Chapter 11

Autism Spectrum Disorder (ASD) and Attention-Deficit/Hyperactivity Disorder (ADHD) Children: From Users to Creators of Virtual Reality Learning Content

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ABSTRACT

Autism spectrum disorder (ASD) is a serious neurological disorder. Using virtual reality (VR), researchers are exploring alternative solutions to treat ASD. Recent experiences show that VR can be a motivating platform to safely practice social and communication skills for children with ASD. It is also seen as an effective method to build empathy and help improve the general understanding of the condition. This study will focus on using and experimenting different 360-degree immersive learning environments for ASD and attention-deficit/hyperactivity disorder (ADHD) pupils and their schoolmates. The chapter will report on a few ASD students who use VR facilities to communicate, learn, improve self-awareness, autobiographical memory, and reduce school pressure, and a few ADHD students who enjoy a VR environment to improve concentration and self-esteem. Both the ASD students and the ADHD ones decided, during the trial, to become VR creators building their own content, with the help of a facilitator.

INTRODUCTION

Virtual reality (VR) plays an important role for autism spectrum disorder (ASD) children, and it represents a growing area of research. The term VR is reasonably broad (Newbutt et al., 2016). In fact, VR may be described as a simulation of the real world based on computer graphics, including virtual environment simulations, collaborative virtual environments, immersive virtual environments, virtual

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worlds, 3D immersive graphics, head-mounted displays, 360-degree movies and photos etc. (Newbutt et al., 2016; Bellani et al., 2011; Guazzaroni, 2017; Radu, 2014). VR may represent a simulation of the reality based on computer graphics or immersive movies. These experiences can be multipurpose for educators, therapists, families to offer a safe and repeatable environment during treatment or learning (Newbutt et al., 2016). Moreover, VR simulates and recreates the real world, or it rebuilds a completely new reality which can be repeated as often as required (Bellani et al., 2011). Using 360-degree cameras, it is possible to offer real world immersive experiences. In other words, immersive movies can be watched using a head-mounted display. The real world is repeated in a way to enhance communication with the autistic student. The ASD is a developmental disorder characterized by core deficits in: social interaction, communication, and repetitive or stereotypic behavior. The causes of autism are largely unknown as different factors are involved. The degree of impairment may vary depending on the single individual. It is crucial to develop tools for neurocognitive rehabilitation enabling children with ASD to improve their ability to perform daily activities. In this context, VR represents a very promising tool (Bellani, 2011; Casas et al., 2012; Parsons & Cobb, 2011). VR potential benefits may support the learning process of autistic children, as VR seems to be particularly useful to enhance the daily life social behaviors (Parsons & Mitchell, 2002). In the last decade, there has been a rapid advance in the use of VR. Recently the level of sophistication has strongly increased, and more and more educators are introducing VR facilities to teach students with special needs. For example, ASD schoolchildren can learn and practice important skills such as eye pointing and gaze fixation. Perhaps because of the seriousness of the disorder, and the lack of effective treatments, VR has received more application in ASD children than in pupils affected by Attention-Deficit/Hyperactivity Disorder (ADHD), although both groups of individuals (ASDs and ADHDs) would appear to benefit from many of the same technology features. Recently VR has renewed, because of affordable head–mounted display (e.g. Google Cardboard viewer). For ASD and ADHD schoolboys and girls an immersive virtual scenario can be an attractive learning environment because it releases their pressure. There is a lot less physical inflection involved in current VR animation or in a 360-degree movie than within real human interactions, and for ASD individuals this simplification can help reduce confusion, and communicate in an effective. VR offers the potential to create a training and treatment environment, immersive and dynamic, allowing “sophisticated interaction, behavioral tracking, and performance recording” (Rizzo & Kim, 2005). VR has a seemingly endless number of real world applications. It is increasingly clear that this technology is not strictly used by gaming enthusiasts. VR is rapidly evolving into an effective tool for education, medical diagnosing and treatment. Highly effective VR technological solutions and useful practices have developed for medical professionals, researchers and educators. This chapter examines the use of different 360-degree immersive learning environments especially for ASD pupils, and their schoolmates. In particular, the chapter will report of a few ASD students that use VR facilities to communicate, to learn, to improve self-awareness, autobiographic memory and to reduce their school pressure level; of a few ADHD students that enjoys a VR environment to improve concentration, self-esteem and to learn in a pleasant way. On the other hand, their classmates experience VR immersive videos to develop empathy, friendship and understanding of the children with special needs. Both the ASD students and the ADHD ones decided, during the trial, to become VR creators building their own didactic content, with the help of a facilitator.