Chapter 41
Assistive Technologies and Autism Spectrum Disorders

Francisco Alcantud
University of Valencia, Spain

Javier Coret
University of Valencia, Spain

Yurena Alonso
University of Valencia, Spain

Esteban Jiménez
University of Valencia, Spain

ABSTRACT

This chapter discusses assistive technologies applied in people with autism spectrum disorders and how these technologies promote their adaptation. We analyzed different technological application areas such as detection, assessment, diagnosis, intervention, training, learning, environment control, communication, mobility, and access. In recent years there has been a notable increase of publications and works related to the use of assistive technologies applied to Autism Spectrum Disorders. While most of the publications present novel systems, devices, and applications (smartphones, tablets, robots, avatars, etc.), general evaluation of the results is insufficient. Future lines of research are targeted to realize intelligent environments in order to integrate all knowledge and technological developments made in recent years.

INTRODUCTION

From its origin as a species, human beings have sought technological elements enabling it to increasingly manage their environment. For example, they were unable to compete with their predators in speed but they developed technologies or tools that allowed them to survive. This one is the case of the wheel, or wheeled vehicles to achieve higher speeds or lever to maximize your effort. In other cases, techniques were developed to aid individuals who, for a particular condition, were weaker and vulnerable. Thus, for example appears crutch, cane or walking-stick in the Egyptian engravings in the tomb of Hirkouf AC 2.830, which allowed people with limited movement in the legs they continue walking.

The evolution of these first assistive technologies has been so profound that although many of the old ones are still in use, Nowadays, assistive technologies include a wide range of tools and methodologies that facilitate social participation of people with disabilities.

Technology for people with Autism Spectrum Disorders (ASD) continues to receive limited attention, despite the fact that technology tends to

DOI: 10.4018/978-1-4666-8789-9.ch041

be a high interest area for many of these people. Assistive technologies have become tools for training and skill development, to support the orientation in the way, to improve their communication, and so on. The entire set of technical aids and support services form what we now know as "assistive technology".

BACKGROUND

Cook and Hussey (1995) referred as assistive technologies as the large number of devices, services, strategies, and practices that are designed and implemented to improve the adaptation to the environment of individuals with disabilities.

Other authors as Alcantud (2003) referred assistive technology as any article, equipment, device or system, purchased commercially or designed ad hoc for been adapted to a person, which is used to increase or improve functional capabilities of individuals with disabilities or to modify or introduce behavior, is considered generically as assistive technology. This definition has several components worth analyzing from an epistemological point of view. First, this definition includes sale, modification, and customization of all types of equipment and tools. Second, this definition emphasizes the functional capabilities of individuals with disabilities. We should note here that functional outcomes are also the real measure of the success of their equipment and utensils. Finally, interventions or treatments must be individual as each technological application is a unique circumstance depending on the nature and degree of disability.

Assistive technologies can be classified as high, medium or low level, as commercial or developed "ad hoc", and as devices or tools. Depending on the purpose they serve, assistive technologies can be classified as (Cook & Hussey, 1995; Alcantud, 2003):

- **Training and Empowerment Systems:** They Include all technology uses aimed to increase the skills of people with disabilities.
- **Augmentative and Alternative Communication Systems:** Systems designed for disabled people who cannot use communication with oral-verbal-linguistic code.
- **Technologies for Manipulation and Environment Control:** They include robots, assistive devices for handling, electronic systems for environmental control, and so forth. We would also include technologies for the daily life, which will enhance the autonomy level for people with disabilities.
- **Technologies for Personal Mobility:** All systems that facilitate personal mobility, both physical (wheelchairs) as cognitive (navigation and guidance systems) technologies are included.
- **Computer Access Technology:** They include all systems (both hardware and software) that allow people with disabilities to use conventional computer systems.

Although in most assistive technology classifications the diagnostic section is not considered, in case of autism we believe that technological development has allowed, and probably will allow in the future, a more accurate and early diagnosis. For this reason, we will include this in our review section.

Similarly, the section will not include access systems independently. We understand that people with ASD do not normally have severe motor limitations. They benefit from the development of alternative access systems such as touch screens or switches. The use of these systems cognitively simplifies the interaction with the computer. Thus, this information is included in the studies from the different areas of our review.