THE DEVELOPMENT OF ATTENTION SKILLS AMONG CHILDREN WITH AUTISM IN JORDAN USING OF NUMBERS AND LETTERS IN ARABIC LANGUAGE (NLAL) APPLICATIONS IN IPAD AND POWERPOINT

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LIST OF ABBREVIATIONS

ABA	Applied Behavior Analysis
AD	Attention Deficit
ADHD	Attention Deficit Hyperactivity Disorder
ADI-R	Autism Diagnosis Interview-Revised
ADOS	Autism Diagnostic Observation Schedule
APA	American Psychological Association
ASD	Autism Spectrum Disorder
AT	Assistive Technology
CAST	Childhood Asperger Syndrome Test
CBI	Computer-Based Interventions
CC	Central Coherence Theory
CDD	Childhood Disintegrative Disorder
CHAT	Checklist for Autism in Toddlers
DSM-IV	Diagnostic and Statistical Manual of Mental Disorders
DT	Dietary Therapy
DV	Dependent Variables
ED	Executive Dysfunction Theory
EFs	Executive Functions
EMB	Extreme Male Brain Theory
E-S	Empathizing–Systemizing Theory
ESAT	Early Screening of Autistic Traits
FC	Facilitated Communication
GARS-2	Gilliam Autism Rating Scale-Second Edition
HD	Hyperactivity Disorder
HT	Holding Therapy
IDEA	Individuals with Disabilities Education Improvement Act
IEP	Individualized Education Plan
IV	Independent Variables

LEA	Language Experience Approach
MA	Mental Age
MMPI-2	Minnesota Multiphasic Personality Inventory-Second Edition
MOE	Ministry of Education
MSD	Ministry of Social Development
MT	Music Therapy
NLAL	Numbers and letters in Arabic language
PBS	Positive Behavior Support
PCT	Perceptual Control Theory
PDA	Personal Digital Assistant
PDD- NOS	Pervasive Developmental Disorder Not Otherwise Specified
PE	Physical Exercise
SID	Sensory Integration Disorder
SIT	Sensory Integration Therapy
SST	Social Skills Training
TEACCH	Treatment and Education of Autistic and Related Communication Handicapped Children
ToM	Theory of Mind
WCC	Weak Central Coherence Theory
WISC-IV	Wechsler Intelligence Scale for Children–Fourth Edition

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PERKEMBANGAN KEMAHIRAN MEMBERI TUMPUAN DALAM KALANGAN KANAK-KANAK AUTISME DI JORDAN MENERUSI PENGGUNAAN *NUMBERS AND LETTERS IN ARABIC LANGUAGE* (NLAL) DALAM iPad DAN POWERPOINT

ABSTRAK

Kajian ini bertujuan untuk mengkaji perkembangan kemahiran memberi tumpuan dalam kalangan kanak-kanak autism di Jordan menerusi penggunaan *Numbers and Letters in Arabic Language* (NLAL) dalam iPad dan PowerPoint. Objektif kajian ini adalah untuk menyelidik penerimaan dalam kalangan guru-guru kanak-kanak autisme terhadap penggunaan aplikasi NLAL dalam iPad dan NLAL dalam PowerPoint untuk perkembangan kemahiran memberi tumpuan dalam kalangan kanak-kanak autisme di Jordan. Selain itu, kajian ini juga menyelidik sama ada terdapat peningkatan dalam kemahiran memberi tumpuan, penghalaan tumpuan, mengekalkan tumpuan, pengalihan tumpuan, dan berkongsi tumpuan dalam kalangan kanak-kanak autisme di Jordan hasil daripada penggunaan aplikasi NLAL dalam iPad dan NLAL dalam PowerPoint. Kajian ini juga menyelidik sama ada terdapat perbezaan peningkatan dalam kemahiran memberi tumpuan, penghalaan tumpuan, mengekalkan tumpuan, pengalihan tumpuan, dan berkongsi dalam kalangan kanak-kanak autisme di Jordan berdasarkan umur mereka hasil daripada penggunaan NLAL dalam iPad dan NLAL dalam Persembahan PowerPoint. Seterusnya, kajian ini mengkaji sama ada terdapat hubungan di antara perkembangan kemahiran memberi tumpuan, penghalaan tumpuan, mengekalkan tumpuan, pengalihan tumpuan, dan berkongsi tumpuan dalam kalangan kanak-kanak autisme di Jordan berdasarkan umur. Kajian ini merupakan sebuah kajian kuasi-eksperimen di mana sampel bagi kajian ini terdiri daripada 30 kanak-kanak autisme (25 lelaki dan 5 perempuan),

