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Saudi Special Education Teachers' Attitudes Toward The Cognitive, Psychological, And Technological Criteria For Applying Ipad Application In Teaching Students With Asd

Mashael Abdulrahman Alshaer
Indiana State University

SAUDI SPECIAL EDUCATION TEACHERS' ATTITUDES TOWARD THE COGNITIVE, PSYCHOLOGICAL, AND TECHNOLOGICAL CRITERIA FOR APPLYING iPAD APPLICATION IN TEACHING STUDENTS WITH ASD

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Mashael Abdulrahman Alshaer

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VITA

Mashael Abdulrahman Alshaer

EDUCATION

2018	Indiana State University, Terre Haute, Indiana Ph.D. in Curriculum Instruction and Media Technology
2013	Indiana State University, Terre Haute, Indiana M.S in Special Education
2005	King Saud University, Riyadh, Saudi Arabia B.A in Special Education

TEACHING AND ADMINISTRATIVE APPOINTMENTS

2013–Present	Indiana State University Vice-President of the Saudi Students Club
2007–2009	King Saud University Instructor
2006–2007	Autism Academy Assistant teacher

CONFERENCES

2017	Hawaii International Conference of Education
2015	International Conference on Social Science, Language, and Education

MEMBERSHIPS

Honor Society Organization

Saudi Students Association

COMMITTEE MEMBERS

Committee Chair: Noble Corey, Ph.D.

Professor, Department of Teaching and Learning

Indiana State University

Committee Co-Chair: Rebecca Hinshaw, Ph.D.

Associate Professor, Department of Teaching and Learning

Indiana State University

Committee Member: Susan Kiger, Ph.D.

Professor, Department of Teaching and Learning

Indiana State University

ABSTRACT

This research was conducted to present Saudi special education teachers' attitudes toward the cognitive, psychological, and technological criteria for applying iPad applications in teaching students with ASD. Saudi Arabia's Ministry of Education (2016) confirmed in rule 54-75 and order 188-194 of the Special Education Law that institutions and programs of special education at public and private schools should implement the use of technology and computer software for educational objectives. This research discusses findings regarding using iPad software as assistive technology for students with ASD. This study further attempts to understand how the government can build on the preparedness of teachers towards undertaking teaching practices for these students with ASD. This study was a quantitative study; a Likert-type questionnaire was developed based on previous literatures. A total of 242 special education teachers were surveyed in Riyadh, Saudi Arabia, to examine their attitudes toward the software's criteria. The study examined the participants' demographic characteristics and the null hypothesis by descriptive analysis, and inferential statistics further analyzed the responses through the use of SPSS. The results are reported in terms of percentages, frequencies, means, and standard deviations. This study identifies significant differences in teachers' attitudes based on their gender, academic qualification, years of teaching experience, and school's type. Implications and recommendations for future studies are provided based on the results.

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CHAPTER 1

INTRODUCTION

The effectiveness of teachers in the teaching profession lies in their preparedness to teach students, which is the greatest predictor of their effectiveness regarding the best education services offered to pupils (Cannella-Malone, Konrad, & Pennington, 2015). Teachers' belief in their preparedness is defined as the capacity to successfully perform their tasks with little or no supervision at all (Ruppar, Neeper, & Dalsen, 2016). Ruppar et al. (2016) noted that the strongest indicator in providing quality teaching services to students, is in the training the teachers have received. The beliefs of teachers to offer the best quality teaching opportunities for students are important, especially when dealing with students with autism spectrum disorder (ASD) in a classroom environment (Stevenson, Jarred, Hinchcliffe, & Roberts, 2015). A student's progress is reflected in the weakness of an unqualified teacher's beliefs or outcomes. Assistive technology has quickly become a significant part of special education services. Teachers who are unaware of how to apply this technology in their teaching might see teaching outcomes affected.

Learning with ASD

ASD is a neurodevelopmental disorder that features persistent deficits in social communication and relations, as well as repetitive patterns of character, activities, and

interests (Yingna et al., 2016). According to Yinga et al. (2016), the overall predominance of the disorder is 0.62%, while the present frequency estimated in the United States shifts to as high as 1.4 %. One primary concern of the disorder is that it requires significant financial investments from the government, ranging from the provision of essential learning materials and well-equipped teachers, to the providing of mental health facilities to students who are severely affected. Although interventions that can help reduce the severity of the condition are currently available, these interventions may not be as effective when used at a later phase of development. Specifically, when these interventions are applied at an early stage of development, they can lead to advance social interaction and communication, as well as increased IQ scores (Yingna et al., 2016).

Low development of language and the ability to communicate at a young age are often the first common symptoms that parents of children with ASD notice (Yingna et al., 2016). According to Dykstra-Steinbrenner and Watson (2015), parents of children with ASD have observed frequent differences in communication approaches with their children, especially during a social function. The authors also asserted that the communication impairment of the students with ASD co-occur with a qualitative anomaly of social interaction and communication. Repetitive behavior is also a common symptom among these students, especially when trying to learn some of the things that general education children tend to take a much shorter time to master (Dykstra-Steinbrenner & Watson, 2015).

According to a study by Arciuli and Brock (2014), three categories of children with ASD disorder are present: high-functioning, limited skills in language, and

nonverbal. Dykstra-Steinbrenner and Watson (2015) noted that the signs in children with ASD entail one common barrier to the social life of an individual: impaired communication and language skills. Children with ASD having impaired communication and language skills have difficulties in communicating with their parents, other adults, and/or classmates in the classroom setting (Dykstra & Watson, 2015). However, Dykstra and Watson (2015) pointed out that higher-functioning children with ASD demonstrate proper language use at appropriate ages. Additionally, speech studies have revealed that all children who exhibit symptoms of ASD have a greater challenge with grammar, turn taking, and providing information—compared to peers without ASD, individuals with ASD often have problems in their social life (Arciuli & Brock, 2014).

Special Education in Saudi Arabia

Children with disabilities have the right to access education wherever they are, so the governments of various states have instituted policies to help these groups attain high-quality knowledge (Molina & Demchak, 2016). Saudi Arabia is not an exception to these educational developments that have an economic and political impact on the growth of the nation. Like other countries of the world, Saudi Arabia has established special education programs to support these children in getting the required standards of education despite their disabilities.

The education system in the kingdom of Saudi Arabia has been established since the kingdom was founded in 1932 (Alquraini, 2011). The education system in Saudi Arabia is directed by the Ministry of Education. The Ministry's functions are to provide all students, including students with disabilities, a free and appropriate education as well as promoting literacy in adult education (Ministry of Education, 2017). The Ministry of

Education (2017) is also responsible for developing and providing curricula based on Islamic beliefs. Moreover, the Ministry is responsible for founding new schools and restoration of old schools.

The education system that the Ministry of Education promotes, also includes special education services for students with disabilities. Students found eligible, are entitled to special needs services to help the students live independent and safe lives (Alquraini, 2011). Alquraini (2011) mentioned that special education services started in 1962, and they were limited to certain disabilities like blindness, deafness, and mental retardation. Then, in the late 1980s, regulations were established to improve special education services and guarantee rights for people with disabilities (Alquraini, 2011).

Three main laws exist in the special needs field in Saudi Arabia. The first one is Legislation of Disabilities and it was established in 1987 (Ministry of Health Care, 2017). It asserts important provisions to guarantee equal rights in life for citizens with disabilities in the society. The Ministry of Health Care (2017) also stated that this first law is comprised of articles that gives definitions for disabilities and defines special programs and assessments. It also contains the diagnosing, prevention, intervention, and procedures for the eligibility of special education services (Ministry of Health Care, 2017).

The second law is Disability Code (Ministry of Health Care, 2017). According to Alquraini (2011), the Prince Salman Center for Disability Research recognized the passing of the law, Disability Code, by the Saudi government in 2000. This code is to guarantee people with disabilities free access to the services they need. The services include medical care, physical care, psychological care, social care, or educational and

rehabilitation services (Ministry of Health Care, 2017). This law also requires assistance from public agencies to eligible people including welfare, habilitation, training and rehabilitation, employment, and other areas to support people with disabilities to live independently (Ministry of Health Care, 2017).

The third special needs law in Saudi Arabia is the Regulation of Special Education Programs and Institutes (RSEPI). Some experts from King Saud University, who have their diplomas from the United States in special education, in cooperation with the Directorate General of Special Education, established and introduced this law in 2001. According to Alquraini (2011), this law was modeled on the United States' special education policies like the Education for All Handicapped Children Act and Individuals with Disabilities Education Act. The RSEPI defines categories of students, as well as defining the appropriate and free services, including the assessments and evaluation, the Individualized Education Program (IEP), elements of IEP, and the professional team who plan and provide the IEP (Alquraini, 2011). Thus, RSEPI ensures quality special education services that are appropriate for students with disabilities, and requires schools to provide the services in their policies (Alquraini, 2011). Some students and pupils with disabilities in Saudi Arabia attend special education schools to obtain education and daily life skills that are essential for their wellness. The efforts made by the government are to reduce the isolation and stigmatization of students with disabilities.

According to Alquraini (2011), all the policies were made to support equal rights to a free and appropriate education for students with disabilities. The law was established many years ago to ensure quality services in special education; unfortunately, it is not completely practiced in the real world (Alquraini, 2011). A gap exists between the law

framework and the services provided because of the lack of effective implementation (Alquraini, 2011). Furthermore, Alruwaili (2016) mentioned in his research that a weakness exists in the delivery of the special education services, resulting in the prevention of achieving the desirable results of these services. Alruwaili also recommended to the Ministry of Education in Saudi Arabia to consider services such as teacher training, parent involvement, special education curriculum, assessments, and providing programming in all regions. The special education curriculum is supported by assistive technology for students with disabilities (Alruwaili, 2016). Assistive technology can help disabled individuals achieve a better quality of life and education. Alruwaili declared in his study that the government should provide schools with assistive technology tools and models of the assessments and evaluations. Alruwaili also added that the government should provide suitable training for the teachers to develop their technological skills.

Despite the government providing essential programs to help the disabled to attain an education, the teachers' perceptions of their readiness to teach, can also be a conflicting factor with these efforts. Saudi Arabia's special education system recognized a need for a professional development program to prepare teachers to teach special education students in both general and special education schools, and to train them on special education curriculum in general and in using assistive technology in teaching students with disabilities in specific. To apply the special education law appropriately, well-trained teachers had to be included in the plan. The Ministry of Education needed to offer training and workshops for all teachers to train them on the special education curriculum and on appropriate assistive technology usage. For this cause, National

Center for Assessment set special education teachers' standards to raise teachers' qualification (National Center for Assessment, 2017).

The technological and economic development that happened in Saudi Arabia required changes in schools and institutes' goals. Teachers' roles needed to shift beyond initiation to becoming more effective and helpful in teaching the knowledge and skills needed in real life. Teachers needed to prepare students to face the changes in society. Teachers' roles carried more responsibility than before; thus, King Abdullah's Project in Education Development, in collaboration with the Ministry of Education, created the special education standards for teachers in 2014 (Ministry of Education, 2017). This project covered much of the criteria teachers should master to pass the special education teachers' test, whether these teachers teach in public or private special education schools. The criteria teachers are evaluated on include having knowledge in special education concepts, growth characteristics, curriculum instruction, assessments and evaluation, IEPs, alternative services, behavior modifications, and life skills teaching technique (National Center for Assessment, 2017). However, the criteria set as special education teachers' standards did not include the teachers' knowledge in technology.

Unlike before, special education teacher standards are targeting teachers who hold at least a bachelor's degree in special education. Those teachers must be eligible to meet the Ministry standards to be able to enroll as a special education teacher both in public and private schools. King Saud University (2017) pointed out that college students who are studying special education do not have requirement courses in technology assistive applications in their bachelor's program. Only an introduction to computers course is available as a foundation to technology (King Saud University, 2017). The university

also offers an educational aids course available for special education students, yet it focuses on using materials like boards, reinforcement tables, and games to support the teaching. There is not specific training for special education teacher on how to use assistive technology in their teaching (King Saud University, 2017).

Special Education Law in Using Technology

Communication is an important skill used by both teachers and students (Turaga, 2016). This skill allows an individual to communicate their thoughts, feelings, ideas, and understand other people. Successful peer communication in the school setting allows students with disabilities and their non-disabled classmates, to understand each other. A productive exchange of ideas in the academic environment permits better performance between the teacher and the student. Therefore, educators and students need communication as a tool to accomplish learning and training objectives set by both the teachers and students. Dell, Newton, and Petroff (2016) suggested teaching students with disabilities should combine the use of technology aids to help the students communicate well. The Individuals with Disabilities Education Act ([IDEA], 2004) developed the assistive technology mandate. The mandate consists of two major segments: assistive technology devices and assistive technology services.

According to the 2004 IDEA law, the definition of assistive technology device is "Any item, piece of equipment or product system, whether acquired commercially off the shelf, modified, or customized, that is used to increase, maintain, or improve the functional capabilities of children with disabilities" (Dell, Newton, & Petroff, 2016, p. 4). These devices are utilized to improve, maintain, and increase the capacity of a child with a disorder. An assistive technology device must, therefore, have an impact on the life of

the child by taking advantage of the child's inability to help them learn. These devices may vary from low-tech to high-tech. These instruments are classifiable according to the functions and the need of the students. Low-tech devices can be as simple as pencil grips on pencils which are used by the students to improve their fine motor controls of the pencil. High-tech devices include desktop computers and tablets. The high-tech devices are more sophisticated in their use; as a result, they call for adequate training on the part of the teachers and the students to make proper use of devices. Providing the assistive technology devices in schools is not enough without offering technical support to the students and teachers.

The use of technology in the learning environment has brought tremendous impact on the education of children with disabilities (Dell et al., 2016). However, special education teachers must be adequately trained to properly assess the child with a disability for assistive technology. Teachers have to select the device that best suits the child, which may require modifying the device to meet the needs of the learner as well as teaching the students how to utilize the services and applications. The teacher also has the responsibility of educating the family of the child with disability on how they can help the child use the devices while at home (Dell et al., 2016).

Teacher Efficiency

Efficiency is a measure of the amount of human resources needed to meet the objectives (Baldiris Navarro, Zervas, Fabregat Gesa, & Sampson, 2016). Assistive technology devices are technical in nature; therefore, without proper training of teachers, these devices cannot help the students to acquire knowledge. For instance, using high-tech devices such as computers, software, and tablets are challenging among most pre-

secondary school teachers. Operating these devices requires well-trained, competent, and qualified staff in order to meet the educational needs of students. As a result, teachers must know how to match the most appropriate assistive technology with their students. Furthermore, teachers must understand the capacities of these students, as well as appreciate the appropriate assistive technology that will best address the disability to enhance the students' learning (Dell et al., 2016).

However, some teachers may have complications when using these devices due to inexperience and unpreparedness. Some of these challenges may also be present during the use of assistive technology devices in the classroom setting. A report from the National Council on Teacher Quality (2011) noted a teacher's efficiency or effectiveness is one of the greatest factors that influences learning in schools. Like any other profession, efficacy and quality of training have a tremendous effect on how well the teacher performs during the teaching process. The only way to ensure that the learning process has achieved its role is by providing adequate professional development training to prepare these teachers to meet the challenges associated with the teaching of these students.

