Chapter 9
Virtual Reality (VR) for School Children With Autism Spectrum Disorder (ASD): A Way of Rethinking Teaching and Learning

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ABSTRACT
Various medical and technological organizations are working on the development of unconventional solutions such as therapy and assistance for people with autism spectrum disorder (ASD). Different organizations, researchers and educators have been involved in the study and realization of virtual reality (VR) solutions to be used as therapy, training, and support for these individuals. Previous researches and experiments showed that it is possible to ameliorate the level of concentration, coordination, socialization, communication, self-awareness, and memory in school children treated with these tools. VR environments may offer a total physical involvement of the ASDs that may see the world through virtual immersion and active practice. This chapter presents a way of rethinking teaching and learning.

INTRODUCTION
Autism spectrum disorders (ASD) present impairments in three important domains: social skills, communication and behaviour. It is important to help ASD individuals with proper strategies (American Psychiatric Association, 2013; Bellani et al., 2011; Parsons & Mitchell, 2002). Virtual reality (VR) for these users has been studied and developed for over two decades (Newbutt et al., 2016). VR is a simulation of everyday real world based on computer 3D immersive graphics and 360-degree videos. VR

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immersive environments may be helpful for educators and therapists to offer the opportunity to access a protected, tailor made and repeatable learning environment (Bellani et al., 2011; Kandalaft et al., 2013; Newbutt et al., 2016). An immersive learning environment is a virtual environment where students can connect, interact, find 360-degree learning objects and complete educational tasks wearing a special head-mounted display. These learning spaces can reproduce real existence, can invent totally new virtual worlds, can offer tailor made experiences useful to understand and perform specific tasks (Bellani et al., 2011). The literature is progressively accepting the benefits of VR facilities in teaching ASD individuals, especially related to social skills (Parsons & Mitchell, 2002; Bellani et al., 2011; Kandalaft et al., 2013; Didehbani et al., 2016; Newbutt et al., 2016). In fact, children with autism experience fundamental difficulties in the social domain. This impairment interferes with the process of creating relationships, participating and integrating with peers (Parsons & Mitchell, 2002; Kandalaft et al., 2013). Core difficulties in communication is one of the critical limitations of ASD children. According to Halabi et al. (2017), these children ‘commonly demonstrate difficulties in initiating as well as responding to social interactions’. In a social situation ASDs experience limitations in processing context, dialogue and non-verbal communication. Many studies have investigated the use of VR technology in the education process of autistic children. The nature of VR learning environments is positive as it induces controlled verbal and non-verbal stimuli, allow to monitor children’s behavior and permit the repetition of the proposed task (Halabi et al., 2017; Newbutt et al., 2016; Bellani et al., 2011; Parsons & Mitchell, 2002). Moreover, children in the autism spectrum usually present impairments and delay in understanding symbolism and symbolic play. VR facilities may offer a further opportunity for these children to understand and manipulate symbols, for teaching pretend play and for understanding imagination (Herrera et al., 2008) with the purpose, for example, to teach numbers and alphabets. ASD children present a developmental delay in the acquisition of self-recognition. Autistic individuals are impaired in accessing autobiographical memories and events happened in the past (Uddin, 2011). The autobiographical memory in children with autism is marked by errors of omission, and it seems poor especially for early-life events (Crane et al., 2009; Uddin, 2011; Lyons & Fitzgerald, 2013). Another relevant characteristics of autism is the lack of empathy and emotional engagement with peers. ASD pupils cannot interpret emotions in the right way, they cannot process their own emotions and have difficulties with the emotional engagement with other people as they are generally focused on their own concerns (Lyons & Fitzgerald, 2013). For ASD schoolboys and girls an immersive virtual scenario can be an attractive learning environment because it releases their pressure. There is less physical inflection involved in VR animation or in a 360-degree movies than within real human interactions, and for ASDs this simplification can help reduce their confusion and anxiety. In this context, VR learning tools offer the potential to create a training and treatment environment, immersive and dynamic, allowing interaction, behavioral tracking, and performance recording (Rizzo & Kim, 2005). In this chapter, the authors outline how a proper use of VR educational facilities ia a new a way of rethinking teaching and learning, and it is useful to improve concentration, coordination, socialisation, numbers and words learning, self-awareness and memory in ASD pupils.