berusia berusia antara 3 dan 13 tahun, dan 15 orang guru perempuan. Untuk pengumpulan data, kajian ini telah mengunakan ujian untuk kemahiran tumpuan di samping borang temubual guru. Ujian-t, *gain score*, ANOVA Sehala, dan korelasi separa telah digunakan dalam kajian ini untuk menganalisis data daripada ujian pra dan ujian pasca. Secara umum, dapatan kajian ini menunjukkan bahawa penggunaan NLAL dalam aplikasi iPad dan dalam PowerPoint telah berjaya meningkatkan kemahiran memberi tumpuan, penghalaan tumpuan, mengekalkan tumpuan, beralih tumpuan, dan berkongsi tumpuan dalam kalangan kanak-kanak autisme di Jordan. Semua guru yang mengajar kanak-kanak autisme juga telah mengesyorkan penggunaan aplikasi NLAL dalam iPad dan NLAL dalam PowerPoint dalam pembangunan kemahiran tumpuan dalam kalangan kanak-kanak autisme di Jordan.

THE DEVELOPMENT OF ATTENTION SKILLS AMONG CHILDREN WITH AUTISM IN JORDAN USING OF NUMBERS AND LETTERS IN ARABIC LANGUAGE (NLAL) APPLICATIONS IN IPAD AND POWERPOINT

ABSTRACT

This research was focused to study the development of attention skills among children with autism in Jordan using of numbers and letters in Arabic language (NLAL) applications in iPad and PowerPoint. The objective of this research was to investigate the acceptance among teachers of children with autism regarding the using of NLAL apps in iPad and NLAL in PowerPoint presentations in the development of attention skills among children with autism in Jordan. In addition to investigate whether there is a development in (attention skills, orienting attention, sustaining attention, shifting attention, and joint attention) among children with autism in Jordan due to the using of NLAL apps in iPad and NLAL in PowerPoint presentations. Also, the research studied whether there is a difference in the development in (attention skills, orienting attention, sustaining attention, shifting attention, and joint attention) among children with autism in Jordan based on their age due to the using of NLAL apps in iPad and NLAL in PowerPoint presentations. Furthermore, this research also find out whether there is a relationship between the development of (attention skills, orienting attention, sustaining attention, shifting attention, and joint attention) among children with autism in Jordan and their age group due to the using of NLAL apps in iPad and NLAL in PowerPoint presentations. This research employed a quasi-experimental approach. The sample of this research consists of 30 children with autism (25 males and 5 females), aged between 3 and 13 years old, 15 female teachers for these children are included in the sample. The research used test for attention skills in addition to teacher interview

form. Independent sample t-test, gain score, one-way ANOVA, and partial correlation were used in this research to analyze the data from pretest, posttest. In general, the findings from this research shows that using of NLAL in iPad applications and in PowerPoint presentations developed attention skills in general and even orienting attention, sustaining attention, shifting attention, and joint attention among children with autism in Jordan. Also all the teachers of children with autism recommend using NLAL apps in iPad and NLAL in PowerPoint presentations in the development of attention skills among children with autism in Jordan.

CHAPTER ONE

INTRODUCTION

1.1 Introduction

Autism is one of the most mysterious developmental disabilities because of the difficulty in determining its causes as well as its strange patterns of unadaptive behavior. This developmental disability is an ambiguous disorder with symptoms overlapping with other disorders and disabilities. The classification of this disorder since its discovery until today reflects the multiple and variable interests of past researchers. The types of autism include the Retts disorder, the childhood disintegrative disorder (CDD), the Asperger disorder, the autism spectrum disorder (ASD), and the pervasive developmental disorder, not otherwise specified (PDD-NOS) (Hansen & Rogers, 2013; Sapp, 2008; Wahlberg, Rotatori, Deisinger & Burkhardt, 2003).

In 1977, the World Health Organization classified autism as a diagnostic category, and the American Psychological Association (APA) in 1980 considered it as a comprehensive developmental disorder (Dietert, Dietert & DeWitt, 2011; Khateeb et al., 2007). Autism affects the social, linguistic, and behavioral aspects of one's childhood. Various definitions have been introduced to explain this disorder. Autism has been described as a disorder in speed or sequence of growth, in the response stimulus, in speech, language, capacity of knowledge, and in the attachment and belongingness to people, events, and topics. These symptoms normally appear in

a child before his/her 30th month. The parents and clinicians who work with children with autism know that the attention of these children is atypical and may affect the triad of the core features of such disorder, namely, communication deficits, impairments in social relatedness, and restricted and repetitive behaviors and interests (Kaale, Smith & Sponheim, 2012; Patten & Waston, 2011).

Considering the continuous advancements in technology, many studies have emphasized the importance and benefits in using assistive technology (AT) on children with disabilities, such as computer-based interventions (CBIs), computerized games, and other advanced technological devices and software. The latest technology is the iPad. Since its invention and introduction in the market, a number of studies have discussed how iPad can help children with disabilities in general and children with ASD in particular (Beaumont & Sofronoff, 2008; Douglas, Wojcik, & Thompson, 2012; Florou et al., 2009; Goldsmith & LeBlanc 2004; Kay, 2012; McClanahan, Williams, Kennedy, & Tate, 2012; Newton & Dell, 2011; O'Malley et al., 2013; Purdue Research Foundation, 2013; Rahman, Ferdous, Ahmed, & Anwar, 2011; Ramdoss et al., 2011; Saylor & Rodriguez-Gil, 2012; Siegle, 2013; Veenstra, 2011).