Problem Statement

Technology application is essential in the education sector and in particular, when teaching students with ASD. Saudi Arabia's Ministry of Education (2016) confirmed in rule 54-75 and order 188-194 of the Special Education Law that institutions and programs of special education at public and private schools should implement the use of technology and computer software for the educational objectives such as the organization of work and documentation of information, data, and assessment outcomes. Computers

and tablets (iPads in specific) are distributed in Saudi school to meet this law. Therefore, in my study, I am focusing on iPads' software. Through extensive reading on special education in Saudi Arabia, it appears that insufficient studies or laws address teachers' effectiveness concerning the use of iPads' software to educate children with ASD (Boer, Pijl, Minnaert, & Post, 2014). Assistive technology devices and assistive technology services must be included in the rights of students with ASD. However, by looking toward the special education standards in accepting special education teachers and in special education programs at universities, no standards or courses for a teacher's efficiency exist in using technology to teach special education students.

Purpose of the Research

The purpose of this study was to discover teachers' attitudes towards iPad communication software for the students with ASD in Saudi Arabia. This study attempts to understand how the government can build on the preparedness of teachers towards undertaking teaching practices for these students with special needs. The study also aims to find the willingness of these teachers towards the use of technology in the education of children with ASD. All students are entitled to an education irrespective of their abilities or race. According to the Ministry of Education (2017), Saudi Arabia has laws concerning special needs students' education, students with ASD have the right to an appropriate education; therefore, the government guarantees them technology development to enhance their learning ability. However, due to inadequate research concerning special education in Saudi Arabia, teachers in these institutions apply limited technology to instruct their students with ASD. Although special education services exist, they lack the occupational application (Alquraini, 2011). The government should

encourage studies about applications of advanced technology in the education system for the students with ASD.

In order to obtain the information regarding the use of technology by the teachers, a survey questionnaire was undertaken to ask the special education teachers in Saudi Arabia about the use and selection of iPad applications. It questioned the extent the teachers are aware of the cognitive, psychological, and technological criteria in selecting the applications. The survey questionnaire was designed to find out factual information concerning the background knowledge and biographical information.

The investigation was designed to understand the Saudi Arabian special education teachers' awareness in choosing and using communication programs of iPads as an assistive technology device for students with ASD to enhance their communication skills. Findings from this study provide an understanding of how to incorporate smoothly current technological advancements into the classroom to improve the teaching process of students with ASD. Also, the current study will be helpful as an academic resource for future revision of the special education standards for teachers in the technology aspect by the Saudi Ministry of Education.

Objectives of the Study

- To determine the level of preparedness of special education teachers to accept this teaching practice.
- To find the appropriate means of training special education teachers to use technologies such as iPads to help the students achieve the goals set for them.
- To establish if there is need for improved technology in the teaching of students with ASD.

- Establish the perceived level of efficiency teachers hold with regard to the use of technology.
- To appreciate the factors influencing the use of assistive technology to help the teachers and students to realize the objective of learning.
- To provide conclusions and recommendations based on the key findings for future study on this area of teaching students with ASD in Saudi Arabia.

Research Questions

1. Among special education teachers in Saudi Arabia, what levels of agreement are held regarding the technical criteria to select and use software applications on the iPad to teach children with ASD?
2. Among special education teachers in Saudi Arabia, what levels of agreement are held regarding the psychological criteria to select and use software applications on the iPads to teach children with ASD?
3. Among special education teachers in Saudi Arabia, what levels of agreement are held regarding the cognitive criteria to select and use software applications on the iPad to teach children with ASD
4. Among special education teachers in Saudi Arabia, is there a significant correlation between educational level and any of the three forms of criteria—cognitive, psychological, and technical?
5. Among special education teachers in Saudi Arabia, is there a significant correlation between years of experiences and any of the three forms of criteria—cognitive, psychological, and technical?

6. Among special education teachers in Saudi Arabia, is there a significant correlation between gender and any of the three forms of criteria—cognitive, psychological, and technical?
7. Among special education teachers in Saudi Arabia, is there a significant correlation between private or public schools and any of the three forms of criteria—cognitive, psychological, and technical?

Research Question Analysis and Null Hypotheses

Questions 1–3 will be addressed through descriptive statistics.

Question 4: $H_0$1. There is no relationship between educational level and any of the three forms of criteria—cognitive, psychological, and technical

Question 5: $H_0$2. There is no relationship between years of experiences and any of the three forms of criteria—cognitive, psychological, and technical

Question 6: $H_0$3. There is no relationship between gender and any of the three forms of criteria—cognitive, psychological, and technical

Question 7: $H_0$4. There is no relationship between private or public schools and any of the three forms of criteria—cognitive, psychological, and technical

Significance of the Study

The outcome of this analysis will strengthen the base knowledge of special education field. The selection of appropriate communication programs on iPads may help in enhancing the communication skills of the students with ASD. It is fortunate that the Saudi Ministry of Education provides remarkable financial supports to special education schools. The special education schools can request new technology aids and suitable assistive devices for each student in need. As a former teacher's assistant, I

noticed that special education schools in Saudi Arabia have many technology devices that help in developing students' skills and education. Some of these devices are special for severe cases and are not in common use on a regular basis; thus, training in operation and application is needed. Students with disabilities in general and students with ASD in specific, can benefit from the provided technology that the Ministry affords, if the implementation of this technology is precise. Thus, teachers' training on selecting and using technology will complete the goal of effectively using technology in special education classroom. Moreover, technology such as software for iPads has a significant impact on the training process of a child. However, not every piece of technology used will be helpful to every person, including individuals with ASD. Consequently, selection of suitable programs for teaching and learning is important, particularly for students with special needs. It is important that the process of selection of these assistive technologies requires teachers to have basic knowledge of how to select, use, and apply these iPad programs to a particular scenario in the classroom. The study will also reveal the criteria that teachers can use to select the best iPad programs that can help improve the students' education.

Definition of Terms

Autism spectrum disorder (ASD) is defined as "a group of complex disorders of brain development. These disorders are characterized, in varying degrees, by difficulties in social interaction, verbal and nonverbal communication and repetitive behaviors" (Autism Speaks, 2010, p. 1).

An *iPad* is one of the most well-known tablet computers made by Apple. iPads are versatile in use as they are handheld and operated through the use of touching the screen rather a typical keyboard.

Lemely (2005) defined *application software* as " programs designed to perform specific tasks for users. Application software can be used as a productivity/business tool; to assist with graphics and multimedia projects; to support home, personal, and educational activities; and to facilitate communications" (para. 2). Applications, known as apps, can be purchased or downloaded free from an online store.

The Saudi *Ministry of Education* is a government department responsible of education in Saudi Arabia.

Special education schools and institutes are established places for students with disabilities. Some are called schools while other institutes. However, institutes focus more on one disability (e.g., institutes for blindness; institutes for ASD).

CHAPTER 2

LITERATURE REVIEW

This chapter will discuss teachers' attitudes towards using iPads application software to teach students with ASD. The chapter starts with the introduction, then the importance and benefit of technology in general education, teaching students with ASD, and ends with the importance of training teachers on technology usage in classrooms.

Importance of Technology in Education

Globally, education has to be asserted as a basic need for all students regardless of their health and well-being. According to Amer and his colleagues, United Nations stated that all children are guaranteed the right to an education whether they are physically fit, physically disabled, or mentally disabled. Quality education should be a right to every child in any country. Effective communication among children and their parents is essential at all levels, and for children with disabilities, technology can be used to support communication efforts (Amr et al., 2012). Al-Salehi, Al-Hifthy, and Ghaziuddin (2009) stated that technology advancements in the education sector have been utilized by many nations in teaching students with disabilities, including those with ASD. They explained that ASD is neurological and is associated with impairment in social interaction, verbal and non-verbal communication, as well as restrictive and repetitive behavior. Students with ASD usually encounter difficulties in communicating

with their peers, teachers, and parents. Thus, technology advancement should be used to teach all students with ASD irrespective of their sex, gender, race, or religion. Al-Salehi et al. (2009) added that discrimination of students with ASD has led to poor performance of the students due to lack of acceptance. They noted that students with ASD also face difficulty at times in their academic processes, so education stakeholders should adopt the use of technology in teaching students with ASD throughout their education.

Technology application and usage in education have led to a greater impact on students by allowing monitoring and evaluating to be more efficient. Technology advancements in both private and public schools, are improving both the teaching and learning. Technology has been integrated into classrooms with electronic devices such as computers, iPods, and tablets. The electronic devices have allowed continuous access to learning materials for students, increased their interaction and collaboration among themselves and teachers, and enhanced their skills, knowledge, and their critical thinking abilities (Lord, Cook, Leventhal, & Amaral, 2013).

Technology advancement in educational curriculum is supported by IDEA law, which is established the assistive technology law consisting of two main parts: assistive technology devices and assistive technology services (Turnbull, Huerta, & Stowe, 2008). The integration of technology into classrooms has enhanced diversity in the education sector and improved the interaction of the students with their classmates by fostering effective collaboration and teamwork. Teachers help prepare students by promoting the importance of technology and innovation, thus making students ready for solving global problems in the future (Amr et al., 2012).

Similarly, students with ASD need to enjoy the advancements in technology just like their counterparts since they face more challenges in their daily interaction with others. Communication and social interaction of students with ASD have raised concerns, and the Ministry of Education is exploring effective ways on how to use technology to teach students with ASD (Lenker & Paquet, 2003). Al-Salehi et al. (2009) mentioned that teachers' attitudes play a vital role in how students with all disabilities learn. The moral values of the teachers, as well as their attitudes, should guide them in their daily work. They also noted that the importance of technology in education is diverse when compared to the old system of education. Unlike earlier days where parents had to spend a lot of money in buying books for their children, technology and innovation advancement has made the availability of books online. Students can access online books from sites such as Amazon and other sites that provide books free of charge. Relevant information in education is now being displayed in the form of images: YouTube clips, videos, and Kindles. Online flash cards are also utilized in the education sector, as well as other software that can be installed in the devices (Al-Salehi et al., 2009).

Integration of technology into classrooms has been considered as one of the ways toward solving global problems and challenges. Effective integration of technology in the classroom enhances the learning process in schools, and through the process, students can connect with different experts from different fields. The integration of technology with the curricular goals has made teaching easier for all teachers. Teachers can monitor and evaluate the progress of the students. Subjects such as science and mathematics have been made easier. Students can study experiments and observe the actual phenomenon, in

reality, allowing students to become great thinkers, ready to solve different problems (Lenker & Paquet, 2003).

Innovation has likewise extended many opportunities for communication and collaboration. Traditionally, classrooms used to be moderately segregated, and collaboration used to be constrained to students in a similar classroom or schools. Today, technology and innovation empower communication and collaboration as compared to the olden days. Students in a class from the rural areas of the United States can get relevant information and study about continents such as Asia, Europe, Africa, and the Arctic. Students are now able to share whatever they are learning with other students globally and among students from different areas. The barriers to education have been removed, and learning has been made accessible through the use of technology and innovation, thereby enhancing effective communication, collaboration, and extensive networking among students (Blischak & Schlosser, 2003).

Technology and innovation have started to change the roles, responsibilities, and duties of both the teachers and the students. Teachers can prepare their notes, share the notes with the students through emails, post the notes on the social media, and open platforms where students share their views on different topics. Higher learning institutions like universities and colleges have online learning platforms whereby different courses are offered through e-learning or distance learning. Technology advancements at higher learning institutions have made learning easier for those students who are working and studying (Lord, Cook, Leventhal, & Amaral, 2000).

Technology helps prepare students for their future careers. Many students can identify and realize their talents and abilities through technology. Technology enables

students to learn more on the Internet and apply the knowledge in their real lives. Students can learn things like arts, comedy, animation, football, basketball, information and technology, music, and much more. The talents of the students can be improved as they identify their area of interest at a young age and as they transition into their careers in the future. Students can access the latest information quickly with the advancements in technology as the teacher role transitions into one that is more aligned to advising and coaching students (Blischak & Schlosser, 2003).

The task of carrying books while going to school has been reduced through the implementation of technology in schools. Digital learning has also made education accessible to all students globally. Students are now able to carry their laptops, smartphones, and tablets. Technology has made learning easier in private and public schools across the world. Learning in classes has been made exciting as students can share various challenges with their colleagues and teachers as well. The interactive approaches created by technology make students more diverse and well informed. The relationship between teachers and students is enhanced with more student participation in learning activities (Murdock, Ganz, & Crittendon, 2013).

Technology and innovation in education have made it possible to achieve the desired goals and objectives. Stakeholders in education can embrace the use of technology with more research being done to ensure that all students, irrespective of their status, have accessibility to technology. Students with disabilities deserve equal rights to the usage of technology and teachers have bigger roles to play in ensuring equity (Blischak & Schlosser, 2003).

However, according to Lord et al. (2000), the usability of the technology design determines the success of the innovation. The electronic devices should be easier to use with better integration of the technology in the learning process. Students with disabilities tend to need more attention so the use of technology in teaching disabled students assists in making their learning easier. More efforts have been put on students with disabilities. Educational researchers and developers should train teachers on better methods of teaching. Teachers' attitudes play a vital role in teaching students with disabilities. Students with ASD have difficulties in communication and interaction with others, creating a need for active learning devices such as iPads in teaching students with ASD. Technology can increase the competency of both the instructor and the students when applied in the learning environment in the best and appropriate means. Another notable advantage of assistive technology in the learning environment is motivation. The education community can become motivated as educational goals are realized (Lord et al., 2000).

Teaching Students with ASD

According to Lord et al. (2000), students with ASD face numerous challenges, including communication. ASD disorder can be defined as a neurodevelopmental disorder that features the persistent deficits in the social communication and relations, as well as repetitive patterns of character, activities, and interests. The disorder affects individuals in varying degrees, ranging from difficulties in social interaction, nonverbal and verbal communication, as well as repetitive behaviors. The disorder may have additional conditions associated with it including anxiety, depression, epilepsy, sleeping problems, low IQ, speech and language disorders, or complications with fine and gross

motor skills. ASD disorder is a lifelong developmental disability that averts students from understanding the things they see, hear, or even sense.

Individuals with ASD can have social communication difficulties, with some having serious social problems with social relationship and interaction, communication, and social behavior. Neurologically, ASD affects the functionality of the brain, yet, teaching students with ASD is similar to teaching other students with disabilities. The teacher should be guided by moral behavior, positive attitude, and passion. According to Lord et al. (2013) teachers of students with ASD should be aware of the following in their students:

- Communication characteristics
- Social behavior and interaction
- Unusual and strange behavior
- Difficulties in learning
- Lack and changes in attention
- Weak response or quick response to sensory stimuli
- Anxiety

Individuals with ASD have challenges in communication. Teachers of students with ASD must be able to identify various changes in communication. Different human beings have different and unique language abilities. Individuals with ASD have difficulty in communication and pragmatics (Lord et al., 2013). ASD is associated with numerous language problems that teachers should identify:

- Difficulty in non-verbal communication
- Problems in verbal communication

- Inability to communicate entirely
- Inappropriate facial expression
- Lacking or no eye contact
- Strange body exposure
- Inadequate attention. (Lord et al., 2013, p. 218)

ASD brings about behavioral challenges as well. Teachers should be careful in identifying these unique behaviors in their students:

- Delay or lack of expression of language skills
- Unusual stress
- Change in voice quality or monotone
- Repetitive or idiosyncratic patterns in speech
- Echolalia, immediate or delayed response to others
- Cognitive problems
- Difficulties in pronouncing words
- Initiating communication problems
- Inability to maintain the conversation of a given topic
- Stereotypic language. (Lord et al., 2013, p. 2018)

Students with ASD may have other challenges and pressure when comprehending verbal information, complex instruction, and remembering the instruction sequence. Teachers of students with ASD need effective programs and interventions. The teachers should be well-trained and led by intrinsic motivation rather than salaries. Effective programs should be in place for students with severe or pervasive developmental

disorders, including ASD. The teaching programs need continuous assessment and intervention. (Lord et al., 2013).

