

Chapter 14

Humanoid Robot–Mediated Communication Teaching for Children With ASD: A Case Study

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ABSTRACT

In special education, the use of tablet devices and personal computers has been practiced. The ease of access to ICT hardware and software for children with disabilities and their families is welcome in terms of increased learning opportunities and leisure options for children with developmental disabilities. In this chapter, the examples of children with ASD who have improved their communication skills through the use of some ICTs are presented. An ASD child who was overly afraid of talking to people and overly avoided failing in public were taught communication through programming into a humanoid robot. As a result, they used the robot as a step and eventually collaborated with friends to program a dance and presented the dance with the robot and classmate at a school festival. Finally, the effectiveness and challenges for the future use of ICT in teaching communication with ASD children were described.

INTRODUCTION

An ICT device called VOCA (voice output communication aid) has been used in educational practice for children with speech difficulties such as cerebral palsy and ASD for augmentative and alternative communication. The attempts to use VOCA to facilitate communication between the children with disabilities, their families, and their supporters have already been practically reported in the 1990s. VOCA is no longer the old, single-function, expensive, large, and heavy device like it used to be. With the widespread use of tablets, VOCA has become one of the many installed apps on tablet devices since they became popular now, since they are small, inexpensive, and can be set easily to the actual needs of the children. Today, it has been reported that the iPad and other tablet devices have the potential to be used not only as an AAC (augmentative and alternative communication) device but also as a supporting tool for various needs for their learning and life. For example, Karissa, Kathy, and Marlene (2019) found that although there was no significant difference between the performance of iPad and paper for language acquisition, the iPad proved was more effective at enhancing motivation for visual understanding. Elizabeth (2018) also showed that after training three ASD children to distinguish between pictures and symbols using the iPad voice output app, their discrimination skills improved and were maintained even after the training ended. Roman and Nitza (2019) also conducted a survey of 100 educators about the impact of iPads on children with ASD in three areas: learning, communication, and social skills. The results showed that, in addition to learning and communication skills, there was an improvement in social skills, which difference to the hypothesis that iPads have a negative impact. This led to the opinion that the iPad could bring a significant positive change in the lives of children with ASD.

Children with ASD communicate differently from typically developing children. Even if a sentence is expressed in a single word, children with typically development can utilize it in various contexts, and the receiver understands the meaning of the word in the context in order to communicate. For example, if a mother shows her child popcorn, she may teach him the word “popcorn” by saying the word, and the child will imitate it and say “popcorn.” If the mother showed the child popcorn and asked him, “What is this?” and the child responded with “popcorn,” it is a comment that serves as a response. When the mother asks her child, “What do you want to eat?” and the child responds “popcorn,” then the word “popcorn” is intended to be a desire in addition to a response. Thus, these kinds of communications and their meaning have various differences from the relationship to the context between the sender and receiver (Bondy & Frost, 2002). In other words, knowing the words and being able to express them in speech is not the same as being able to communicate. We should not also simply assume that using ICTs and VOCA is effective for children with ASD.

When an ICT is used to teach communication to children with communication difficulties, such as the children with ASD, it is necessary to analyze the child’s communication difficulties, accurately identify their developmental level and modalities of strengths, and use them appropriately according to their individual abilities (Mizuuchi, 2015). Murray (2014) and Doris and Margaret (2014) have compared the effectiveness of using the Picture Exchange Communication System (PECS), which has traditionally been used to teach communication to children with ASD, with the text-to-speech function of the iPad. Each has their own advantages and disadvantages, and the study points out the necessity of using an effective communication approach depending on the actual state of the child’s abilities.

Thus, the practice of using tablets and computers in special education are becoming more widely used. For children with disabilities and their families, the accessibility to the ICT hardware and software is a welcoming development in terms of increasing the way of learning and options for spare time. Megan,

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