This research aimed to determine the use of numbers and letters in Arabic language (NLAL) applications in iPad and PowerPoint in development of attention skills (AS) among children with autism in Jordan. NLAL was used to describe the application "Numbers and Letters in Arabic Language" in both platforms iPad and PowerPoint presentations using a laptop.

This chapter is organized as follows. First, the research background is provided. Second, the problem statement, research objectives, questions, hypotheses, and the importance and definition of terms used are presented. Finally, the limitations and framework of the research are cited.

1.2 Background of the Research

Special education programs are provided to students with special needs to enable them to adapt themselves according to their abilities and potential behaviors (Jordan, 2006). The official statistics in Jordan show that in 2004, 60,364 persons had disabling conditions, with a prevalence rate of 1.3%. Approximately 60.6% of this population were male (Hamza Al Shoura., & Aznan Che Ahmad, 2014). Hamza Al Shoura and Aznan Che Ahmad (2014) asserted that Jordan is a developing country that lacks natural and economic resources and has therefore depended on external aid, particularly from western and Arab Gulf countries. This circumstance has been the result of the constant conflict in the Middle East and the increasing number of refugees escaping to Jordan. Therefore, Jordan depends more on its investment in human resources than in economic resources.

Jordan began to offer services for special education at the end of the 1960s. In particular, an institute was established, offering services to people who are deaf, blind, and cognitively impaired (i.e., with mental retardation) (Al Jabery & Zumberg, 2008; Melhem & Mohd Isa, 2013).

Bataineh (2009) claimed that the special education in Jordan underwent a massive development when the United Nations declared 1981 as a universal year for people with special needs. This declaration led to significant recommendations that helped elevate the conditions of this particular population. Jordan has become one of the leading Arab countries in this regard owing to the considerable attention it has given to the matter, emphasizing that retardation is a problem that needs resolution in addition to other beneficial undertakings, including drawing up activities and developing and implementing polices for providing the best educational, training, counseling services and institutional care for all people with special needs according to their abilities and aptitudes.

The government of Jordan maintains, provides, and develops special education programs for all concerned categories. These programs include schools, special day and residential schools, resource rooms in government schools, and comprehensive centers for vocational rehabilitation. Jordan's authorities have issued new laws and legislations to help the persons with special needs, who have obtained privileges through the Law for the Welfare of Disabled Persons (1993), attain a respectable life. This particular law gives precedence to the integration of all children with special educational needs in regular classrooms (Bataineh, 2009).

Since 1997/98, the Division of Special Education of the Ministry of Education (MOE) in Jordan has provided educational services to students with special needs and slow learners through 121 and 205 learning resource rooms, respectively, distributed in various education directorates. Other private institutions also offer services to students with different disabilities through private funds under

the supervision of the MOE and the Ministry of Social Development (Al Jabery & Zumberg, 2008; Jordan, 2006).

Ancillary services are also offered through the joint effort of all public and private institutions in Jordan, including assessment and diagnostic services as well as special education and related services, such as early intervention, day care, residential, and inclusion services. These institutions include 400 resource rooms for students with learning disabilities and nine schools that provide services for hearing impairments, rehabilitation, and vocational employment. Around 144 institutions and 400 resource rooms in Jordan provide their services to about 13,275 students, of which 7,380 are females, and 5,895 are males (Al Jabery & Zumberg, 2008).

The Jordan MOE (2006) confirmed that they have developed facilities to cope with the technological advancements to correspondingly enhance the country's educational facilities by constructing educational computer laboratories, establishing learning resource centers with advanced educational tools for learning, and using modern technology in the curriculum and textbooks of the students. These developments reflect the role and importance of using technology in education. The Ministry of Information and Communications Technology in Jordan (2007) mentioned that 36% of Jordanian families have computers, whereas 64% do not have because of their financial inability. This situation illustrates the economy level of Jordanian families.

Hamza Al Shoura and Aznan Che Ahmad (2014) emphasized that one of the basic challenges encountered in providing special education programs is the inadequacy of educational funding, especially in new innovations, such as in the area of AT and relevant instructional techniques that need a huge amount of funding.