Speech language pathologists should be an educational support for teaching students with ASD. They can participate in the evaluation of the students and conduct classroom-based observations. Assessments done by the special education teacher should identify the goals and objectives of the curriculum. With the support of the speech language pathologist, special education teachers can develop receptive and pragmatic language skill goals. Teachers should develop receptive language and artistic skills among the students in line with the pragmatic skills. The special education teachers of students with ASD need to pay greater attention to the use of effective language to promote social interaction. The primary objective of communication goals is to emphasize on the functional use of language and effective communication in various aspects and settings (Murdock et al., 2013).

Teaching students with ASD requires a positive attitude and simple, concrete language. The language employed by the teacher matters a lot. Teachers need to use task analysis by planning their activities in a sequential order. ASD teachers should avoid giving lengthy instructions to the students (Lord et al., 2013). Teaching students social rules and skills should be encouraged by the teacher. Students with ASD may excel in the area of arts, such as drawing, painting, and computer programming. In teaching these areas, attention should be given in the practical applications of skills rather than theories. The use of concrete visual methods should be embraced when teaching different concepts. The use of computers in typing helps students with ASD since many of them have poor handwritings caused by anxiety while writing. Teachers should use computers,

tablets, and/or smartphones in teaching students with ASD. The use of technology is efficient and effective in promoting the communication skills of the students (Howlin, 2006).

Lenker and Paquet (2003) pointed out how teachers should avoid the use of sarcasm or irony while teaching the students. Students with ASD might be tempted to use the same words to their peers in the classroom or any other place. Giving clear choices that are open-ended will make the students more comfortable in the class. Repeating what is taught in class is imperative; thus, a daily routine for the students is critical. Using presentations when teaching the students with ASD helps them understand things better. Teachers should use pictures, images, and PowerPoint presentations in order to have more effective teaching. Images are considered the first language of ASD students. The use of videotapes helps the memory of the students. Students can remember the images they see and apply the concept in their daily lives. Moreover, Teachers should make students with ASD safe. Students need protection from sounds that may affect their hearing and may increase their disturbance. Such sounds include bells and microphone feedback from the public addresses among other things that may cause hearing problems. The teachers should also support the positive behaviors and sensory needs of the students by providing the appropriate learning experience with less discomfort feeling for the students (Lenker & Paquet, 2003).

Communication includes an expansive scope of difficulties for people with ASD and includes taking-in information, processing, verbal presentation, reading skills and writing. Usage of the non-verbal cues, body language, intonation, interpretation, and subtle intent are among the problems encountered by the students with ASD. Since all

students who have ASD have communication problems and social deficits, their teachers should be guided by a speech pathologist in their learning programs. The pathologist should guide the teacher by helping with the preparation of lessons, planning, advice on best mode of communication, and help in sign language through the use of picture exchange communications system (PECS), and other augmentative devices. For younger students without language, the speech pathologist ought to help with planning arrangements for substitute methods of correspondence, for example, PECS or augmentative gadgets. Students with emerging language, expressive language problems, pragmatics issues, and conversation reciprocity will need more attention (Lenker & Paquet, 2003).

Speech pathologists are instrumental in driving the social and communication segments of cooperation in students with ASD. Notwithstanding, the improvement of relational abilities in an understudy with a mental imbalance cannot be the sole obligation of the speech pathologist. Correspondence on needs, and also social interactions, happens for the duration of the day, and all school professionals will provide supports. The speech pathologist is supposed to work together with teachers in improving the social lives of the people and their language. However, development of communication skills in students with ASD is not only the responsibility of the speech pathologist and teachers, but also the entire management of the school as well as the communities.

Technology advancement in teaching students with ASD is the greatest achievement and innovative measure for all students with the disorder. The use of computers in teaching students with ASD has numerous strengths, including enhancing communication, learning, and diverse instruction (Lenker & Paquet, 2003). The

innovation of the iPad in teaching students with ASD has led to numerous opportunities including improving the communication skills of the students, cognitive expertise, and motor skills. The need for integrating technology for students with ASD is due in part to the complexity of learning, communication, behavior, and social skills. For students with limited speech abilities, technology in teaching these students has been enhanced by alternative and augmentative communication (AAC) applications on the iPads. The AAC applications on iPads have symbols, signs, images, and pictures. Teachers should enhance the use of technology in strategic planning and implementation the AAC applications and other applications on the iPads (Lenker & Paquet, 2003).

Technology advancements in teaching students with ASD using devices such as iPads have made it easier for students to study. iPads are portable and very flexible when compared to laptops. The touchscreen enables students to have easy accessibility to information through tapping and sliding. This portability makes it easier for students to move from one place to the other. The customization of iPads makes it easy for students to interact with the iPad smoothly and efficiently. Communication between the students and teachers has also been greatly improved (Howlin, 2006).

Applications can help organize, predict, and make it easier to access and break down different concepts. Students with ASD can feel a level of independence and leisure when they use the iPads. However, despite the benefits of using iPads among students, the cost of the device is very high, and many parents of students with ASD cannot afford to have an iPad. Luckily, non-governmental organizations such as the Autism Spectrum Disorder Foundation (ASDF) have made it possible for students with ASD to study using iPads. ASDF donates iPads to many students with the disorder (Al-Salehi et al., 2009).

In the social policy report, Lord and Bishop (2010) stated that the increasing number of people with ASD, the move in instructive ideal models, and the technology advancements that permit moderateness and openness were the inspiration driving various studies. Students with ASD can create social and enthusiastic aptitudes, and also expand inspiration for learning while utilizing technology, specifically tablets like the iPads as instructional devices. Once viewed as uncommon, ASD is currently accepted to be the most widely recognized and most burdensome of youth disorder. The primary symptoms of ASD that is different from other disorders lies in the different social development which impacts their scholarly execution, conduct, and social and family connections. General support in activities is one such social aptitude that can be particularly troublesome for kids with ASD (Lord & Bishop, 2010).

Frith and Happé (2005) stated that instructive laws, technology advances, and access to technology in the classroom are giving a large number of students an opportunity to achieve enhanced learning results. The high increase of students with ASD raises a major concern to the education sector. Frith and Happé (2005) argued that more support from legislations such as IDEA, No Child Left Behind Act, section 504 of the Rehabilitation Act, American with Disability Act, and Assistive Technology empowered more students with ASD (Frith & Happé, 2005).

Turnbull et al., 2008 mentioned that Individuals with Disabilities Education Act supported assistive technology as helping a person with ASD in decision-making, securing, or utilization of an assistive technology gadget with the end goal of expanding personal satisfaction. Also, the advancement in Internet and other instructional tools, as well as other technological devices, have enhanced communication skills in students with

ASD (Turnbull et al., 2004). Many studies ascertained that people with ASD seem to have a characteristic proclivity for computers and the controlled environment given by technology apparatuses. Different studies from backing associations examined focus and found that technology can enhance social communications for the students and empower grown-ups to interact more with them (Frith & Happé, 2005).

The innovation in tablets such as iPads has made students with ASD more comfortable and happier with their education. Tablets make it easier for students to study, read, and draw numerous images. Tablet devices such as the iPad have opened up the universe of technology to the average classroom and have been instrumental in helping the most tested learners to peruse, talk, and associate. Tablets have turned out to be more than only an oddity for some students with ASD. Laws to guarantee all schools are accessible to people with disabilities were put in place after seeing the adjustments in the specialized curriculum. With regards to the non-disabled, the headways in technology are changing our view of what is unimaginable (Howlin, 2006).

ASD, a neurological issue affecting the working of the cerebrum, is turning out to be more prevalent than growth, diabetes, spinal issues, and cancer in children. It was once viewed as an uncommon adolescent issue connected with serious scholarly incapacities, the absence of social mindfulness, and nonappearance of significant expressive dialect. ASD has gone from being a dark condition to a recognizable finding since its introduction to the medical world more than 100 years ago. Many advances and characterization in the conclusion of ASD and related conditions, alongside a developing acknowledgment of the most extensive range of conditions identified with ASD, have occurred since the term was first defined (Cardon, 2012). Fischbach (2007) stated that

Leo Kanner presented the idea of child with ASD in 1943. Kanner, one of the foremost researchers of ASD, utilized the term ASD and alluded to it to depict children with passionate and social issues (Fischbach, 2007).

Fischbach (2007) stated that in 1944, Hans Asperger, a researcher from Germany, recognized a related condition in children referred to today as Asperger's. Children with Asperger's show formal dialect aptitudes, psychological capacities, and evident onset conditions that show later in life. By 1950, ASD was viewed as the child schizophrenia due to the trusted parent-child psychodynamics relationship (Fischbach, 2007).

According to Kenney (2011), technology development is one of the ongoing social movements that impacts special education. Additionally, over the past decade, an increase was seen in the variety of technology tools introduced in schools to improve teaching and motivate learners. Technology can be an assistive device to support an ability that is either missing or impaired for learners with learning disabilities ranging from cognitive problems to physical deficiencies. Without these assistive devices, students with disabilities may not receive the same quality of educational services provided to their peers (Kenney, 2011). As a result, assistive educational technology development has become a central discussion when tackling the challenges individuals with ASD encounter in specific and special needs individuals in general.

Assistive Technology

Assistive technology includes pieces of equipment that are used to enhance, maintain, and improve the functionality of people with disabilities. An assistive technology device is defined as any piece of equipment or product system that is used to increase efficiency, sustain, or improve functional capabilities of individuals with disabilities. It may be a high-tech or a relatively low-tech piece of equipment, ranging from a robotic therapist down to laminated picture cards (Lewis, 1998).

Assistive technology serves two primary objectives, the first being to counterbalance the effects of the disability by increasing the individual's strengths. Secondly, assistive technology can provide an alternative mode of performing; thus, allowing learners to compensate for the disability in the classrooms by potentially enhancing academic achievement in written expression, reading, mathematics, and spelling. Assistive technology integrated into academic curriculum has advanced significantly since 1997, along with effectiveness in the general education classroom, and the notion that education is central to improving the lives of people with learning disabilities (Aarons & Gittens, 1998).

Kogan, Blumberg, Schieve, Boyle, Perrin, Ghandour, & van Dyck, 2009 stated that assistive technology and innovation are auxiliary gadgets that are low-, medium-, or high-tech, which helps individuals with the cognitive, neurological, and physical disabilities to perform their daily tasks more efficiently. Assistive innovation incorporates both manual assistance, mechanical, and electrical gadgets such as dry-eradicate loads up, photograph collections, three-ring fasteners, recording devices, clocks, calculators, voice yield gadgets, scanners, advanced cameras, trackballs, augmentative

and elective communication gadgets, computers programming, reproductions, and virtual reality (Kogan et al., 2009). These can help a person with visual, hearing, intellectual, and physical incapacities achieve an errand that would somehow be unthinkable, significantly tedious, or troublesome without the tool. As stated by Lewis (1998), while trying to make a wide system of access to assistive technology for people who are elderly and those with inabilities, the Assistive Technology Act of 1998 was passed. The Act helps students with ASD in the following ways:

- Helps them better understand their environment
- Improves their social interaction
- Improves their communication skills
- Promotes and builds better attention skills
- Expands motivators
- Improves the organization's skills
- Keeps them in touch with the classroom curriculum
- Increases the independence to the students
- Builds self-confidence in the ASD students
- Makes learning entertaining and enjoying
- Improves the performance of the students (Lewis, 1998, p.16)

The act also subsidized state level projects and administrations that permitted people with inabilities to acquire assistive innovation tools. Confirmation-based intercessions are compelling systems to distinguish best practices for kids, guardians, and teachers with the quick progressions and expansion in innovation in the classroom. Particular practices describe a mental imbalance. Extremely introverted students

experience issues with social connection, show problems with verbal and nonverbal communication, and display dull practices or over the top interests. These practices can extend in effect from mellow to impairing (Cramer, Hirano, Tentori, Yeganyan, & Hayes, 2011).

A mental imbalance differs in its seriousness and may go unrecognized, particularly in somewhat influenced youngsters or when all the more weakening debilitations veil it. Researchers are not sure what causes a mental imbalance. However, it is probable that both hereditary qualities and environment assume a part. Mental imbalance does not have a cure. Treatments and behavioral intercessions are intended to cure particular side effects and can bring about generous change (Cramer et al., 2011).

Children with ASD are often the recipients of assistive technology, due to their learning and behavioral characteristics and the impact the handheld technology tools have on their communication and social skills (Mirenda, 2001).

The use of handheld technology has become widely accepted as part of the classroom-learning environment, as such devices are readily available to learners and teachers. The use of iPads have made learning possible among the individuals with ASD. iPads are not the first electronic devices used in special education in classrooms though. Special education experts have used a variety of visual software and tools for years to teach and supplement lessons in mathematics, reading, writing, organization, and memory with the use of handmade visual aids, expensive communication devices, and TVs. However, with the camera feature, teachers have more obvious options to offer the children (Kogan et al., 2009). For example, children can tap words and sentences on the screen for the specialized apps to voice them out, and they can take photos and videos

that can be personalized and modified. Moreover, children with poor fine-motor skills find the touch-screen design more friendly and easy to use as compared to desktops and laptops. Other advantages are their simplicity and the ease with which they can be customized essentially for all students with disabilities (Charman, 2008).

The ability for learners with ASD to use traditional speech-generating devices is well recognized. Limited scientific research exists on how students with ASD learn to use iPads to communicate. Recent reviews have confirmed that students with ASD and other developmental disabilities can be taught to use a range of speech generating devices, but only a small number of studies have looked at using tablet devices correctly. The accessibility features and availability of apps along with positive benefits of touch-screen apps make tablet devices particularly appropriate for children with ASD and with other mental and communicative challenges (Cardon, 2012).

Moreover, with the increase of iPad usage as a learning and communication tool for children with ASD, an app rating can provide guidance into selecting an app that has been scientifically tested and proven effective for children with ASD. Apps can be rated into three categories: anecdotal, research, and evidence. An app is identified as anecdotal when it has not been linked to any scientific research. The research category is when some related studies have been conducted, but direct support is lacking. The evidence type is when research illustrates concrete scientific evidence of its effectiveness (Kogan et al., 2009). Research also shows touchscreen apps and multi-touch displays enable individuals with ASD to learn and communicate in new ways. For instance, touchscreen apps strengthen the ability to communicate with learners with ASD by using their visual learning strength while multi-touch displays encourage social interactions and help

children practice social skills. For example, a four-player cooperative game was designed for children with ASD after discovering the positive impact the engagement had on the children (Cardon, 2012).

One of the common symptoms that parents will notice with their children having ASD is the low development of language and the ability to communicate at a young age (Yingna et al., 2016). Parents of the children with ASD observed frequent indifference in communication approach with their children, especially during a social function. Another significant symptom is the communication impairment of these students with ASD co-occurs with a qualitative anomaly of social interaction and communication. Repetitive behavior is also a common symptom among these pupils, especially when trying to learn some of the things that normal children tend to take the shortest time to master.

