


Chapter 2

Socially Assisted Robotics as an Intervention for Children With Autism Spectrum Disorder

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ABSTRACT

In this chapter, the author introduces and expands upon the use of robots for social assistance with children who have autism spectrum disorders and other similar conditions. The social skills these robots can assist autistic children with are identified, and five specific robots (NAO, Milo, Kaspar, QTrobot, and Moxie) developed for use with autistic children are reviewed. Each robot is described in terms of specifications functionality and price, and a practical example of its use is also included. Additionally, advantages, disadvantages, and research-based outcomes are discussed.

INTRODUCTION

In the United States, autism spectrum disorders (ASDs) are the most prolific and fastest growing developmental disability (Autism Society of America, 2003), with approximately one of 44 children affected across all racial, ethnic, and socioeconomic groups (Centers for Disease Control and Prevention, 2022). According to the American Psychiatric Association (2013) “autism is a lifelong neurodevelopmental condition

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or spectrum of related conditions that affects the way a person interacts with others and experiences the world around them” (as cited in Alcorn et al., 2019). Children diagnosed with autism spectrum disorder (ASD) have known difficulties with social interactions, behavior, joint attention skills, imitation skills and communication (American Psychiatric Association, 2013). Research on ASD emphasizes the criticality of early intensive interventions to ameliorate the significant impairments associated with ASD (Dawson, et al., 2010).

One approach to such an early evidenced-based intervention is robotic assisted instruction (Bekele et al., 2014; Warren et al., 2015), an area of interest for therapeutic interactions with children with ASD since the 1990s (Syrdal et al., 2020). For the purposes of this chapter, the author will review the literature regarding the use of social robotics with children with ASD.

Robotics and ASD

The research literature contains several studies devoted to investigating the use of robotic applications as instructional assistants for individuals with ASD (Diehl et al., 2012; Duquette et al., 2008; Feil-Seifer & Mataric, 2011; Goodwin, 2008; Kim et al., 2012). The advantages of using robots in a classroom setting with students with ASD are many: they can supply customizable learning experiences that are repeatable and elicit high levels of engagement (Saadayzi et al., 2012); they have a physical presence in the classroom (as opposed to virtual reality programs) that is conducive for establishing rapport (Powers et al., 2007) and for encouraging physical support and interactions; and, they can enable joint attention (JA) between ASD children and adults (David et al., 2018). Socially Assistive Robotics (SAR) are robotic devices designed to assist individuals with improving social interactions (e.g., speaking, observing, reminding, guiding, etc.) (Ghita et al., 2020). The literature notes that students with ASD prefer interactive robots to toys or humans, as anthropomorphic robots induce less anxiety, are more conducive for instruction giving, and offer consistent and predictable interactions (Dautenhahn, 1999; Dautenhahn & Werry, 2004; Duquette et al., 2008; Rudovic et al., 2017; Staten et al., 2018). Children with ASD are also motivated by and interested in robots because they are interactive but also because they rely heavily on rules and structure (Staten et al., 2018).

Social Skills

Social skills are those behaviors “that result in positive social interactions and encompass both verbal and nonverbal behaviors necessary for effective interpersonal communication” (Rao et al., 2008, p. 353). Autism is known to negatively impact the brain’s normal social abilities, causing a person with ASD to be unable to

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