Table 1.1 Numbers of Institutions for Disabilities in Jordan

	Type of Handicap	Public	Private	Organization	International Organizations	Total
1	Cognitive Impairment	13	25	30	1	69
2	Hearing Impairment	12	0	11	0	23
3	Visual Impairment	1	0	2	1	4
4	Physical handicap	0	0	4	1	4
5	Cognitive/hearing Impairment	0	1	6	0	7
6	Autism	0	2	0	0	2
7	Multiply Handicap	3	2	9	9	23
8	Cerebral Palsy	0	0	10	0	10
9	Cognitive/Cerebral palsy Handicap	0	1	0	0	1
	Total	29	31	72	12	144

Source: (Al Jabery and Zumberg, 2008)

The table presented above shows that only two private institutions cater to the needs of children with autism. This situation implies that insufficient services are allotted for such population of children compared with those that have other disabilities and that public schools have no experience in attending to the special needs of these children.

Al Jabery and Zumberg (2008) mentioned that the teaching methods used in these institutions need to be updated to improve the quality and quantity of services provided and gain new supplementary instruction that can increase the efficiency and quality of such services for students with disabilities. All public, non-profit, and private service organizations should offer new services such as vocational rehabilitation, prevention services, early medical, social, technological support services, and family services.

This research failed to obtain further official information and details about the programs for children with ASD in Jordan. Hamza Al Shoura and Aznan Che Ahmad (2014) mentioned that such insufficiency in the available information is one of the major challenges for special education programs in Jordan, which relates to the lack of the national data information about and the special education programs for children with the disability in the country. Melhem and Mohd Isa (2013) reported that no exact statistics on the propagation or the proportion of individuals with special needs in Jordan is affected in future planning. These researchers also asserted that a wide database needs to be set up to cover all the information on disability in the country for the easy access by the decision makers, professionals, and researchers.

Al-Bataineh (as cited in Khaled, Mohammad, & Ghaleb, 2015) suggested that Jordan needs to establish further comprehensive policies to meet the needs of students with disabilities by recruiting additional number of qualified teachers, developing in-service training, and increasing the funding for special education.

The number of services offered to children with ASD remains inadequate, and the teaching methods used for this population need to be updated. Several recent studies showed the importance and benefits of using AT on children with disabilities in general and children with ASD in particular. AT includes hardware and software (i.e., CBIs, PowerPoint presentations, and other technology devices and software) and iPad applications that teach and develop the skills of these children (i.e., communication, social, and cognitive skills, which include attention and memory) (Douglas, Wojcik, & Thompson, 2012; Huang, Clark,& Wedel,2013; Kay,2012; McClanahan, Williams, Kennedy, & Tate, 2012; O'Malley et al., 2013; Pelangka, 2011; Huang, Clark, & Wedel, 2013).

1.3 Problem Statement

The Centers for Disease Control and Prevention of the United States (2012) mentioned that the prevalence estimated for ASD continuously increases and that this disorder has become an important public health concern. The government statistics showed that the prevalence rate of autism generally increases by 10%–17% annually (Guzic, Tonkin, Roberts, & Demuth, 2011).

The American Psychiatric Association (2000) indicated that the children with ASD exhibit three different aspects: (i) impairment in social skill deficits; (ii) impairment in verbal and communication skills; and (iii) restrictive, repetitive, and stereotyped patterns of behavior, interests, and activities (Moss & Howlin, 2009; Mukuria & Obiakor, 2008). These children also exhibit a number of distinguished characteristics; they suffer from memory problems and disturbance in attention,

hyperactivity, rapid dispersion, and loss of interest in missions shortly after their engagement (Moss & Howlin, 2009). In addition, numerous children with ASD encounter problems with regard to their cognitive and knowledge skills and display repeated behavioral and cognitive patterns (Khateeb et al., 2007; Low Hui Min & Lee Lay Wah, 2011).

Martins and Harris (2006), Patten and Waston (2011), and Riby, Brown, Jones, and Hanley (2012) examined the characteristics of AS among children who suffer from ASD and looked into how their AS can be improved with the help of teachers considering the importance of attention in learning, social responsiveness, and communication. These researchers particularly focused on the orienting, sustaining, shifting, and joint attentions of the children. Orienting attention refers to the initial physical adjustment toward a stimulus. Sustaining attention is one's ability to maintain his/her attention over an extended period of time. Shifting attention pertains to the case in which an individual disengage from one stimulus and then shift and reorient to a new stimulus. Finally, joint attention is the shared attention between two individuals and an object or another individual.

Most children with ASD have attention problems such as inability to follow head turn, eye gaze, and pointing; difficulty to fixate on a particular stimulus while ignoring other stimuli; inability to disengage from one stimulus and then shift their attention to a new stimulus; deficit in their ability to use joint attention gestures to engage other people to share their attention to an object; and inability to respond to their names. Most instruments that screen for ASD have included a test for screening AS given the increasing number of children who have problems with regard to their

AS (Brereton, 2010; Jiang, Capistrano, Esler, & Swallow, 2013; Kaale, Smith, & Sponheim, 2012; Lawton & Kasari, 2012; Martins & Harris, 2006; Murray et al., 2008; Patten & Waston, 2011; Riby, Brown, Jones, & Hanley, 2012; Schietecatte, Roeyers, & Warreyn, 2012).