The signs in the children with ASD entail one common barrier to the social life of an individual. With impaired communication and language skills, these kids have difficulties in communicating with either their parents or other colleagues in the classroom setting (Dykstra & Watson, 2015). However, children are present with more functioning ASD features with age, such as proper language use. According to studies, three categories of children with ASD disorder exist: high functioning ASD, limited skills in language, and nonverbal. ASD speech studies revealed that all children who exhibit symptoms of ASD have great challenges with grammar, turn-taking, and providing information.

Integrating the Use of Technology into Classrooms

Change is considered inevitable, and society is expected to adopt new technological advancement. Teachers should be trained, and their moral values must guide them in their daily activities within the school environment and classroom. Technological integration relies on the adoption of the technology. According to Cassady (2011), the stages in adapting to technology are usually in steps, and people with disabilities can be classified in stages as shown below:

- Innovators
- Early Adopters
- Early Majority
- Later Majority
- Laggards

Integration of technology in classrooms is a process and it is gradual. The process takes place in a sequenced manner and children with the disorder have different and unique capabilities. Most of the students with ASD are slow learners and take time to respond to the new technology. Technological advancement and integration into classrooms takes time and occurs in four stages. Firstly, the innovators are individuals who are risk-takers and oriented. These are people who are interested in technological change and are considered innovators. Secondly, early adopters are also interested in technological change and follow the innovators. Early majority are those people who wait to see the progress while the late majority are not readily convinced of technological development. Laggards are not ready to change and show no interest at all. They are the last to adapt to technology (Cassady, 2011).

When integrating technology in education, the process begins by training and directing learners to adapt to the changes. The students are taught the importance of the technology in making their work easier. The process of addressing the learners into the new technology is vital, and ASD teachers should be well-advanced with the new technology before passing the knowledge to students. Accessibility to the technology should be prioritized, and the students with disabilities should have access to the devices. Accessibility should be done after proper planning and implementation of the programs in the curriculum of the education system (Cassady, 2011). Mobility is enabling the students to move from the old and traditional method of learning to new technology. Mobility is an important process in the adoption of technology into the classrooms. Self-direction is the ability of the students to operate the devices on their own with little assistance. Students with ASD should be monitored regularly, and teachers should continue to empower the students and promote capacity building.

As Cassady (2011) mentioned, integration of new technology such as iPads in classrooms will require time, patience, and perseverance. Students with ASD present challenges to the education community, so their teachers should be motivated and driven by passion. The attitude of the teacher is correlated to the adoption of the technology, as well as academic performance in students with ASD disorder. Integrating technology into classroom implies more than showing essential computer knowledge. Successful technology coordination must happen over the curriculum in ways that indicates development and improvement the learning process. The efficiency of integration of technology into classrooms should show active engagement and corporation, group participation and socialization, foster collaboration and feedback, enhance

communication skills, promote language proficiency, and make learning efficient. Integrating technology into the classroom should be in line with the primary objectives of the students (Cassady, 2011)

Some education scientists have found a positive correlation between technology and teaching. Alsarhan and Hamdana (2013) stated that learning through tasks while furnished with technology tools permit students to be mentally and physically fit while giving them a realistic preview of what the present-day world resembles. Through ventures, students can refine their research and critical thinking abilities through using the Internet (Alsarhan & Hamdana, 2013).

Teachers should establish best ways of integrating technology into the classroom. Children with disabilities have numerous challenges that create a need for integrating technology into their curriculum. The use of iPads and other devices in classrooms is one of the best ways of promoting education in students with ASD. The attitude and behaviors of teachers should be positive. The students with disabilities need love, affection, and attention throughout their lives-just like any other student (Alquraini, 2011).

Teachers' Attitude Towards Using iPads in Teaching Students With ASD

Globally, teachers are considered the second parents of children, and often play a big role in children's development. As mentioned in Al-Shammari's study, teachers' attitudes are affected by culture, traditions, religion, education system, and the well-being of the teacher. Teachers' success enables students to become responsible grownups. Additionally, teachers' operation in schools is basically affected by many factors including the environment of the school, the efficiency of the tool, technology in the

schools, government and employer's policies, and home-related factors. Teachers should be well-empowered and equipped with proper skills in teaching students. Teachers' attitudes and personalities are the inner feelings of the teacher affected by the internal and external surroundings of the teacher. Attitudes of teachers affect their environment, and the success of students is affected by teachers (Al-Shammari, 2006).

Teachers' perspectives comprise of affective, behavioral, and cognitive indicators. Students with ASD often learn at slower rates and lack communication skills. Their interaction with others as well as teachers depends on their cognitive ability. Different teachers have different unique attitudes, which are either strong or weak depending on their environments. In their article Brantlinger, Sherin, and Linsenmeier (2011) asserted that teachers' thinking is shaped by many factors such as opinions, judgment, ideology, values, self-understanding, and their conscious. Subsequently, their attitudes can also be driven by axioms, perceptions, and beliefs (Brantlinger, Sherin, and Linsenmeier ,2011).

Teacher's attitudes towards students with ASD are imperative. Training of teachers should be done in a holistic manner with the inclusion of educational philosophy. Teachers should understand that it is the right of every child regardless of ability to have access to quality education.

According to Gilberg and Peeter (1999), Teachers should also work toward improving the social interaction of students with ASD with others. Teachers should be driven by love, positive attitude, and passion. They should understand the students' needs and act as guidance and counseling professionals. Some teachers have been found mistreating students with ASD by removing them out of class during lessons. The teachers with negative attitudes demoralize the students with ASD and make them feel

disassociated in school programs. The government and all the relevant stakeholders in education should ensure that institutions appropriate for training students with disabilities are well-empowered and fully trained (Gilberg & Peeter, 1999).

In his study, Al-Shammari (2006), mentioned how the unfriendly environment and pressure factors whether from the government, parents, or policymakers have negative impacts on teachers especially when the laws and policies are put in place without their involvement and participation. Ethical consideration and practices must adhere to the moral behavior of every teacher. The success of students who have ASD depends on the perception of teachers toward them. The relationship between the teacher and the students is correlated to their well-being. Some teachers punish the students and disown them in classes before their peers which demoralize the students with ASD from attending classes as required in the school curriculum (Al-Shammari, 2006).

Alquraini (2011) stated in his article that lack of proper skills and experience in teaching students with ASD affects the attitude of teachers toward the students. The teacher's attitudes towards disabled students, including those with ASD, may be the result of lack of enough skills, knowledge, and experience in teaching these students. In achieving the objective of educational policy in the land of Saudi Arabia, the government provides a guideline for educating both the gifted students and those with disabilities as the responsibility of the education sector. The strategy was to allow the government control and provide affordable education to all students irrespective of their capabilities. A growing demand for education services from the public arose due to the huge number of students getting admissions to the public schools in Saudi Arabia (Alquraini, 2011).

The Ministry of Education (2017) realized that leaving the education sector to the private hands would devastate the government's effort to make education affordable to every child. Approximately 20 percent of the children in Kingdom of Saudi Arabia are in dire need of special education services. The government believes that the profits offered by the services to beneficiaries will be boundless to the various groups seeking to acquire basic education. This will also help in transforming the educational plans and guidelines, as well as yield a positive impact on the lives of the students and the society of Saudi Arabia (Ministry of Education, 2017).

The efficiency of any teacher in the teaching profession lies on their preparedness to teach students; it is the greatest predictor of their effectiveness regarding offering the best education services to pupils. The teacher's belief is the strongest indicator quality-teaching services will be provided to the students. The belief of these teachers offering the best and highest quality teaching opportunity plays a role, especially when dealing with students with ASD in a classroom environment (Gilberg & Peeter, 1999).

Cassady (2011) indicates that the competency of teachers in teaching students with disabilities is paramount in the provision of education to students. Teachers' attitudes toward students with ASD are based in inclusiveness. Research has found that lack of competency and enough skills in managing students with ASD is related to teachers' attitudes toward the students. The inclusion of teachers with ASD into classrooms is a major problem in many schools. The government is supposed to offer special training to as many teachers as possible in ensuring nondiscrimination of students with disabilities is minimized and excluded in both public and private schools. Specially

trained teachers have positive attitudes toward students with ASD as compared to general education teachers (Cassady, 2011).

In conclusion, other additional factors affect teachers' attitudes toward students with ASD. Parental-involvement, school management, and community support are necessary. Teachers sometimes feel that the responsibility of taking care of the students with ASD is left in their hands. Parental involvement builds ethos in students with ASD, and it is the responsibility of the whole society to take care of students with ASD disorder.

CHAPTER 3

RESEARCH METHODOLOGY

According to Saudi Arabian special education law, all students, including special needs students, have the right to use technology to enhance their learning (Ministry of Education, 2017). All students need to receive appropriate programs, devices, instructions, and assessments that meet their needs and interests (Ministry of Education, 2017). Due to lack of research about how Saudi Arabia's special education teachers use technology for instruction of students with ASD, more studies are needed about current applications. In order to gather information, a survey questionnaire was used to ask Saudi Arabia special education teachers who teach students with ASD, how software applications loaded onto iPads were selected for use in their teaching process. Questionnaire methodology was chosen based on Punch's (2009) assertion that "the questionnaire will seek factual information (background and biographical information, knowledge and behavioral information), will also include measures of attitude, values, opinions and beliefs" (p. 241). The aim of this study was to recognize the Saudi Arabian special education teacher's awareness in selecting and using communication programs on iPads as a technology assistive device for students with ASD to enhance their communication skills. The aim of the study was to provide a better understanding of how

to smoothly integrate technology, especially the communication applications in iPad, into the classroom to effectively teach students with ASD.

Quantitative Research Method

This study is based on a quantitative methodology. An important and critical phase of research is collecting quantitative data for the exploratory study that an individual is undertaking. Data collecting in quantitative research technique is different from those collected through qualitative research methods (Creswell, 2015). Data obtained through these methods require a high degree of accuracy and precision; therefore, the data collected should put great focus on the digits and variables tested.

Questionnaire surveys and interviews frequently use the quantitative approach in obtaining data to research on the phenomenon under study. However, quantitative research can prove to be cheaper compared to the qualitative approach of data collection (Creswell, 2015). The cost of a research technique should not determine the type of approach to collecting of data. The aim of the research leads in choosing the appropriate method. In this research, the method of the research was survey research. According to Fraenkel and Wallen (2009), a survey possesses three major characteristics. First, the information collected to describe some aspects of a group of people that is a part of a population (Fraenkel & Wallen, 2009). The aspects or characteristics of the group was abilities, opinions, attitudes, beliefs, and knowledge. Thus, a survey was chosen because the current research sought out the special education teachers' attitudes toward using iPads in teaching students with ASD. Second, collecting answers through asking question was the main way in survey method (Fraenkel & Wallen, 2009). The answers construct the data of the study, and in this study the data that is sought is about what the

participants answered, not why they choose the answers. Finally, data come out of samples' answers to represent the population (Fraenkel & Wallen, 2009). In this study, like most studies, it is impossible to ask every teacher working with special education in Saudi Arabia. Thus, the survey was distributed to an accessible population of teachers in Riyadh.

Research Questions

1. Among special education teachers in Saudi Arabia, what levels of agreement are held regarding the technical criteria to select and use software applications on the iPad to teach children with ASD?
2. Among special education teachers in Saudi Arabia, what levels of agreement are held regarding the psychological criteria to select and use software applications on the iPads to teach children with ASD?
3. Among special education teachers in Saudi Arabia, what levels of agreement are held regarding the cognitive criteria to select and use software applications on the iPad to teach children with ASD
4. Among special education teachers in Saudi Arabia, is there a significant correlation between educational level and any of the three forms of criteria—cognitive, psychological, and technical?
5. Among special education teachers in Saudi Arabia, is there a significant correlation between years of experiences and any of the three forms of criteria—cognitive, psychological, and technical?

6. Among special education teachers in Saudi Arabia, is there a significant correlation between gender and any of the three forms of criteria—cognitive, psychological, and technical?
7. Among special education teachers in Saudi Arabia, is there a significant correlation between private or public schools and any of the three forms of criteria—cognitive, psychological, and technical?

Research Question Analysis and Null Hypotheses

Questions 1–3 will be addressed through descriptive statistics.

Question 4: $H_0$1. There is no relationship between educational level and any of the three forms of criteria—cognitive, psychological, and technical

Question 5: $H_0$2. There is no relationship between years of experiences and any of the three forms of criteria—cognitive, psychological, and technical

Question 6: $H_0$3. There is no relationship between gender and any of the three forms of criteria—cognitive, psychological, and technical

Question 7: $H_0$4. There is no relationship between private or public schools and any of the three forms of criteria—cognitive, psychological, and technical

Data Analysis

Research Questions 1, 2, and 3 were tested by descriptive analysis. Means, standard deviations, and frequencies were reported to determine the technical criteria, educational criteria, and knowledge criteria to select and use software applications on the iPads to teach children with ASD.

Independent variables were tested for relationships with overall iPad teaching agreement, as well as cognitive, psychological, and technical agreement individually. As

a result, each hypothesis required four tests. Hypothesis 1 was tested with Spearman rank-order correlations with education level as the ordinal variable, while agreement is a numerical scale variable. Hypothesis 2 was tested with Pearson's product-moment correlations because both years of experience and agreement are numerical scale variables, which are assumed to be normally distributed. If either variable did not meet the assumption of normal distribution, a non-parametric Spearman rank-order correlation was again used as a substitute. Hypothesis 3 tested with an independent samples t-test because gender is a dichotomous categorical variable while agreement is numerical. If agreement was not normally distributed, the non-parametric Mann-Whitney test was substituted. The last hypothesis was tested with an independent samples t-test because the schools' form is a dichotomous categorical variable (private school and public school) while agreement is numerical.

Data Collection Method and Procedure

Data assembly is the process of gathering data by obtaining the required information from the field for the study. Proper data collection allows the researcher to obtain as much information as they can from the field to help bring out a clear analysis of the phenomenon. After the collection process, analysis of the collected data began, undertaken in line with the design of the research method. Before delivering or undertaking questionnaires, I identified the target subject for the study. For this study, the target participants were the special education teachers of students with ASD in Saudi Arabia (Chandler et al., 2015).

Participants

There are about 120,000 children with ASD in Saudi Arabia (Kaddy, 2013). In both public and private schools, Saudi Arabia has 739 special education schools for male students and 409 special education schools for female students with more than 15,215 male and female students enrolled. The Ministry of Education hired 7,508 male and female teachers in all special education schools among the Kingdom of Saudi Arabia (Ministry of Education, 2016).

Fraenkel and Wallen (2009) stated, "A sample in a research study is the group on which information is obtained. The larger group to which one hopes to apply the results is called the population" (p. 90). The target population of this study was both female and male special education teachers in Saudi Arabian private and public special education schools who teach students with ASD. However, the accessible population was both female and male special education teachers from private and public special education schools who teach students with ASD in Riyadh during the second term of school year of 2017.

A simple random sampling was used to choose the participants to participate in the survey. Fraenkel and Wallen (2009) explained that simple random sampling is a method in which everyone in the population will have an equal chance to be selected. The survey was distributed to all ASD schools and institutes in the city of Riyadh. All special education teachers who teach students with ASD had a chance to be involved in this study. The sample size of the current study was 242 male and female special education teachers in ASD schools.

