

## Chapter 19

# Instructional Design and 3D Virtual Worlds: A Focus on Social Abilities and Autism Spectrum Disorder

**Laura Fedeli**

 <https://orcid.org/0000-0002-1509-0323>

*University of Macerata, Italy*

**Valentina Pennazio**

*University of Macerata, Italy*

### ABSTRACT

*Starting from the analysis of the typical difficulties of the condition of autism spectrum syndrome and the literature relating to the effectiveness of the use of virtual worlds, the chapter presents the design and implementation of social stories within a 3D social virtual world, namely edMondo. The environment was used for a second phase of a piloting of a research project about the development of social abilities in children with ASD and involve the use of social scenarios thanks to the interaction with a robot avatar.*

### INTRODUCTION

Currently, to address the difficulties in social skills, typical of people with Autism Spectrum Syndrome (ASD), in addition to the cognitive-behavioral intervention protocols generally provided in rehabilitation, an important role has been attributed to technologies (social media), social robotics and virtual worlds. In fact, these applications create a high degree of involvement for people with ASD because they allow designers to customize the intervention based on the specific characteristics of the user (in case of autism can vary greatly from one person to another), and allow the user with ASD to interact from a safe and reassuring position. Thanks to their potential, these applications are starting to be used not only in the rehabilitation, but also in the educational context (e.g. at school).

DOI: 10.4018/978-1-7998-7638-0.ch019

The use of social media, for example, allows people with ASD to create and maintain communicative interactions more easily than what happens in the physical world (Mazurek, 2013). Asynchronous social media can provide a particularly safe environment for people with ASD because they allows people to (1) communicate and interact by remaining physically in a known environment, which creates a sense of security and control, (2) immediately leave a threatening situation by simply disconnecting the computer (Stendal & Balandin, 2015). Furthermore, in social media the need to understand the normal requirements of face-to-face communication, including social cues, facial expressions and body language, decreases (Mazurek & Wenstrup, 2013).

Many studies conducted with robotics have, instead, tried to address the deficient aspects of socio-emotional reciprocity typical of the ASD, by intervening specifically on the individual precursors of the Theory of Mind (ToM): eye contact, imitation, attention, human interaction (Charron, Lewis & Craig, 2017; Simut et al., 2016; Warren et al., 2015). Other researches (Costa et al., 2014; Pennazio & Fedeli 2019a, 2019b; Fedeli, Pennazio & Datteri, 2020; Pennazio et al., 2020; Scassellati, 2018) have tried to investigate the overall development of the ToM, that is the ability of people to “mentalize”, to recognize and interpret the behavior of others as the result of mental states similar to theirs, and therefore regulate their behavior based on these mental states. Research conducted with robotics has confirmed that a person with ASD interacts more easily with a robot than with a human interlocutor thanks to its simplicity of communication and relationship.

The international literature has also highlighted the usefulness of using virtual environments customized to the needs of people with ASD (Didehbani et.al., 2016; Wallace, Parsons & Bailey, 2017; Fedeli & Pennazio, 2020) and the wide use of “virtual reality” in projects whose primary objective is the development of social and emotional skills through 3D virtual environments (Mesa-Gresa et.al., 2018). Parsons and colleagues (2006) concluded that virtual environments can be a useful tool for the development of social skills in people with ASD, but that it is necessary to adequately design the virtual world so that it can favour the generalization of the skills learned to the real context.

Generally, the intervention to help people with autism to cope the difficulties manifested in the area of sociality, involves the use of social stories (which are described in the following paragraphs) therefore, these stories are usually associated with the use of robots and virtual worlds, by acquiring characteristics that make them more effective.

Starting from the analysis of the typical difficulties of the condition of autism and the literature relating to the effectiveness of the use of virtual worlds for people with ASD, the contribution presents the design and implementation of social stories within the virtual world “edMondo”; stories to be used in work sessions aimed at acquiring social skills with a child with autism. The work with social stories within the virtual world that we present, follows an in-presence work with the Nao Robot where the child listened to social stories told by the robot and performed activities requested by the robot (for an analysis, see Pennazio & Fedeli 2019a, 2019b; Fedeli, Pennazio & Datteri, 2020; Pennazio et al., 2020).

## **AUTISM SPECTRUM DISORDER AND SOCIAL ABILITIES**

As research on the topic describes, ASD is a neurodevelopmental disorder with a very high incidence rate (Hannah et al., 2020; Ofner et al., 2018).

To understand the characteristics of ASD it is necessary to refer to the Diagnostic and Statistical Manual of Mental Disorders fifth edition (DSM-V) (APA, 2013) which identifies the condition of autism

15 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:

[www.igi-global.com/chapter/instructional-design-and-3d-virtual-worlds/273037](http://www.igi-global.com/chapter/instructional-design-and-3d-virtual-worlds/273037)

## Related Content

---

### Development of Online Distributed Training: Practical Considerations and Lesson Learned

Eileen B. Entin, Jason Sidman and Lisa Neal (2008). *Computer-Supported Collaborative Learning: Best Practices and Principles for Instructors* (pp. 180-197).

[www.irma-international.org/chapter/development-online-distributed-training/6920](http://www.irma-international.org/chapter/development-online-distributed-training/6920)

### Identification of Key Issues in Adopting a Web 2.0 E-Portfolio Strategy

Gary F. McKenna and Mark H. Stansfield (2013). *International Journal of Virtual and Personal Learning Environments* (pp. 49-64).

[www.irma-international.org/article/identification-key-issues-adopting-web/76373](http://www.irma-international.org/article/identification-key-issues-adopting-web/76373)

### New Wine or New Bottles: What's New about Online Teaching?

Michael Forret, Elaine Khoo and Bronwen Cowie (2006). *Managing Learning in Virtual Settings: The Role of Context* (pp. 253-273).

[www.irma-international.org/chapter/new-wine-new-bottles/25965](http://www.irma-international.org/chapter/new-wine-new-bottles/25965)

### Faculty Professional Learning: An Examination of Online Development and Assessment Environments

Olga M. Alegre and Luis M. Villar (2011). *Teaching through Multi-User Virtual Environments: Applying Dynamic Elements to the Modern Classroom* (pp. 66-93).

[www.irma-international.org/chapter/faculty-professional-learning/46501](http://www.irma-international.org/chapter/faculty-professional-learning/46501)

### A User-Friendly Interface for an Educational Travel English Game Supported with Virtual Reality

Ceren Çalar and İrfan İmek (2022). *International Journal of Virtual and Personal Learning Environments* (pp. 1-19).

[www.irma-international.org/article/a-user-friendly-interface-for-an-educational-travel-english-game-supported-with-virtual-reality/307151](http://www.irma-international.org/article/a-user-friendly-interface-for-an-educational-travel-english-game-supported-with-virtual-reality/307151)