The importance of including AS in the programs for children with ASD has been reported. Many other studies support the use of AT, which includes computer, computer software (PowerPoint presentations), computerized games, and tablet computers (i.e., iPad technology and its applications), to improve the skills of children with ASD, such as their attention, communication, and social skills (Aronin & Floyd, 2013; Beaumont & Sofronoff, 2008; Blood, Johnson, Ridenour, Simmons, & Crouch, 2011; Coleman, 2009; Conn, 2012; Douglas, Wojcik, & Thompson, 2012; Giannopulu & Pradel, 2010; Gulchak, 2008; Kay, 2012; Malley, Lewis, & Donehower, 2013; McClanahan, Williams, Kennedy, & Tate, 2012; Price, Howard, & Winslow, 2011; Rahman, Ferdous, Ahmed, & Anwar, 2011; Saylor & Rodriguez-Gil, 2012; Sahin & Cimen, 2011; Shah, 2011; Siegle, 2013; Staley, 2012; Stromer, Kimball, Kinney & Taylor, 2006; Tanaka et al., 2010; Wu et al., 2007). Numerous studies have proven that the use of computers positively affects AS. Reynolds and Baker (as cited in Rajabi & Ketabi, 2012) mentioned that presenting lessons and educational materials through computers can increase the attention and learning of the students; when the students' attention is increased, their learning is increased as well. Using such advanced programs is compatible with the learning style of children with ASD given that they are visual learners (Aliee, Jomhari, Rezaei, & Alias, 2013; Fan, 2012).

Swettenham (as cited in Durkin, 2010) presented three main reasons why children with ASD are attracted to computers. First, computers do not involve any social factors. Second, computers are consistent and predictable. Third, computers allow children to take active control and determine the pace of their chosen activity. Nonetheless, the iPad has more advantages than computers because it features touch screen actions, which are easier than using a keyboard or mouse, and has a number of free and low-cost apps. Thus, some studies have confirmed that an educational iPad game can increase the sustained attention of children with ASD; the attention span of these children is sustained when they interact with the iPad for a long period of time (Huang, Clark & Wedel, 2013; Ogura, Coco, & Bulat, 2007; Pelangka, 2011).

Many previous studies specified that this new technology should be investigated further and should be implemented for children with ASD. Apple Inc. has allocated a special category of applications for children with ASD on the iPad. These applications vary from those made for education and for various children with special needs. Google indicates that a total of 3,020,000 results when searching for: iPad applications for children with ASD. This condition indicates the increasing interest on this subject despite the recent use of the iPad

Despite the growing interest on and the programs offered to children with ASD in Jordan, the education, training, and rehabilitation for these children in public and private schools continue to focus on traditional teaching methods, which are based on the use of simple means and teachers' methods (AL Jabery & Zumberg, 2008). Some studies have emphasized the importance and benefits of using AT, including PowerPoint and iPad applications (Douglas, Wojcik, & Thompson, 2012;

Huang, Clark, & Wedel, 2013; Kay, 2012; McClanahan, Williams, Kennedy, & Tate, 2012; O'Malley et al., 2013; Pelangka, 2011; Huang, Clark, & Wedel, 2013). However, these techniques are yet to be used in Jordan to formally train and rehabilitate children with ASD.

Hamza Al Shoura and Aznan Che Ahmad (2014) highlighted the need to set up information technology (IT) centers in Jordan to design AT, technical aides, and instructional strategies to meet the different needs of disabled children in line with the current orientations of the development of education technology strategy for all students in the country. All the previous findings about the use of AT in Jordan were supported by Mayada, Hatem, and Khalid (2008). These researchers specified that the special education teachers at schools in Amman, Jordan insufficiently use educational programs (i.e., Word, PowerPoint, graphic related programs, and educational games) and information and communication technology (ICT). Moreover, the use of AT is new and extremely limited in Jordan given the difficulty in accessing the Internet and the lack of educational programs and devices for students with special needs.

The number of available studies on children with ASD, especially those related to the use of AT in general and iPad applications and PowerPoint presentations in particular, remains limited in Arab countries (e.g., Jordan). Therefore, this topic should be studied thoroughly in the Jordanian society. The researcher is interested in special education and autism because she has taught students with disability at private and public schools for many years. Hence, she understands the need for such kind of study.

The use of AT (i.e., computer, computer software, handheld computers, and classroom technology) should be integrated into the special education programs. The teachers' acceptance of the use of computers is an important factor to the successful use of AT in education (Adiguzel, Capraro, & Willson, 2011; Aypay, Coşkun Çelik, Aypay, & Sever, 2012). Therefore, this research examines the acceptance of teachers in using PowerPoint and iPad applications to teach children with autism.