Settings

The study was conducted at both private and public special education schools in Riyadh, the capital city of the Kingdom of Saudi Arabia. The reason of choosing Riyadh as a representative of this study is due to Riyadh being the largest city in the kingdom with a diverse population. Thus, the diversity of teachers is also high. It also has the highest number of ASD institutes and schools in Saudi Arabia. Teachers from Riyadh's ASD schools and institutes reasonably represented the whole kingdom.

Instrument

A close-ended questionnaire was established to measure the special education teachers' attitudes toward software applications loaded onto iPads for use in their teaching students with ASD. The items of the questionnaire were be grouped into three parts: cognitive criteria, psychological criteria, and technical criteria (See Appendix D). According to Patten (2001), measuring a groups' attitude is about asking questions to seek this group's feelings, actions, and potential actions toward something. Thus, the attitude scale was designed to get one overall attitude score for each respondent (Patten, 2001).

The scale of the conducted questionnaire is the Likert-type scale. Likert developed a Likert-type item in the 1930s. He advocated using items that asked participants to specify the degree of their agreement or disagreement with the given statements. The questionnaire had five choices: *strongly disagree*, *disagree*, *neutral*, *agree*, and *strongly agree* (Patten, 2001).

The survey statements were guided by the findings of experiential studies and theoretical framework in the literature review in designing the survey. Statements were

founded from certain studies. Statement numbers 1, 2, 3, 5, 7, 8, 16, 17, 18, 19, 23, 32, 48, 50, 52, and 53 were from Al-Salehi, et al. (2009). Al-Salehi et al. (2009) confirmed the importance of using electronic images in teaching students with ASD. They also mentioned that educators must be aware of the skill sequences in teaching students with ASD. The learning process has to be in sequences from simple to more complicated, and from easy to difficult to move into goals step by step. The items listed above were established from this concept. For example, the first statement in the questionnaire is "A picture should include cognitive scaffolding to provide help and suitable guidance to a child in building learning". The term scaffolding in education in this item represents the concept of skills sequences that Al-Salehi et al. confirmed in their study. Moreover, Al-Salehi et al. stated that in sequences learning or scaffolding, the educators should start from cognitive skills that are familiar to the students, and then move them progressively toward new skills. From this Item 52 was founded "Texts shall be written in easy, simple words familiar words of those learners reducing as much as possible any new words".

Items 9, 10, 11, 12, 15, 27, 29, 37, 39, 40, 49, 55, and 68 were generated from the findings in Lenker and Paquet (2003). Lenker and Paquet (2003) defined how sound can affect the learning of students with ASD. Because some sounds might bother children with ASD, teachers have to consider the suitable sounds of the devices being used to keep students comfortable. Although sounds are considered important aspect iPad software, Item 15, "Contents shall include visual presentations more than written, verbal presentations" stated that images are more important that sounds. Lenker and Paquet mentioned that pictures are often the first language for children with ASD. Using pictures is significant for students with ASD, especially for communication. Many

applications based on images help students with ASD communicate with his/her teachers and peers, like PECS. However, these pictures have to be suitable to students' knowledge, culture, and age. Therefore, many items in the questionnaire were added from the Lenker and Paquest study asking about the images, such as Item 49, " Pictures shall be suitable to the educational experiences students go through (direct experience, alternative, or abstract experiences)".

Statements 4, 6, 13, 14, 20, 28, 30, 38, 41, 42, 43, 44, 54, 46, 47, 51, 69, and 70 were established from studies by Lord et al. (2000). Lord et al. (2000) explained some of the ASD characteristics. They stated that children with ASD have some conditions associated with the disorder like anxiety, depression, and epilepsy. I generated some items in the questionnaire from these characteristics, such as in Item 42, "A picture should only use the positive enhancement of students' response which includes reward (praise, encouragement reward) after giving the correct answer, to support and develop correct response". While Item 43 says, "Negative enhancement shall be given after receiving wrong answers for avoiding making the same wrong answer, with caution, avoiding blame, scolding, or failure". Also, it was mentioned in their study that certain aspects have to be considered in constructing instruction for children with ASD. Simple language, short sentences, and positive attitude should be included in instruction for students with ASD to encourage them to continue in work. This part is shown in many items like Item 4, "Instructions and knowledge guidance will be through definite steps "short and quick".

Items 21, 22, 54, 64, 65, 66, 67 were formed from Howlin (2006). Howlin (2006) declared the importance of using computer software in teaching students with ASD. He

mentioned that touchable tablets can be a good alternative of writing skills that are challenging for students with ASD, and it will increase their interaction and response for the instruction. This led to items being formulated like Item 21," Content shall be written in a way to help students build their special learning skills, to encourage them to interact and participate positively in those activities".

Validity and Reliability

After establishing any questionnaire, validity and reliability tests have to be done to confirm the test's feasibility. Reliability refers to the uniformity or repeatability of the measure; while validity means that the questionnaire is measuring what it should measure according to the objectives of the study (Patten, 2009). In order to ensure the validity and reliability of the study tool, five professors from King Saud University checked the questionnaire to ensure the face validity. Two of the professors were from the Department of Educational Technology, and three of them were professors in Special Education. After reviewing the questionnaire, their opinions and suggestions were taken into consideration.

Cronbach's alpha is considered as a measure of scale reliability. It measures the internal consistency to check how sets of items are closely related as a group. The acceptable scores of the questionnaire reliability have to be above.70. Items below this will have to be reconsidered (Goforth, 2015). To check the reliability of the study, a test group of 50 special education teachers filled out the survey. Cronbach's alpha was run on each factor of the survey to test internal consistency by using SPSS statistics.

As shown in Table 1 below, the factors had adequate reliability. All factors show strong levels of internal consistency.

Table 1

Cronbach's Alpha for the Reliability of the Factors of Survey

Factors	Number of Items	Alpha
Cognitive Criteria	26	0.96
Psychological Criteria	24	0.95
Technological Criteria	26	0.97

The survey was modeled in both language English and Arabic. The translation of the questionnaire to Arabic was because Arabic is the first language in Saudi Arabia, the country of the study, and Arabic is the teachers' native language. After receiving the questionnaire approval from the IRB, an Arabic version of the questionnaire and a permission request letter explaining the purpose of the study were submitted to begin the process of approval for the research (See Appendix A); and the questionnaire along with the invitation letters (See Appendix B) and informed consent (See Appendix C) were distributed among special education teachers in Riyadh. The questionnaire was available during the Saudi schools' second semester of 2017.

CHAPTER 4

RESULTS

The purpose of this study was to learn about teachers' attitudes towards iPad communication software for students with autism in Saudi Arabia. This study was planned to help the Saudi government understand how it can build on the preparedness of teachers toward undertaking teaching practices for students with special needs. This study also aimed to find the willingness of these teachers to use technology in the education of children with autism.

This chapter describes the collecting and analysis of data. Data were collected then analyzed by Statistical Package for Social Science to find frequencies, means, standard deviations, and other statistically significant differences. All results from the statistical analyses of the data collected from special education teachers and teacher's assistants of students with autism in the second semester of the 2017 school year are presented in this chapter. Also, the chapter presents the data collection procedure and provides tables and reports to clarify the data collected.

Demographic

Participant demographics were the first part of the questionnaire. It focused on the participant's current occupation, gender, academic qualification, the school system in which he or she works, teaching experience, and experience in using technology for

teaching students with autism. In this study, the participants were special education teachers and special education teacher's assistants at public and private special education schools in Riyadh, Saudi Arabia. In Table 2, it shows that special education teachers who participated made up 92.65% of the participants, and the special education teacher's assistants made up 7.44%.

Table 2

Participants' Current Position

Current Position	Frequency	Percent
Special education teachers	224	92.56
Special education teachers' assistant	18	7.44
Total	242	100.00

As shown in Table 3 below, gender of the participants was 51.24% male special education teachers and assistants, and 48.76% were female special education teachers and assistants.

Table 3

Participants' Gender

Gender	Frequency	Percent
Male	124	51.24
Female	118	48.76
Total	242	100.00

The participants' academic qualifications ranged between bachelor's degree holders to PhD diploma holders. Table 4 below shows that participants who have a bachelor's degree made up 3.72% of the population; those with master's degrees were 85.54% of the population, and participants with a Ph.D. were 10.74% of the population.

Table 4

Participants' Academic Qualification

Academic Qualification	Frequency	Percent
Bachelor's	9	3.72
Master's	207	85.54
PhD	26	10.74
Total	242	100.00

As shown in Table 5, the participants of this study were almost equal in terms of distribution of employment in private and public special education schools. Participants from public schools totaled 42.15%, while 57.85% of them were from private special education schools.

Table 5

School System

School System	Frequency	Percent
Public	102	42.15
Private	140	57.85
Total	242	100.00

The years of experience in teaching students with autism ranged from one year to over 10 years. In Table 6, Teachers who were in their first year of teaching students with autism comprised 11.16% of the total participants. Participants with teaching experience from two to six years were 32.23% of the total population. Teachers with seven to 10 years of experience were 27.27% of the total participants. Teachers who had experience above 10 years made up 29.34% of the total population.

Table 6

Teaching experience

Teaching Experience	Frequency	Percent
First year	27	11.16
2—6 years	78	32.23
7—10 years	66	27.27
Over 10	71	29.34
Total	242	100.00

In Table 7 below, teachers who were in their first year of using technology for teaching students with autism was 15.29% of the population. Participants with two to six years of experience in using technology totaled 35.54% of the population. The teachers with experience between six and 10 years in using technology was 28.93% of the total, and 20.25% of the participants had over 10 years of experience in using technology in teaching students with autism.

Table 7

Years of Experience in Using Technology

Years of Experience of Using Technology	Frequency	Percent
First year	37	15.29
2—6 years	86	35.54
7—10 years	70	28.93
Over ten years	49	20.25
Total	242	100.00

Perceptions of using iPads in Teaching Students with ASD

After obtaining demographics, the research questions were investigated through the second section of the questionnaire. Research questions 1, 2, and 3 were tested by descriptive analysis. Means, standard deviations, and frequencies were reported to determine the technical criteria, educational criteria, and cognitive criteria to select and use software applications on the iPads to teach children with autism. In this questionnaire, all items were based on a five-item Likert-like scale (i.e., *strongly disagree, disagree, neutral, agree, and strongly agree*). The highest rating was a 5 (*strongly agree*), and the lowest rating was a 1 (*strongly disagree*).

The 5-point Likert scale covers a range from 1 to 5 points. As a result, the mean scores on the scales were divided into five equal sections. This resulted in ranges of .80 points as displayed in Table 8. This adjusted scale places participants scores appropriately into five equal categories of responding, consistent with the questions asked.

Table 8

Distribution of Responding Categories

Description	Range of Mean Scores
Strongly Disagree	1.00-1.80
Disagree	1.81-2.60
Neutral	2.61-3.40
Agree	3.41-4.20
Strongly Agree	4.21-5.00

Table 9 shows the overall means and standard deviations for answers to the criteria scales for knowledge, education, and technology. Knowledge was rated highest,

with a mean of 4.06. Education was next highest with mean of 3.97, and the lowest was technology with a mean of 3.87. This indicates a high level of endorsement of the criteria, particularly knowledge. Scores were more varied for technology with a higher standard deviation (.74) than the other criteria. This indicates less agreement on ratings of the technology items. Tables 10, 11, and 12, each table reveals frequencies, percentages, means, and standard deviations of each criteria: cognitive criteria, psychological criteria, and technological criteria.

Table 9

Means and Standard Deviations between Cognitive, Technological, Educational

Criteria	Mean	Standard deviation
Knowledge	4.06	.65
Education	3.97	.63
Technology	3.87	.74

Table 10

Frequencies, Percentages, Means, and Standard Deviations for Cognitive

Items		Responses*						*M*	*SD*	Order
		1	2	3	4	5	Total			
Statement 1	f	-	10	11	111	110	242	4.33	0.75	1
	%	-	4.13	4.55	45.87	45.45	100			
Statement 2	f	-	13	11	109	109	242	4.30	0.79	2
	%	-	5.37	4.55	45.04	45.04	100			
Statement 3	f	-	20	19	113	90	242	4.13	0.88	6
	%	-	8.26	7.86	46.69	37.19	100			
Statement 4	f	1	22	15	118	86	242	4.10	0.90	9
	%	0.41	9.09	6.20	48.76	35.54	100			
Statement 5	f	-	26	8	89	119	242	4.24	0.95	3
	%	-	10.74	3.31	36.78	49.17	100			
Statement 6	f	-	23	18	104	97	242	4.14	0.92	4
	%	-	9.50	7.44	42.98	40.08	100			
Statement 7	f	-	26	26	96	94	242	4.07	0.96	12
	%	-	10.74	10.74	39.68	38.84	100			
Statement 8	f	-	30	19	100	93	242	4.06	0.98	13
	%	-	12.40	7.85	41.32	38.43	100			
Statement 9	f	-	21	19	118	84	242	4.10	0.88	10
	%	-	8.68	7.85	48.76	34.71	100			
Statement 10	f	-	22	19	109	92	242	4.12	0.90	7
	%	-	9.09	7.85	45.04	38.02	100			
Statement 11	f	-	25	19	104	94	242	4.10	0.93	8
	%	-	10.33	7.85	42.98	38.84	100			
Statement 12	f	-	35	19	113	75	242	3.94	0.98	24
	%	-	14.46	7.86	46.69	30.99	100			
Statement 13	f	-	37	13	111	81	242	3.98	1.00	19
	%	-	15.29	5.37	45.87	33.47	100			
Statement 14	f	-	32	10	116	84	242	4.04	0.96	14
	%	-	13.22	4.13	47.93	34.72	100			
Statement 15	f	-	34	23	103	82	242	3.96	1.00	22
	%	-	14.05	9.50	42.57	33.88	100			
Statement 16	f	-	35	17	107	83	242	3.98	1.00	18
	%	-	14.46	7.02	44.22	34.30	100			

Table 10 (continued)

Items		Responses*					Total	*M*	*SD*	Order
		1	2	3	4	5				
Statement 17	f	1	33	18	119	71	242	3.93	0.97	25
	%	0.41	13.64	7.44	49.17	29.34	100			
Statement 18	f	1	34	9	124	74	242	3.98	0.97	20
	%	0.41	14.05	3.72	51.24	30.58	100			
Statement 19	f	1	32	14	113	82	242	4.00	0.98	17
	%	0.41	13.22	5.79	46.69	33.89	100			
Statement 20	f	-	32	8	109	93	242	4.09	0.97	11
	%	-	13.22	3.31	45.04	38.43	100			
Statement 21	f	-	32	13	119	78	242	4.00	0.95	16
	%	-	13.22	5.37	49.18	32.23	100			
Statement 22	f	1	31	18	119	73	242	3.96	0.96	23
	%	0.41	12.81	7.44	49.17	30.17	100			
Statement 23	f	-	25	11	113	93	242	4.13	0.91	5
	%	-	10.33	4.55	46.69	38.43	100			
Statement 24	f	-	25	23	113	81	242	4.03	0.92	15
	%	-	10.33	9.50	46.69	33.48	100			
Statement 25	f	2	30	22	109	79	242	3.96	1.00	21
	%	0.83	12.40	9.09	45.04	32.64	100			
Statement 26	f	4	21	27	133	57	242	3.90	0.91	26
	%	1.65	8.68	11.16	54.96	23.55	100			
Total								4.06	0.65	-

