Chapter 5

On the Development of VR and AR Learning Contents for Children on the Autism Spectrum: From Real Requirements to Virtual Scenarios

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ABSTRACT

Autism spectrum disorder (ASD) is an umbrella term used to group a range of brain development disorders. The learning profile of most people with ASD is mainly visual, and VR and AR technologies offer important advantages to provide a visually based mean for gaining access to educational contents. The prices of VR and AR glasses and helmets have fallen. Also, a number of tools that facilitate the development and publication of AR and VR contents have recently appeared. Therefore, a scenario of opportunity for new developments has appeared in this field. This chapter offers guidelines for developing AR and VR learning contents for people on the autism spectrum and analyses those guidelines from the perspective of two important case studies developed in previous years.

DOI: 10.4018/978-1-5225-5243-7.ch005
INTRODUCTION

This chapter approaches the development of VR and AR learning contents for autism considering the important evidence-based knowledge available from the research in social sciences, in order to maximize impact and effectiveness of technological tools to be developed in this area. The chapter starts introducing the formal definition of Autism Spectrum Disorder and the relevant concepts and terms in the area of serious games.

ASD Definition

The term Autism Spectrum Disorder groups a range of brain development disorders. Before 2013, it was widely accepted that people with autism had a ‘tripod of impairments’: in social communication, social interaction and the presence of restricted and repetitive behaviors and interests (according to the DSM-IV by the American Psychiatric Association or APA). Things changed in 2013 when the APA proposed that all autism-related diagnoses (including Autism and Asperger’s Syndrome) be given the label ‘Autism Spectrum Disorder’ (ASD).

The DSM-5 (APA, 2013) provided a definition that described a dyad of impairments in: (1) persistent social communication and interaction deficits in multiple contexts, and (2) restricted, repetitive patterns of behavior, interests, or activities. Both aspects of the dyad must be present for a diagnosis. Most studies indicate that at least 1% of the population have ASD (Atlanta Centre for Disease Control) and it is estimated that 25-50% of individuals with autism also have intellectual disability/learning difficulties.

Visual Learning Style and Technology Use in ASD

No medical treatment is available for the core symptoms of Autism. Students with autism progress much better when specific educational supports are provided. Visual supports for both receptive communication (daily agendas, individual work-systems, tasks structures, etc.) and expressive communication (alternative communication systems based on picture-exchange to communicate what they need, and to share ideas with others) are examples of autism-specific supports that have evidence for their effectiveness. Very often, these visual supports are provided by means of technologies, taking advantage of the visual capabilities of innovative technologies. Lots of technological solutions are available for people with autism, with hundreds of apps for smart devices available on Google Play ® and Apple AppStore ® Markets and with an increasing number of VR and AR solutions running on game consoles or PCs. Given the rapid decrease of the prices for VR and AR solutions
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