Despite the tremendous increase in the role of AT in education and the high acceptance from teachers for using this technology for teaching, the frequency of use of such technology among the teachers remains low because of their low confidence, lack of professional development opportunities, and their preference in using such technology that is influenced by a number of personal, behavioral, and environmental factors. These reasons can be classified as technology acceptance constructs. The personal and behavioral factors that affect the teachers' use of such technology are attitude, perceived ease of use, perceived usefulness, self-efficacy, and computer compatibility. The environmental factors subjective norm and job relevance may also contribute to or inhibit the performance of teachers in using computers (Adiguzel, Capraro, & Willson, 2011; Aypay, Coşkun Çelik, Aypay, & Sever, 2012; Kumar, Che Rose, & Lawrence D'Silva, 2008; Nam, Bahn, & Lee, 2013).

Murad (2014) mentioned that the teachers in Jordan do not use AT in classrooms despite their acceptance of its importance because of the lack of sufficient numbers of computers in classrooms, insufficient time to employ ICT in teaching, poor training on how to use ICT in teaching, and the inadequate number of educational software that can be used as teaching materials. These findings were also supported by Al Amayra, 2003; Al-Barakat and Bataineh, 2008; and Mayada, Hatem, and Khalid, 2008.

Therefore, the problem statement of this research focuses on the following issues:

i. The difficulties experienced by children with ASD in terms of their AS and those that affect the other aspects of their daily lives.

ii. Studies have proven the effectiveness of AT (i.e., computer, PowerPoint presentations, and the iPad) in educating children with ASD. These programs are considered for their visual support, which is consistent with the learning style of children with autism, and the role of teachers' acceptance for using such technology to teach children with ASD.

iii. The teaching of children with ASD in Jordan focuses on traditional methodologies and old styles of education.

Thus, this research looked into the use of numbers and letters in Arabic language (NLAL) applications in iPad and PowerPoint in development of attention skills (AS) among children with autism in Jordan. The study generally responds to the call of previous research recommendations to further investigate such topic in the Arab context (i.e., Jordan). Thus, the significance of this research constitutes an attempt to narrow the existing gap in the literature on the said topic.

This research particularly investigated the NLAL in both iPad applications and PowerPoint presentations, which are different types of AT that can improve the quality of life of children with ASD. Chapter 3 explains the justifications for using NLAL. Subsection 3.6.3 mentions that the content of NLAL is not one of the research objectives, and the researcher only uses it as a tool that refers to the lack of applications in Arabic language.

The researcher studied two types of AT of visual learning programs to obtain further evidence that the different types of AT that help children with ASD (i.e., iPad applications and PowerPoint presentations) are user-friendly, cheap, and available in the Jordanian society compared with other types of AT. Al Jabery and Zumberg (2008) specified that the teaching methods used in most institutions in Jordan need to be updated to improve the quality and quantity of the services provided. Moreover, Fan (2012) mentioned that the majority of the children with ASD are visual learners and that the teaching methods of teachers and the learning styles of students (preferences for learning) should be compatible because they may affect the motivation, lifelong learning patterns, and academic performance levels of the children.

Therefore, this research investigated the use of numbers and letters in Arabic language (NLAL) applications in iPad and PowerPoint in development of attention skills (AS) among children with autism in Jordan.

1.4 Research Objectives

This research aimed to:

i. Investigate whether there is a development in attention skills, (orienting attention, sustaining attention, shifting attention, and joint attention) among children with autism in Jordan due to the using of NLAL applications in iPad and in PowerPoint presentations.

ii. Investigate whether there is a difference in the development in attention skills, (orienting attention, sustaining attention, shifting attention, and joint attention) among children with autism in Jordan based on their age due to the using of NLAL applications in iPad and in PowerPoint presentations.

iii. Investigate whether there is a relationship between the development of attention skills, (orienting attention, sustaining attention, shifting attention, and joint attention) among children with autism in Jordan and their age group due to the using of NLAL applications in iPad and in PowerPoint presentations.

iv. Investigate the acceptance among teachers of children with autism regarding the using of NLAL applications in iPad and in PowerPoint presentations in the development of attention skills among children with autism in Jordan.

1.5 Research Questions

This research attempted to answer the following questions:

i. Is there a development in attention skills, (orienting attention, sustaining attention, shifting attention, and joint attention) among children with autism in Jordan due to the using of NLAL applications in iPad and in PowerPoint presentations?

ii. Is there a difference in the development in attention skills, (orienting attention, sustaining attention, shifting attention, and joint attention) among children with autism in Jordan based on their age due to the using of NLAL applications in iPad and in PowerPoint presentations?

iii. Is there a relationship between the development of attention skills, (orienting attention, sustaining attention, shifting attention, and joint attention) among children with autism in Jordan and their age group due to the using of NLAL applications in iPad and in PowerPoint presentations?

iv. What is the acceptance of teachers of children with autism regarding the using of NLAL applications in iPad and in PowerPoint presentations in the development of attention skills among children with autism in Jordan?