Table 11

Frequencies, Percentages, Means, and Standard Deviations for Psychological

Items		Responses*								
		1	2	3	4	5	Total	*M*	SD	Order
Statement 1	f	3	28	17	107	87	242	4.02	1.00	
	%	1.24	11.57	7.02	44.22	35.95	100			5
Statement 2	f	2	29	17	103	91	242	4.04	1.00	
	%	0.83	11.98	7.02	42.57	37.60	100			3
Statement 3	f	1	30	28	107	76	242	3.94	0.98	
	%	0.41	12.40	11.57	44.22	31.40	100			16
Statement 4	f	-	29	28	116	69	242	3.93	0.94	
	%	-	11.98	11.57	47.94	28.51	100			18
Statement 5	f	4	27	25	120	66	242	3.90	0.98	
	%	1.65	11.16	10.33	49.59	27.27	100			21
Statement 6	f	1	23	23	112	83	242	4.05	0.93	
	%	0.41	9.50	9.50	46.29	34.30	100			2
Statement 7	f	-	23	24	118	77	242	4.03	0.89	
	%	-	9.50	9.92	48.76	31.82	100			4
Statement 8	f	-	29	17	120	76	242	4.00	0.93	
	%	-	11.98	7.02	49.59	31.41	100			7
Statement 9	f	-	32	15	117	78	242	4.00	0.96	
	%	-	13.22	6.20	48.35	32.23	100			10
Statement 10	f	-	27	35	117	63	242	3.89	0.92	
	%	-	11.16	14.46	48.35	26.03	100			22
Statement 11	f	-	33	19	121	69	242	3.93	0.95	
	%	-	13.64	7.85	50.00	28.51	100			17
Statement 12	f	-	31	20	108	83	242	4.00	0.97	
	%	-	12.81	8.26	44.63	34.30	100			8
Statement 13	f	1	28	20	116	77	242	3.99	0.95	
	%	0.41	11.57	8.26	47.94	31.82	100			11
Statement 14	f	1	29	18	120	74	242	3.98	0.95	
	%	0.41	11.98	7.44	49.59	30.58	100			13
Statement 15	f	-	29	14	127	72	242	4.00	0.92	
	%	-	11.98	5.79	52.48	29.75	100			9
Statement 16	f	1	31	16	125	69	242	3.95	0.95	
	%	0.41	12.81	6.61	51.66	28.51	100			15

Table 11 (continued)

Items		Responses*						*M*	*SD*	Order
		1	2	3	4	5	Total			
Statement 17	f	4	29	23	126	60	242	3.86	0.98	
	%	1.65	11.98	9.50	52.08	24.79	100			24
Statement 18	f	1	28	29	116	68	242	3.92	0.95	
	%	0.41	11.57	11.98	47.94	28.10	100			19
Statement 19	f	2	28	10	133	69	242	3.99	0.93	
	%	0.83	11.57	4.13	54.96	28.51	100			12
Statement 20	f	-	37	16	131	58	242	3.87	0.95	
	%	-	15.29	6.61	54.13	23.97	100			23
Statement 21	f	1	32	21	123	65	242	3.90	0.96	
	%	0.41	13.22	8.68	50.83	26.86	100			20
Statement 22	f	-	25	22	130	65	242	3.97	0.88	
	%	-	10.33	9.09	53.72	26.86	100			14
Statement 23	f	-	27	12	134	69	242	4.01	0.89	
	%	-	11.16	4.96	55.37	28.51	100			6
Statement 24	f	-	22	9	125	86	242	4.14	0.86	
	%	-	9.09	3.72	51.65	35.54	100			1
Total								3.97	0.63	-

Table 12

Frequencies, Percentages, Means, and Standard Deviations for Technological

		Responses*								
Items		1	2	3	4	5	Total	*M*	*SD*	Order
Statement 1	f	1	38	23	88	92	242	3.96	1.07	
	%	0.41	15.70	9.50	36.36	38.03	100			4
Statement 2	f	-	40	18	101	83	242	3.94	1.04	
	%	-	16.53	7.44	41.73	34.30	100			7
Statement 3	f	1	42	16	98	85	242	3.93	1.07	
	%	0.41	17.36	6.61	40.50	35.12	100			9
Statement 4	f	2	41	26	103	70	242	3.82	1.06	
	%	0.83	16.94	10.74	42.56	28.93	100			20
Statement 5	f	-	42	27	96	77	242	3.86	1.05	
	%	-	17.36	11.16	39.66	31.82	100			15
Statement 6	f	-	34	31	99	78	242	3.91	1.00	
	%	-	14.05	12.81	40.91	32.23	100			11
Statement 7	f	-	29	30	108	75	242	3.95	0.96	
	%	-	11.98	12.40	44.63	30.99	100			6
Statement 8	f	1	34	23	108	76	242	3.93	1.00	
	%	0.41	14.05	9.50	44.64	31.40	100			8
Statement 9	f	1	39	34	91	77	242	3.84	1.06	
	%	0.41	16.12	14.05	37.60	31.82	100			18
Statement 10	f	1	44	17	107	73	242	3.86	1.06	
	%	0.41	18.18	7.02	44.22	30.17	100			16
Statement 11	f	1	37	31	112	61	242	3.81	1.00	
	%	0.41	15.29	12.81	46.28	25.21	100			21
Statement 12	f	1	42	30	106	63	242	3.78	1.03	
	%	0.41	17.36	12.40	43.80	26.03	100			23
Statement 13	f	-	37	17	106	82	242	3.96	1.01	
	%	-	15.29	7.02	43.81	33.88	100			2
Statement 14	f	2	45	30	109	56	242	3.71	1.05	
	%	0.83	18.60	12.40	45.03	23.14	100			25
Statement 15	f	2	36	19	114	71	242	3.89	1.02	
	%	0.83	14.88	7.85	47.10	29.34	100			12
Statement 16	f	1	32	12	120	77	242	3.99	0.97	
	%	0.41	13.22	4.96	49.59	31.82	100			1

Table 12 (continued)

Items		Responses*						*M*	*SD*	Order
		1	2	3	4	5	Total			
Statement 17	f	1	33	20	118	70	242	3.92	0.98	
	%	0.41	13.64	8.26	48.76	28.93	100			10
Statement 18	f	-	32	18	120	72	242	3.96	0.95	
	%	-	13.22	7.44	49.59	29.75	100			3
Statement 19	f	-	40	20	109	73	242	3.89	1.02	
	%	-	16.53	8.26	45.04	30.17	100			13
Statement 20	f	-	33	21	112	76	242	3.95	0.97	
	%	-	13.64	8.68	46.28	31.40	100			5
Statement 21	f	-	40	21	110	71	242	3.88	1.01	
	%	-	16.53	8.68	45.45	29.34	100			14
Statement 22	f	1	37	25	120	59	242	3.82	0.98	
	%	0.41	15.29	10.33	49.59	24.38	100			19
Statement 23	f	-	38	25	116	63	242	3.84	0.99	
	%	-	15.70	10.33	47.94	26.03	100			17
Statement 24	f	1	48	20	114	59	242	3.75	1.05	
	%	0.41	19.83	8.26	47.12	24.38	100			24
Statement 25	f	2	52	26	105	57	242	3.67	1.08	
	%	0.83	21.49	10.74	43.39	23.55	100			26
Statement 26	f	1	43	24	114	60	242	3.78	1.03	
	%	0.41	17.77	9.92	47.11	24.79	100			22
Total								3.87	0.74	-

Teachers' Academic Qualification

Hypothesis 1 was tested with Spearman rank-order correlations. Education level was significantly positively related to cognitive criteria, *rho* = .299, $p < .001$. Psychological criteria, *rho* = .268, $p < .001$. Technological criteria, rho = .239, $p < .001$. The correlations were similar in strength, and the positive coefficients indicate that more educated individuals also scored the items higher. Therefore, the null hypothesis is

rejected for Research Question 4; education is related to all three variables. Correlations can be found in Table 13

Table 13

Difference of Teachers and Assistants' Education Qualification

Spearman's rho	Mean	Correlations	Education Level
	Mean of Cognitive Criteria Items	Correlation Coefficient	.299**
		Sig. (2-tailed)	<. 000
		N	242
	Mean Psychological Criteria' Items	Correlation Coefficient	.268**
		Sig. (2-tailed)	<. 000
		N	242
	Mean of Technological Criteria Items	Correlation Coefficient	.239**
		Sig. (2-tailed)	<. 000
		N	242

** Correlation is significant at the < 0.01 level (2-tailed).

Years of Experience

Hypothesis 2 was tested with non-parametric Spearman rank-order correlation as a substitute. Teaching experience was significantly positively related to cognitive criteria, *rho* = .310, $p < .001$. Psychological criteria, *rho* = .303, $p < .001$. Technological criteria, *rho* = .260, $p < .001$. The correlations were positive, indicating that more experienced individuals also scored the items higher. Therefore, the null hypothesis is rejected for this research question; teacher experience is related to opinions on all three items. Correlations can be found in Table 14.

Table 14

Spearman Correlation for the Difference of Years of Experience in Teaching.

Mean	Correlation	Level of years experience
Mean of cognitive criteria items	Correlation Coefficient	.310**
	Sig. (2-tailed) Correlation Coefficient	< .000
	N	242
Mean of Psychological Criteria Items	Correlation Coefficient	.303**
	Sig. (2-tailed) Correlation Coefficient	< .000
	N	242
Mean of Technological Criteria Items	Correlation Coefficient	.260**
	Sig. (2-tailed) Correlation Coefficient	< .000
	N	242

** Correlation is significant at the < 0.01 level (2-tailed).

Gender

The non-parametric Mann-Whitney test was selected due to violations of normality in the responses, particularly those of males, which clearly were not normally distributed. Results indicated gender differences in responses for all three items. Male participants scored items higher than women for cognitive criteria, $Z = 4.659 = .310$, $p < .001$. Psychological criteria, $Z = 5.721$, $p < .001$. Technical and technological criteria, $Z = 5.882$, $p < .001$. Therefore, the null hypothesis is rejected for Research Question 6; male participants gave higher scores on all three measures. This difference was statistically significant and is displayed in Tables 15 and 16.

Table 15

Mann-Whitney Test for Gender

Mean	Gender	N	Mean Rank	Sum of Ranks
M of Cognitive	Male	124	141.93	17599.50
	Female	118	100.03	11803.50
	Total	242		
M of Psychological	Male	124	146.58	18176.50
	Female	118	95.14	11226.50
	Total	242		
M of Technological	Male	124	147.30	18265.00
	Female	118	94.39	11138.00
	Total	242		

Table 16

Gender Tests

Test Statistics	Mean of Cognitive	Mean of Psychological	*M* Technological
Mann-Whitney U	4782.500	4205.500	4117.000
Wilcoxon W	11803.500	11226.500	11138.000
Z	-4.659-	-5.721-	-5.882-
Asymp. Sig. (2-tailed)	.000	.000	.000

Note. Grouping Variable: Gender: Male / Female

School System (Public/Private)

The results of independent-samples *t* tests indicated significant differences in ratings of the criteria scores between school types. Public school teachers and teacher's assistants rated all the items higher than those in private schools. This difference in knowledge criteria was evidenced by a mean of 4.19 for public schools and 3.97 for private schools, a statistically significant difference, $t = 2.70$, $p = .007$. Psychological criteria were found to have mean of 4.15 for public schools and 3.85 for private schools, also a statistically significant difference, $t = 3.82$, $p < .001$. Finally,

technical/technological criteria had a mean of 4.01 for public schools and 3.77 for private schools, which was a significant difference, $t = 2.62$, $p = .009$. Because all p-values were less than .01, the confidence in these differences exceeds 99% and is very unlikely to be due to random variation. Psychological criteria differed the most (.30 points). Therefore, the null hypothesis is rejected, and it can be concluded that scores differ between the school types. Table 17 displays these results.

Table 17

T-Test for the Difference Between Private and Public Special Education Schools

Dependent Variables	Type of School	N	*M*	*SD*	*t*	df	P value
Cognitive Criteria	Public	102	4.19	.59	2.70	232.41	.007
	Private	140	3.97	.68			
Psychological Criteria	Public	102	4.15	.56	3.82	233.32	.000
	Private	140	3.85	.65			
Technological Criteria	Public	102	4.01	.71	2.62	225.98	.009
	Private	140	3.77	.76			

Note. If P Value ≤ 0.05 reject null hypothesis (H_0)

CHAPTER 5

SUMMARY, DISCUSSION, AND RECOMMENDATIONS

The purpose of this chapter is to provide the results and conclusions of the study. Also, the purpose of it is to state the relationships to previous research, general recommendations, and suggestions for further research. Before the results, this chapter will summarize the study by providing a restatement of the research questions, the research methodology, and the data analysis procedures.

Summary

The purpose of this study was to learn about the teachers' agreement toward using iPad communication software for teaching students with autism in Saudi Arabia focusing on three criteria; cognitive, psychological, and technical. This study was conducted in Riyadh, the capital city of Saudi Arabia. A survey was distributed among special education schools. There were 242 participants between special education teachers and special education teacher's assistants in public and private special education schools. First, the study examined the participants' demographic characteristics, including gender, current position, academic qualification, years of teaching experience, years of engaging in iPad experience, and school system. Secondly, the study examined the null hypothesis by descriptive analysis and inferential statistics further analyzed the responses through

use of SPSS. The results were reported in terms of percentages, frequencies, means, and standard deviations.

The results of this study may help the Saudi education ministry consider the preparedness of teachers toward undertaking teaching practices for these students with special needs. The study also aimed to find the willingness of special education teachers toward the use of technology in the education of children with autism. The research questions that guided this study were

1. Among special education teachers in Saudi Arabia, what levels of agreement are held regarding the technical criteria to select and use software applications on the iPad to teach children with ASD?
2. Among special education teachers in Saudi Arabia, what levels of agreement are held regarding the psychological criteria to select and use software applications on the iPads to teach children with ASD?
3. Among special education teachers in Saudi Arabia, what levels of agreement are held regarding the cognitive criteria to select and use software applications on the iPad to teach children with ASD?
4. Among special education teachers in Saudi Arabia, is there a significant correlation between educational level and any of the three forms of criteria—cognitive, psychological, and technical?
5. Among special education teachers in Saudi Arabia, is there a significant correlation between years of experiences and any of the three forms of criteria—cognitive, psychological, and technical?

6. Among special education teachers in Saudi Arabia, is there a significant correlation between gender and any of the three forms of criteria—cognitive, psychological, and technical?
7. Among special education teachers in Saudi Arabia, is there a significant correlation between private or public schools and any of the three forms of criteria—cognitive, psychological, and technical?

Demographics

The majority of respondents (92.56%) were special education teachers, while (7.44%) were special education teacher's assistants. For this study, 51.24% were male teachers and 48.76% were female teachers. Regarding academic qualifications, all special education teachers and special education teacher's assistants have at least a baccalaureate degree, and most of the participants held a master's degree (85.54%), although a significant number, 10.74% held a doctoral degree. The participants of this study were almost equal in both schools: private and public special education schools. In terms of their teaching experience, teachers' experience were spread almost equally between two to ten years. Only 11.16% of the participants were in their first year of special education teaching. Likewise, the time spent using technology in teaching students with special education ranged between 2 to 10 years; and only 15.29% of the participants were in their first year of using technology.

