologies, and expansion of employment opportunities be provided for PwD. Section 508 of the Rehabilitation Act enforces that all electronic and information technology developed and used by the US government must be accessible to PwD (Rehabilitation Act of 1973). The Americans with Disabilities Act (ADA) was passed in 1990 to ensure equal access to architecture, governmental services, employment opportunities and transportation (Americans with Disabilities Act of 1990). The act was revised in 2010 to include ADA Standards for Accessible Design, which mandates that newly constructed or altered facilities, including state, local government, public and commercial, be accessible and usable to PwD (United States Department of Justice, 2010). The Technology-Related Assistance for Individuals with Disabilities Act (1998) provided federal funds to states to develop training and delivery systems for assistive technology devices and services. The Individuals with Disabilities Education Improvement Act (IDEA, 2004) ensure the availability of necessary tools (including assistive technology) for “free and appropriate education” of children with disabilities. The Assistive Technology Act (2004) affirms that technology is a valuable

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