1.6 Research Hypotheses

The hypotheses that drive this research are listed below; this research intended to examine the following hypotheses:

Ho1: There is no significant difference in the development of attention skills, (orienting attention, sustaining attention, shifting attention, and joint attention) among children with autism in Jordan due to the using of NLAL applications in iPad and in PowerPoint presentations.

Ho2: There is no significant difference in the development of attention skills, (orienting attention, sustaining attention, shifting attention, and joint attention) among children with autism in Jordan based on their age due to the using of NLAL applications in iPad and in PowerPoint presentations.

Ho3: There is no significant relationship between the development of attention skills, (orienting attention, sustaining attention, shifting attention, and joint attention) among children with autism in Jordan and their age group due to the using of NLAL applications in iPad and in PowerPoint presentations.

1.7 Importance of the Research

The significance of this research is derived from the importance of the following issues: children with ASD, the AS in general, the four aspects of AS (i.e., orienting, sustaining, shifting, and joint attention), and the use of AT, including iPad applications and PowerPoint presentations. This research enriches the theoretical frameworks for children with ASD and the use of NLAL applications on the iPad and PowerPoint in the development of the AS of children with autism in Jordan. This research is the first to look into the use of iPad applications and PowerPoint presentations among children with ASD in Jordan.

The results of this research can improve the understanding of the effectiveness of using AT on children with ASD and introduce appropriate changes that can enhance the quality of the programs for children with ASD.

This research also shows the importance of activating AT in the educational, rehabilitative, and assistance programs for children with ASD in the Jordanian society, which suffers from a lack of this kind of study. Thus, this research satisfies the shortage in studies on special education, autism education, and the use of AT (i.e., iPad and its applications and PowerPoint presentations) in educating children with ASD in the Jordanian context. Hence, this research contributes to the current scientific knowledge and information on this field in Jordan and on a global scale.

1.8 Definition of Terms

1.8.1 Autism

Autism is a comprehensive developmental disorder affects social, linguistic, and behavioral aspects of the individual‘s childhood. Various definitions have been introduced to explain autism. One of these definitions describes autism as a disorder in speed or sequence of growth, and disorder in the responses stimulus, disorder in speech, language, capacity of knowledge, and disorder in the attachment and belonging to people, events and topics, this should appear in the child before age of 30 months. This particular definition was adopted in this research (Kaale, Smith & Sponheim, 2012; Patten & Waston, 2011).

1.8.2 Attention Skills (AS)

Attention is the cognitive process of selectively concentrating on one aspect of the environment while ignoring other things. Attention also refers to the allocation of processing resources. AS can be classified into orienting, sustaining, shifting, and joint attentions. Orienting attention refers to the initial physical adjustment toward a stimulus. Sustaining attention shows one’s ability to maintain his/her attention over an extended period of time. Shifting attention requires the individual to disengage from one stimulus, and then shift and reorient to a new stimulus. Finally, joint attention refers to the shared attention between two individuals and an object or another individual (Patten & Watson, 2011; Young & Bramham, 2012).

1.8.3 PowerPoint Presentations

A PowerPoint presentation is created using the Microsoft PowerPoint software, and it is a collection of individual slides that contain information about a certain topic. PowerPoint presentations are commonly used in business meetings and for training and educational purposes. The slides in presentations may contain text, images, graphics, and other media (i.e., audio clips and movies, sound effects, and animated transitions), which add extra appeal to the presentation (Boyce et al., 2007). Murray (2003) mentioned that PowerPoint is a program that combines all kinds of presentation tools to help create effective, impressive, and professional-quality presentations. PowerPoint works as a visual aid for conducting presentations (Wang, 2007).

1.8.4 iPad

The iPad is a tablet computer developed by Apple Inc. on April 3, 2010. This handheld computer is smaller than a typical laptop but is significantly larger than an average smartphone. The iPad does not have a keyboard or a track pad but has a touch screen interface, which is used to control the device (Gliksman, 2013).

1.8.5 NLAL

NLAL refers to the content of two iPad applications and two PowerPoint presentations that include *N*umbers and *L*etters in *A*rabic *L*anguage, which was investigated in this research.

1.8.6 Assistive Technology (AT)

The Tech Act of 1988 (Alper and Raharinirina as cited in Nkabinde, 2008) stated that an "assistive technology device" refers to any item, piece of equipment, or product system, whether acquired commercially, modified, or customized, that is used to increase, maintain, or improve the functional capabilities of individuals with disabilities; "device" includes hardware, software, and stand-alone devices (Nkabinde, 2008).

1.9 Limitation of the Research

Limitations are the conditions beyond the control of the researcher that may restrict the conclusions of the research and their application to other situations. The present research and its contributions have certain limitations that need to be considered.

