

The Use of Mobile Phone Technology to Support People with Autism Spectrum Disorders (ASD)

Kristie Asaro-Saddler

University at Albany (State University of New York), USA

Diana Akhmedjanova

University at Albany (State University of New York), USA

INTRODUCTION

Mobile phone use has significantly increased over the last several years. In accordance with CTIA-The Wireless Association®, an international nonprofit membership organization, nearly ninety percent of American adults used cell phones (CTIA, 2013). Accordingly, mobile devices have become a significant part of everyday life. The rapid increase of use and the ease of accessibility to mobile phones have greatly enhanced multiple facets of people's lives, including people with various disabilities such as Autism Spectrum Disorders (ASD; Durkin, Whitehouse, Jaquet, Ziatas, & Walker, 2010; Mechling, 2011). ASD is a complex developmental disability characterized by deficits in social communication, language, and behavior (American Psychiatric Association, 2013).

Along with the rapidly growing utilization of mobile phones in general, new initiatives are being supported in an attempt to apply mobile or technology-aided learning to schools and universities, as well as workplace and informal settings (Kukulka-Hulme, Sharples, Milrad, Arnedillo-Sanches, & Vavoula, 2009). Mobile technology, including tablet computers and cellphones, have many applications in school settings. For example, mobile or technology-aided learning can support the learning of various topics simultaneously while providing easy access to information whenever needed across various physical settings (Kukulka-

Hulme et al., 2009). In fact, mobile technologies have been considered the "most intuitive and engaging forms of communication and expression ever available... in the classroom" (Peluso, 2012, p. E125). As a result, these technologies have emerged as a viable option for instructional purposes for learners both with and without disabilities. One particular group of learners with disabilities, those with autism spectrum disorders (ASD), may especially benefit from mobile technologies because of their unique characteristics. This article will focus on an emerging area of research in mobile phone technology - supporting learning in people with ASD across multiple domains of development.

In order to understand the use of mobile phone technology for people with ASD, we have organized this article into three major sections. The first section will provide an overview of the field, along with the scholars who have emerged as leaders in this area. We will then define the characteristics of people with autism spectrum disorders and its impact on people's lives.

The second section provides insight into the use of mobile technology for people with autism spectrum disorders beginning with a brief discussion of the educational uses of general mobile phone technology. We will then review the literature for people with ASD in several educational contexts or domains: communication, social skills, and academic skills.

Lastly, we will discuss the implications of the reviewed studies for practitioners such as teachers and therapists in education and psychology. We will also discuss future research directions and empirical questions that need to be addressed as the field moves forward.

1. MOBILE TECHNOLOGY FOR PEOPLE WITH ASD

Technology-aided instruction and intervention (TAII) is not new in the field of ASD (Knight, McKissick & Saunders, 2013), and it has been identified as a research based practice for children with ASD (Odom, 2013). However, while many practitioners have promoted mobile applications as “effective” or “promising” with people with ASD, there are few experimental studies in the use of mobile technology. This may change, as the recent increase in the availability and use of mobile technologies has attracted more attention from researchers attempting to discern the feasibility of using mobile devices in interventions with children with ASD (Campigotto, MsEwen, & Epp, 2012; Falloon, 2013; Ganz, Hong, & Goodwyn, 2013; Mechling, 2011). At present however, technology in the broader sense, including desktop computers and video modeling, has been the primary focus.

Encouragingly, the studies examining the effects of mobile-operated applications yield promising results in delivering interventions for children with ASD (Achmadi et al., 2012; Fernandez-Lopez et al., 2013; Hoch et al., 2009; De Leo et al., 2011; Mintz et al., 2012; van der Meer, 2011). These findings are not surprising since people with ASD prefer visual stimuli (Caron & Shane, 2014), a strong suit of this technology. In fact, some believe the emergence of handheld and mobile devices “represent a potential paradigm shift” in supporting many areas of development for people with ASD (Shane et al., 2012, p. 1228). Dr. Peter Ohrstrom from Aalborg University, Denmark and Dr. Joseph Mintz of the University of London in the United Kingdom, were among the

first to explore the use of mobile technology for students with ASD. Researchers including Dr. Jeff Sigafoos of Victoria University of Wellington and Dr. Howard Shane from Boston, Massachusetts are also among the leading experts in the area.

A number of researchers from the Victoria University of Wellington and the University of Canterbury in New Zealand explored the use of speech generating devices to support the communication of individuals with ASD. These researchers are: Drs. Jeff Sigafoos (Professor); Larah van der Meer (Research Fellow); Donna Achmadi and Debora Kagohara from Victoria University of Wellington (note: the latter two researchers were graduate students at the time of publication, and their current institutions are unknown); and Dr. Dean Sutherland (Professor) from the University of Canterbury. These researchers have produced numerous articles in mobile technology, specifically focusing on the effectiveness of iPod® and iPad® based supports to improve communicative output.

Another leader in the field, Dr. Howard Shane from Boston, Massachusetts, has explored the effectiveness of technology on the communication skills of people with ASD. Dr. Shane is the director of the Center of Communication Enhancements and the Autism Language Program at Boston’s Children’s Hospital in Boston and he holds appointments at the MGH Institute for Health Professions and Harvard Medical School. His most recent work has focused on using mobile technology to develop a visual language system to improve the spoken language of people with ASD.

Finally, a group of researchers including Dr. Joseph Mintz of the University of London in the United Kingdom, have worked to develop a mobile application for smartphones to support children with ASD with life and social skills functioning. This application, the HANDS project (described later in the article), is a software program designed to be individualized for the specific interests and needs of each user. Dr. Mintz and his colleagues have conducted several studies to test the efficiency and “user friendliness” of HANDS with promising results.

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