Discussion and Recommendations

Research Questions 1–3

Research Questions 1–3 sought to learn about what levels of agreement are held regarding cognitive, psychological, and technical criteria employed to select and use

software applications on the iPad to teach children with ASD. The descriptive analysis provided insight into these questions by reflecting the mean, frequency, and standard deviation for each criterion separately, and between the three criteria in the questionnaire. Comparison between the three criteria, cognitive criterion had the highest mean (M = 4.06, SD = 0.65). Special education teachers and teachers' assistants scored high in the cognitive criteria compared to the psychological and technological criteria. Technology criteria scored the lowest (M = 3.87, SD = 0.74), which leads one to speculate that special education teachers and their assistants possessed agreement on the importance of the cognitive criteria of iPads' software. Technical criteria reflected the lowest mean between the other criteria. Because the standard deviation is higher, technology responses were more varied. It leads one to perceive that teachers and assistants had a wider range of perspectives.

Barri (2013) conducted a study on the integration of technology into the school curriculum in Saudi Arabia. His study was identifying the stages of concerns of using technology in the classroom between three types of schools in Medina City. There were interesting findings in the study about teachers' concerns in using technology. He concluded his study by stating that Saudi teachers have some ideas on how to improve the use of technology in teaching; however, these ideas are inconclusive because of the absence of basic knowledge of the technology (Barri, 2013). According to Pelgrum (2001), the success of educational innovations has a strong relationship with the teachers' computer knowledge and skills. Also, he discovered that the second most inhibiting obstacle to using computers in schools is due to the lack of knowledge, background, and skills of the teachers. Thus, knowing the importance of using technology in the

classroom is not enough. Teachers need to improve their technological skills to ensure appropriate usage of technology.

In testing the level of agreement in each criterion, cognitive criteria scored a relatively higher percentage of agreement. Almost all teachers and assistants agreed on the importance of cognitive scaffolding, goal sequence, and choosing suitable content in teaching students with ASD. The questions that scored highest agreement were Questions 1: " A picture should include cognitive scaffolding to provide help and suitable guidance to a child in building learning", 2: " Knowledge guidance shall be continuous in the program and in all its stages", and 3: " Goals shall be graded in slow and definite steps, from easy to difficult, from simple to complicated, from known to the unknown, from tangible to the abstract, to help them succeed and avoid frustrating failure in the act". The least agreement in the cognitive criteria was on some aspects related to levels of challenge. The specific questions included 15: " Contents shall include visual presentations more than written, verbal presentations", 22: " Content shall be written in a friendly way to address students as friends", and 26: " Pictures shall combine between spontaneous and multiple-choice scaffolding, at the request of the learner ".

Psychological criteria showed some agreement among the teachers and assistants. Almost 86% of the participants agreed on the importance of pictures of the content, and how it should meet the students' mental, physical, and psychological needs. Moreover, participants agreed on using appropriate and clear pictures to direct the learning to the goals and reduce rote learning. The highest agreements were in Questions 28: " A picture shall indicate directly the educational goals required of the learners", 32: " Pictures shall reduce the rote learning", and 50: " Pictures shall be suitable to the characteristics of

students of different shades of autism, their levels, abilities and skills".

However, the lowest levels of agreement were in Questions 43: " Negative enhancement shall be given after receiving wrong answers for avoiding making the same wrong answer, with caution, avoiding blame, scold or failure", and 46: " Feedback shall be given after enhancement directly in a response that requires only one step presented after a response that requires more than one step". Teachers' opinions varied in questions that asked about feedback to students' answers, especially wrong answers.

Technological criteria had interesting findings because of the wide range of participants' answers. The questions participants agreed on the most were in Questions 63: "Pictures and illustrations shall carry out suitable hints to attract student's attention to required aspects", 66: " Color should be used as in an original item, in the similar color of the original, when the color is a basic characteristic of the original", and 68: " Colors shall be clear and suitable in any combination". These questions asked about the illustration and color of items in the learning content. The questions that had various opinions from the participants were 62: " Scale of size of one illustration shall be equal to the scale of the size of real objects", 64: " The main item shall be in the center of attention in the picture or illustration, either in the middle or on the right", and 75: "Written or illustrated aspects shall be marked using suitable marks to differentiate them". These questions were asking mainly about the color, size, positions, and other technical information of content items that are appropriate for students' with ASD.

Technological criteria findings are related to findings in the literature review. Lenker and Paquet (2003) stated that the AAC in general and iPads particularly have significant impacts on outcomes for students with ASD. However, these applications are

designed based on symbols, signs, images, and pictures. Teachers should enhance their use of this technology in strategic planning and implementation (Lenker & Paquet, 2003). From the findings in the technological criteria questions, the participants in the current study have varying opinions on these application designs, and on what works best for their students. This concern helps to reveal the lack of technological standards for teachers related to teaching students with ASD, especially if using iPads' software. As Alruwaili (2016) mentioned that the government should provide suitable training for the teachers to develop their technological skills. Given these findings, I recommend hiring experts specialized in educating students with autism, to create a standardized form of the suitable cognitive, psychology, and technology criteria for students with ASD. This could be used to guide special education teachers and assistants on selecting and utilizing technology in general, and iPad software in particular in teaching. Likewise, it would be useful to establish technology centers in special education schools for designing and programming suitable software for students with ASD based on the standards. Such a center could function as a learning resource center for special education teachers.

Research Question 4

Research Question 4 sought to learn if there is a significant correlation between educational level and any of the three forms of criteria—cognitive, psychological, and technical among the study's participants. The hypothesis of this question was *There is no relationship between educational level and any of the three forms of criteria—cognitive, psychological, and technical*. After applying the Spearman rank order correlation, I found that education level is related to all three variables. The hypothesis is rejected because the positive coefficients indicate that more educated teachers and assistants

scored the items higher. This difference points out those higher educated teachers may have higher awareness of selecting the suitable software and using technology in the classroom. Alsarhan and Hamdana (2013) found that teachers with a master's degree are more willing and have a positive attitude toward using the Internet in teaching in the classroom than diploma and bachelor's holders. Additionally, the researchers assumed that the difference in the results between the teachers was attributable to more educated individuals (holders of higher degrees) having more awareness of teaching techniques. Moreover, they stated that teachers with master's degrees experienced more technology usage in their higher education studies than teachers with a bachelor's degree.

The special education bachelor program in a main Saudi university such as King Saud University includes a computer course and educational aid course as required courses. However, none of them have intensive curricular focus on utilizing a technological aid, iPad and software in particular, in teaching students with disabilities (King Saud University, 2017). I suggest designing a core course in the special education bachelor's program that focuses on the ways of selecting and using suitable programs and devises for each disability. Therefore, all special education teachers, including the bachelor holders, will be technologically aware of the appropriate usage of assistive technology for students with disabilities.

Research Question 5

Research Question 5 sought to learn if there is a significant correlation between years of experiences and any of the three forms of criteria—cognitive, psychological, and technical. The hypothesis of this question was *There is no relationship between years of experiences and any of the three forms of criteria—cognitive, psychological, and*

technical. The correlations found by the Spearman rank order correlation were positive; indicating that more experienced teachers scored the questionnaire items higher. The null hypothesis for research question 5 is rejected; teacher's years of experience are related to opinions on all three items. In his article, Nagel (2017), provide data from Project Tomorrow survey that is released in 2016 and matches the findings of this study. The study was conducted on 37,000 educators among the United States of America; the findings show that although first-year teachers are more confident in technology, they use it less than teachers with 11 or more years of experience (Nagel, 2017). Russell, Bebell, O'Dwyer, and O'Connor (2003) tested the use of instructional technology in and out the classroom. The researchers found differences between teachers' years of experience and their use of technology in the classroom. New teachers held a high level of comfort with technology and used it often for preparation. However, experienced teachers reported higher levels in using technology in the classroom and engaging students in learning activities with technology (Russell, et al., 2003).

In contrast, another study conducted by the National Center for Education Statistics (2000) stated that teachers with fewer years of experience were using computers in the classroom more than teachers with more years of experience. The study showed that teachers with three years or fewer of teaching experience reported using computers 30% of the time, while teachers with 20 years or more reported using computers only 19% of the time. However, teachers with 4 to 9 years reported 30% of the time, which is the same as to the 3 years and less experienced teachers. The researchers attributed these findings to the fact that new teachers are familiar with computers during their pre-service

training, which led to having more experience using this tool (National Center for Education Statistics, 2000).

Because of this difference in the finding, it is recommended that special education schools establish frequent workshops for their teachers to update the schools' teachers with the new programs and technology in the field. Some teachers have been exposed to computer training in their lives and other teachers have not (National Center for Education Statistics, 2000). Workshops would likely help all teachers be more familiar with computers as educational assistive devices and encourage them to use these technologies more in the classrooms. Also, as mentioned in studies above, new teachers are less confident in using technology in the classroom. Thus, these workshops can give teachers at all levels of experience the opportunity of exchanging their ideas and experiences of using technology in teaching.

Research Question 6

Research Question 6 sought to learn if there is a significant correlation between gender and any of the three forms of criteria—cognitive, psychological, and technical. The hypothesis of this question was *There is no relationship between gender and any of the three forms of criteria—cognitive, psychological, and technical*. The hypothesis was tested by the non-parametric Mann-Whitney test. The null hypothesis for research question 6 is rejected because male participants gave higher scores on all three questionnaire's criteria, and this difference was statistically significant.

In his study, Barri (2013) also found another difference between the genders of Saudi teachers in regard to using technology. His study was to seek the stages of concerns of using technology in the classroom between three types of schools in Medina

city. The findings showed that female teachers scored higher in the informational concerns, awareness concerns, and personal concerns in using technology than male teachers. However, there were no significant differences between male and female teachers in the other concerns he tested like management, consequence, collaboration, and refocusing (Barri, 2013).

Moreover, in a study conducted by Mahdi and Al-Dera (2013) about the impact of teachers' age, gender, and experience in the use of information and communication technology in EFL teaching, the results showed that there was no correlation between teachers' age and experience in using technology. However, there is a significant difference between the teachers' gender and the use of technology. For example, the findings demonstrated that 90.6% of male teachers used computers while teaching; however, 50% of female teachers used computers in their teaching. Likewise, 46.9% of male teachers had joined computer-training courses, whereas only 7% of the female teachers had joined computer-training courses. Mahdi and Al-Dera indicated in their discussion that gender is an important factor that impacts the use of computer in teaching language. However, the situation inspected in their study is unique. The Saudi school system practice of separation by gender affects the ways that female teachers use computers in their teaching. For example, computer breakdowns delay them in using it smoothly. If there is any technical error, female teachers have to wait for male IT experts to fix the problem after work hours, when there is nobody inside the campus. These obstacles might affect the use of technology by female teachers (Mahdi & Al-Dera, 2013).

The difference in the findings of this study might be due to the previous separation in schools based on gender in Saudi Arabia. Sixteen years ago, Saudi schools were separated by gender and under two different ministries. Female schools were under the General Presidency for Girls' Education, and males' schools were under the Ministry of Knowledge. Although these two ministries have been merged into one ministry, known as the Ministry of Education, Saudi schools and universities are still separated by gender (Ministry of Education, 2017). The separation in education between boys and girls might increase the difference in the outcomes in gender, and I think this is the reason for the participants' outcomes in this study.

As mentioned in the Ministry of Education website, King Abdullah's Project in Education Development, in collaboration with the Ministry of Education, created the special education standards for teachers in 2014. This project covered much of the criteria teachers should master to pass the special education teachers' test, whether these teachers will be teaching in public or private special education schools (Ministry of Education, 2017). The criteria teachers are evaluated on include having knowledge in special education concepts, growth characteristics, curriculum instruction, assessments and evaluation, IEPs, alternative services, behavior modifications, and life skills teaching technique (National Center for Assessment, 2017). These standards are established to improve special education teachers' qualifications. Nevertheless, although there is an alternative services part included in these standards, technology knowledge in specific is missing. I recommend adding an inclusive description of using technology as an assistive learning tool into these standards. As pre-service teachers come from different

backgrounds whether from private and public schools and from female and male school system, the standards will minimize the difference in teachers' qualification.

Research Question 7

Research Question 7 sought to understand if there is a significant correlation between private or public schools and any of the three forms of criteria—cognitive, psychological, and technical. The hypothesis of this question was *There is no relationship between private or public schools and any of the three forms of criteria—cognitive, psychological, and technical*. The hypothesis was tested by independent-samples *t* test. The null hypothesis is rejected and the scores show difference between the school types where public schools' teachers rated all the items higher than private schools' teachers did. The curricula in both schools are equal. Both schools are under the Saudi Ministry of Education. Both schools have to follow the ministry's system like the curriculum, school's calendar and policy (Ministry of Education, 2017).

In his article in Alriyadh newspaper Alnemr (2014) stated, there are many factors that impact teachers' qualifications in private schools, including financial factors, and job instability. Private schools' teachers work in these schools as a waiting station until they find a more stable job. The quality of teaching is not improving, the teachers' willingness is low, and teachers are not looking for changes because of some factors like low income and undefined work at private schools (Alnemr, 2014). In contrast, a qualitative study conducted by Kattan (2010) reported different opinions regarding what was written by Alnemr. Kattan interviewed some of private and public schools' teachers to seek the difference between these two sectors and their impact on quality education in Saudi Arabia. Some of the results were focusing on the teachers' performance. Kattan

stated that teachers of private schools are fresh graduates; their performance and attitudes were much better than public schools' teachers- even though their salary is low and their jobs are unstable. Also in the concept of digital literacy, private schools are equipped with advanced technology and the number of classes helps teachers to apply technology in their teaching. This is unlike public schools where the number of students and classes are higher than private schools, thus using technology, like computer laptops for example, is difficult (Kattan, 2010). In this case, there is a difference between private schools and public schools' teachers.

No matter which is better, the quality of education in Saudi Arabia must be equal between private and public school sectors. Thus, I recommend to the Department of Special Education in the Saudi Arabia Ministry of Education to make each special education school participate with international special education associations and organization like the National Association of Special Education teachers or the International Society for Technology in Education, that specialize in special education technology. Moreover, these learned societies allow teachers from both public and private schools to be updated with the new studies. Also, the ministry should require all these schools, private and public, to set up free monthly or by-term seminars or workshops to discuss the new findings from these associations. These free seminars and workshops may encourage teachers in schools, private and public schools to pursue the improvement in their teaching skills. Free training and seminars will be a good motivation for private schools' teachers to work, as these certificates might increase their professional experience.

Limitations

1. The participants in this study were limited to those special education teachers and assistants in Riyadh, the capital city of Saudi Arabia. It might be difficult to generalize to special education teachers and assistants in other cities in Kingdom of Saudi Arabia.
2. This study surveyed only special education teachers who teach in special education schools, whether private or public. The special education teachers in general education were excluded.
3. This survey only tested three criteria of a software: cognitive, psychology, and technology. Testing other areas may influence recommendations growing from the current study.
4. The truthfulness and honesty of the participants could not be controlled.
5. The participants may have interpreted the questions in different ways, and this could not be controlled. Findings may have been influenced by interpretation.