The first limitation is the research sample; the researcher acknowledge that the sample does not follow the research requirement, because really severe availability of respondent on a severe limitations. Therefore, the generalization of the findings of this study should be limited to only the population described and cannot be applied to any other group. This research only involved a total of 30 children with autism, with 25 males and 5 females. The gender of the children with ASD was not taken as a variable because of the difficulty in determining enough number of female children with ASD; the prevalence rate of autism is four times more common in males than females, which imposes other limitations on the research (Dolah, 2013; Hillman, Snyder, & Neubrander, 2007; Mukuria & Obiakor, 2008; Nichols, Moravcik, & Tetenbaum, 2009; Wahlberg, Rotatori, Deisinger, & Burkhardt, 2003).

The research was conducted at a private center in Amman, the Jordanian capital, owing to financial and permission constraints. However, only 30 children with autism at the center met the participant selection criteria of this research. Future studies should look into large samples to yield increasingly conclusive results.

The second limitation of this research refers to the age of the respondents. Children below 3 years and above 13 years were excluded from the research because of the restriction related to the number of children with ASD.

The third limitation refers to the limited literature on the use of AT with children with disabilities in Jordan.

1.10 Conceptual Framework

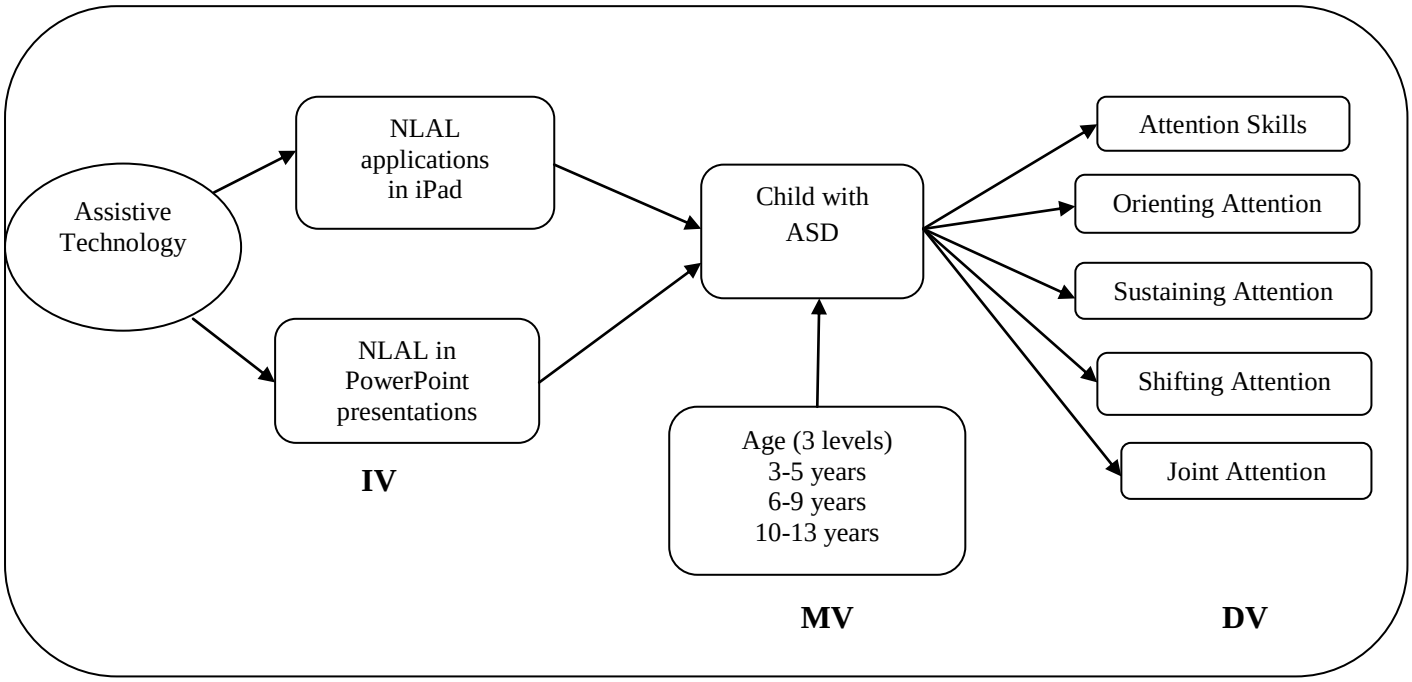

Figure 1.1 Conceptual framework

Figure 1.1 above shows the conceptual framework of the research, while the independent variables IV include both of using NLAL in iPad applications and in PowerPoint presentations with laptop computer as an examples of assistive technology, the dependent variables DV includes: Attention skills, orienting attention, sustaining attention, shifting attention, and joint attention. In addition to the age of the children with ASD in the sample of this research as a moderator variables MV. The researcher have been studied the effect of the independent variables on the dependent variables in three levels of the age of the children.