Recommendations for Future Study

The study was limited to special education teachers and assistants in public and private schools in Riyadh city. Thus, I suggest similar studies to be conduct in other regions of Saudi Arabia to investigate if the special education teachers and assistants' attitudes toward using iPads in teaching students with ASD are the same among other areas of the country or not. Regarding teachers' qualifications, I recommend conducting a similar study for technology trained and non-trained special education teachers to examine the impact of technology training on special education teachers' perceptions of productivity.

Moreover, a similar study can be done with general education teachers at the elementary, secondary, or high schools. This study was of special education teachers and assistants. However, another study could be of general education teachers because the teachers' attitudes toward using iPads in teaching are important in both school systems. Finally, I recommend a study to be conducted on preservice special education teachers who have a special education college diploma but have not start their jobs. The study might be done with individuals who have just graduated from a university with a special education major, to see if the college special education program is sufficient for technology assistive awareness in teaching students with ASD.

Summary

In this chapter, the study defined the findings and likened them to previous studies. There are recommendations provided for researchers to conduct further studies congruous to this chapter. Also, there are suggestions to elaborate on the use of technology in teaching students with ASD.

Based on the findings of this study, teachers have an awareness of the importance of using technology in teaching student with ASD. However, they need to develop their cognitive, technical, and psychological skills of selecting and using iPads software to improve communication with this specific group of students. In general, special education teachers and assistants have positive attitudes toward using iPads software in teaching students with ASD. However, the study showed that more training and workshops were needed to improve teachers' skills; especially in the three criteria of selecting and using suitable software: cognitive, psychology, and technology. Also, the

study identified significant differences in teachers' attitudes based on their gender, academic qualification, years of teaching experience, and school's type.

Some earlier studies agreed with this study; however, other studies found that there were no significant difference based on gender, school type, and teachers' level of experience and academic qualification. Besides training and workshops, adding technology skills to the special education teachers' standards that are required by the National Center for Assessment, can minimize the difference in teachers' qualification between schools.

Further, having a standardized form to follow in selecting and using assistive technology in teaching students with disabilities, will facilitate teachers' work. Students with disabilities should be allowed an equal quality of teaching. Changes to fill the gap that exists between the technology policy that is required in Saudi special education and the appropriate application to run this policy is warranted. New changes and new policies in the special education field in Saudi Arabia are advantageous if they are appropriately applied. To apply any educational method properly, qualified and trained teachers is a fundamental requirement. Good teachers are the bridge that connects the theoretical aspect and the practical application to achieve the goals, which are always for the sake of the students' improvement. Suggestions were provided to improve this issue in this chapter.

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APPENDIX A: PERMISSION TO CONDUCT RESEARCH

Dear Sir/Madame,

I am conducting a survey as part of a research study to increase my understanding of special education teachers' attitude toward selecting and using iPad software in teaching students with autism. As a special education school's principal, you are in an ideal position to give me permission to attend the school and meet the teachers.

The survey takes around 10 minutes for each teacher. The name of your school, teachers, and other personal identifiers of both will not revealed during the analysis and write up of the findings.

There is no compensation for participating in this study. However, teachers' participation will be a valuable addition to my research and findings. If you agree on letting me attend, please suggest a day and time that suits you and the teachers, and I'll do my best to be available. If you have any questions, please do not hesitate to ask.

Thank you for your time and consideration.

Sincerely,

Mashael Alshaer
812-223-3877

APPENDIX B: INVITATION LETTER

Dear Potential Participant:

I am a doctoral candidate at Indiana State University, and I am conducting a study about special education teachers' attitude toward selecting and using iPad's software in teaching students with autism. This study is being conducted as part of a dissertation in my Ph.D. program. You were selected as a possible participant because this study is aimed toward special education teachers who teach students with autism.

Participation in this study is completely voluntary. If you choose to participate, you will be provided with an informed consent that will give more details of this study. They survey will ask questions about your attitude toward selecting and using software applications to teach students with autism. If you choose to participate, your responses to the survey will be kept confidential. Please know that there is no penalty if you choose not to participate. The survey should only take around 10 minutes to complete.

If you have any questions about the study, please contact Mashael Alshaer, 1891 Cobblestone Way S, Terre Haute, IN, 47802, 812-223-3877, or Malshaer@sycamores.indstate.edu. You may also contact Dr. Noble Corey, Faculty Sponsor, at noble.corey@indstate.edu or 812-243-1927. If you have any questions about your rights as a research subject or if you feel you've been placed at risk, you may

contact the Indiana State University Institutional Review Board (IRB) by mail at Indiana State University, Office of Sponsored Programs, Terre Haute, IN, 47809, by phone at (812) 237-8217, or by e-mail at irb@indstate.edu.

Sincerely,

Mashael Alshaer

APPENDIX C: INFORMED CONSENT

Dear Potential Participant:

You are being asked to participate in a research study about special education teachers' attitude toward selecting and using iPad's software in teaching students with autism. This study is being conducted by Mashael Alshaer (Principal Investigator) and Dr. Noble Corey (Faculty Sponsor) from the Department of Curriculum Instruction and Media Technology at Indiana State University. This study is being conducted as part of a dissertation in my Ph.D. program. You were selected as a possible participant because this study is aimed toward special education teachers who teach students with autism. Your participation is completely voluntary. Please continue reading for more information about this study before deciding to participate or not.

PROCEDURES

If you volunteer to participate in this study, you will be asked to complete the survey on the following pages. Questions will ask you about your attitude toward selecting and using software applications to teach students with autism. You will rate each statement on an effectiveness scale from 1 to 5. The questionnaire will take about approximate 10 minutes to complete.

POTENTIAL RISKS AND DISCOMFORTS

As with any survey, there is the possibility of a slight discomfort as you answer some of the questions. You are free to not answer any question that makes you uncomfortable. Any known risks for participating in this research study are minimal. By participating in the study, you will not be exposed to more than minimal risks or discomforts known to Mr. Alshaer or Dr. Corey. Your participation in this study is

voluntary. By completing and giving it back to me, you are voluntarily agreeing to participate. You are free to decline to answer any particular question you do not wish to answer for any reason.

POTENTIAL BENEFITS TO SUBJECTS AND/OR TO SOCIETY

As a participant, you are not expected to benefit directly from this research. The outcomes of this study might help you and other teachers find more effective ways to select and use software as an educational aid for teaching students with autism. The information collected may not benefit you directly, but the information learned in this study should provide more general benefits.

PAYMENT FOR PARTICIPATION

There are no costs to you for participating in the study, nor will you be compensated for your participation.

CONFIDENTIALITY

This survey is anonymous. Do not write your name on the survey. No one will be able to identify you or your answers, and no one will know whether or not you participated in the study. Individuals the Institutional Review Board may inspect these records, but no names or other means of identification will be collected. Should the data be published, no individual information will be disclosed.

PARTICIPATION AND WITHDRAWL

Your participation in this study is voluntary. By clicking the bottom of this informed consent, you are voluntarily agreeing to participate. If you volunteer to be in this study, you may withdraw at any time without consequences of any kind by simply destroying the survey and/or not turning it in to Mr. Alshaer. You are free to decline to

answer any particular question you do not wish to answer for any reason. No other contact will be made.

If you have any questions about the study, please contact Mashael Alshaer, 1891 Cobblestone Way S, Terre Haute, IN, 47802, 812-223-3877, or Malshaer@sycamores.indstate.edu. You may also contact Dr. Noble Corey, Faculty Sponsor, at noble.corey@indstate.edu or 812-243-1927

RIGHTS OF RESEARCH SUBJECTS

If you have any questions about your rights as a research subject or if you feel you've been placed at risk, you may contact the Indiana State University Institutional Review Board (IRB) by mail at Indiana State University, Office of Sponsored Programs, Terre Haute, IN, 47809, by phone at (812) 237-8217, or by e-mail at irb@indstate.edu. You will be given the opportunity to discuss any questions about your rights as a research subject with a member of the IRB. The IRB is an independent committee composed of members of the University community, as well as lay members of the community not connected with ISU. The IRB has reviewed and approved this study.

I understand the procedures described above. My questions have been answered to my satisfaction, and I agree to participate in this study. I have been given a copy of this form.

_____

Printed Name of Subject

_____

Signature of Subject Date

APPENDIX D: SURVEY QUESTIONS

Personal information

Please answer these questions:

1. Your current occupation:

( ) Teacher ( ) teacher's assistant

2. School system

( ) Public School ( )Private School

3. Gender:

( ) male ( ) female

4. Academic qualification:

( ) Bachelor ( ) Master ( ) Doctoral

5. teaching experience in teaching students with Autism:

( ) first year ( ) 2-6 years

( ) 7-10 years ( ) over 10 years

6. Experience in using technology for teaching students with Autism:

( ) 0 years ( ) first year

( ) 2-6 years ( ) 7-10 years

( ) over 10 years

To respond to this survey, please follow the instructions below:

Cognitive Criteria:

To what extent you agree on the following criteria to apply for students with Autism learning using iPad tablets by checking on the appropriate choice:

	Criteria	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	A picture should include Cognitive Scaffolding to provide help and suitable guidance to a child in building learning.					
2	Knowledge guidance shall be continuous in the program and in all its stages.					
3	Knowledge guidance shall be suitable to the nature of response and characteristics of students.					
4	Instructions and knowledge guidance will be through definite steps “short and quick”					
5	Goals shall be graded in slow and definite steps, from easy to difficult, from simple to complicated, from known to the unknown, from tangible to the abstract, to help them succeed and avoid frustrating failure in the act.					
6	Content will be connected directly with educational goals set for the students’ needs.					

7	Content shall be suitable and sufficient to achieve the educational goals					
8	Content will cover all objectives, ideas, concepts, and behaviors that are included in the subject area.					
9	Content shall conform to integration and complete link with experiences introduced by the picture					
10	Content shall be familiar to the students, linked to life experience through which they live and problems they face.					
11	Content shall be suitable to the mental abilities and former experiences of students.					
12	Content of activities and presentations, educational aids are varied include suitable life experiences, educational games pictures, fixed and movable, enlarged figures to suit student's low abilities.					
13	Activities, presentations shall be attractive, thrilling, and innovative to attract the attention of the students.					
14	Activities shall be simple, clear as much as possible concentrating on tangible experiences.					
15	Contents shall include visual presentations more than written, verbal presentations.					

16	Content shall include life skills like applications to concepts, processes and behaviors suitable to students.					
17	Content shall be organized and presented in the light of principles and theories compatible to teaching and learning.					
18	Content shall be presented in a series of pictures in accordance to graded, serial pictures, in accordance with steps and be organized, one followed with other performances.					
19	Steps and performance shall be short because of short attention span of students.					
20	Content shall be present in an attractive and thrilling way suitable to those students.					
21	Content shall be written in a way to help students build their special learning skills, to encourage them to interact and participate positively in those activities.					
22	Content shall be written in a friendly way to address students as friends.					
23	Content shall be written with the least number of short sentences and be in simple structures.					

24	Educational goals shall be written in few and quick steps based one on the other.					
25	Content applications and drills shall be presented more than once, yet through different and in a variety of shapes.					
26	Pictures shall combine between spontaneous and multiple-choice scaffolding at the request of the learner.					

Psychological Criteria:

	Criteria	Strongly disagree	disagree	Neutral	Agree	Strongly Agree
27	A picture shall include one concept, or one process, or one behavior.					
28	A picture shall indicate directly the educational goals required of the learners.					
29	Pictures included shall contribute to achieve knowledge skills, tactile, psychological skills that suit the variety levels of Autism.					
30	Goals shall be practically and clearly phrased; defines what the learner is supposed to do and carries out after learning.					
31	Goal of behaviors shall include only one clear action to be carried out, and only one response of behavior, such as to point to the “L” letter at the beginning of a word.					
32	Pictures shall reduce the rote learning.					
33	Interactive input should be used to train students on communication and social interaction with others.					

34	Real functional life like input shall be used to present functional knowledge linked to the lives of students.					
35	Self-Care input shall be used to present behavioral activities that help students to take care of themselves and create self-independence in all one's activities of life.					
36	Integration between inputs, strategies, and methods shall be used.					
37	A picture shall encourage students to positively participate and to put out more effort in the learning process.					
38	A student shall be given an opportunity in accordance with his abilities, readiness and speed of learning.					
39	A picture shall include ways, simple tools suitable to students to participate.					
40	A picture shall promote student's response immediately, to indicate whether a response is right or wrong.					
41	Enhancement shall be continuous, be in response to the students' choice.					
42	A picture should only use the positive enhancement of					

	students' response which includes reward (praise, encouragement reward) after giving the correct answer, to support and develop correct response.					
43	Negative enhancement shall be given after receiving wrong answers for avoiding making the same wrong answer, with caution, avoiding blame, scold or failure.					
44	Enhancement shall be clear and definite in meaning, familiar and can be understood by the students.					
45	Enhancement shall be given in an attractive and thrilling method that combines sound, words, voice, pictures and illustrations.					
46	Feedback shall be given after enhancement directly in a response that requires only one step presented after a response that requires more than one step.					
47	Feedback shall be clear and easily understood by students.					
48	Strategy shall include the following steps: A: activate students'					

	response. B: Transitional, building training for each assignment. C: Often suitable enhancement and feedback to a response.					
49	Pictures shall be suitable to the educational experiences students go through (direct experience, alternative, or abstract experiences).					
50	Pictures shall be suitable to the characteristics of students of different shades of Autism, their level, abilities and skills.					

Technological Criteria:

	Criteria	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
51	Written statement shall be reduced to the minimum					
52	Texts shall be written in easy, simple words. Familiar words of those learners reducing as much as possible any new words.					
53	Words shall be definite in meaning, not words that carry more than one meaning.					
54	Texts shall be written in separate paragraphs; each paragraph shall carry only one concept or only one idea.					
55	Pictures and fixed illustrations shall be used functionally and in accordance with educational needs to achieve definite goals, not to exaggerate in their use without any need. When a program includes those, student's attention will be diverted from the educational, original purpose of the program.					

56	Photographic pictures shall be avoided and used only to describe apparent shapes of things that do not need the aspect of movement.					
57	Cartoon illustrations in diagrams shall be used to present events, operations, movements, and behaviors.					
58	Pictures and illustrations shall be suitable to achieve the functions defined in the presentations.					
59	Pictures and illustrations will be likable by students such as in cartoon characters.					
60	Pictures and illustrations shall be supplied by written information, verbal and aural comments in a suitable way.					
61	Pictures or illustrations shall be set in a frame so that students can realize it as one unit.					
62	Scale of size of one illustration shall be equal to the scale of the size of real objects.					
63	Pictures and illustrations shall carry out suitable hints to attract student's attention to required aspects.					
64	The main item shall be in the center of attention in the picture or illustration, either					

	in the middle or on the right.					
65	Pictures or illustrations shall be integrated with the written texts or aural comments in a suitable way.					
66	Color should be used as in an original item, in the similar color of the original, when the color is a basic characteristic of the original.					
67	color shall be used as an original influence in order to : -describe things, events and actions and behaviors.					
68	colors shall be clear and suitable in any combination.					
69	Simple colorful symbols will used in accordance to the knowledge of students.					
70	Picture shall attract students in learning to request them to response in a behavior to any defined thrillers in the pictures.					
71	Desired behavior shall include hints and clues, or indicators to help a student give a correct answer at the first time, such as writing the word in large type of font, and make the color of the square in bright red and correct behavior in a large					