KNOWLEDGE AND USE OF APPLIED BEHAVIOR ANALYSIS AMONG TEACHERS OF
STUDENTS WITH AUTISM SPECTRUM DISORDER IN SAUDI ARABIA

By

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To the Faculty of Washington State University:

The members of the Committee appointed to examine the dissertation of ABDULHADI ALI ALOTAIBI find it satisfactory and recommend that it be accepted.

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KNOWLEDGE AND USE OF APPLIED BEHAVIOR ANALYSIS AMONG TEACHERS OF 
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Abstract 
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Chair: Darcy Miller. 

Autism Spectrum Disorder (ASD) has become more prevalent in recent decades. 
Most of the research supports the use of Applied Behavioral Analysis (ABA) techniques to 
reduce disruptive behaviors with students with ASD. However, little is known about the 
level of knowledge and frequency of use of ABA based strategies of teachers of students 
with ASD. This study surveyed 158 male and female teachers of students with ASD from 
various ASD programs in public schools and institutes in seven major cities in Saudi Arabia 
(Riyadh, Jeddah, Makkah, Al-Madinah, Al-Dammam, Abha, and Hail). The survey was 
administered to the participants using Qualtrics, a secure online survey tool. 

The results indicate that female teachers reported to have a higher level of knowledge 
and a higher frequency of use for the 16 ABA strategies more than male teachers considered 
in this study. Teachers with ABA training or who had previously participated in a behavior 
management course also tended to have higher levels of knowledge and frequency of use of 
ABA strategies compared to their counterparts. The results also indicate that there are some 
factors that affect the receptivity of various educators to an array of teaching strategies. 
Findings from the study are expected to help policy formation to improve the preparation of 
and training programs for teachers of students with ASD in Saudi Arabia.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACKNOWLEDGEMENTS</td>
<td>iii</td>
</tr>
<tr>
<td>ABSTRACT</td>
<td>iv</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>viii</td>
</tr>
<tr>
<td>DEDICATION</td>
<td>x</td>
</tr>
<tr>
<td>CHAPTER</td>
<td></td>
</tr>
<tr>
<td>1. CONTEXT AND STATEMENT OF PROBLEM</td>
<td>1</td>
</tr>
<tr>
<td>The Education System in Saudi Arabia</td>
<td>6</td>
</tr>
<tr>
<td>Laws and Policies Regarding People with Disabilities in Saudi Arabia</td>
<td>11</td>
</tr>
<tr>
<td>Statement of Problem</td>
<td>12</td>
</tr>
<tr>
<td>Purpose of the Study</td>
<td>13</td>
</tr>
<tr>
<td>Rationale for the Study</td>
<td>14</td>
</tr>
<tr>
<td>2. LITERATURE REVIEW</td>
<td>16</td>
</tr>
<tr>
<td>History of Autism Spectrum Disorder</td>
<td>16</td>
</tr>
<tr>
<td>Categories of Autism Spectrum Disorders</td>
<td>18</td>
</tr>
<tr>
<td>Causes of Autism Spectrum Disorder</td>
<td>20</td>
</tr>
<tr>
<td>Characteristics of Children with Autism Spectrum Disorder</td>
<td>22</td>
</tr>
<tr>
<td>Prevalence of Autism Spectrum Disorder</td>
<td>24</td>
</tr>
<tr>
<td>Intervention for Autism Spectrum Disorders</td>
<td>26</td>
</tr>
<tr>
<td>Conclusion</td>
<td>44</td>
</tr>
<tr>
<td>3. METHODS</td>
<td>47</td>
</tr>
<tr>
<td>Research Design</td>
<td>47</td>
</tr>
<tr>
<td>Participants</td>
<td>49</td>
</tr>
</tbody>
</table>
Instrumentation

Data Collection and Analysis

4. RESULTS

Response Rate

Demographic Information

Relationship between Selected Variables

Teachers’ Level of Knowledge of ABA Strategies

Teachers’ Frequency of Use of ABA Strategies

Regression on Average Level of Knowledge and Frequency of Use of ABA Strategy

Ordinal Logistic Regression of each ABA Strategy

Importance of Activities and Learning Opportunities

Frequency of Conditions as Barriers to Implementation

Importance of Desired Training and Resources

Regression on Average Effectiveness of Learning Opportunities

Regression on Average Barrier to Use ABA strategies

Regression on Average Desire for ABA Training

5. DISCUSSION

Knowledge of ABA Strategies

Frequency of Use of ABA Strategies

Demographic Characteristics and Knowledge and Frequency of Use of ABA Strategies

Effectiveness of Instructional Techniques
Frequency of Conditions as Barriers of Implementation.................................123
Desired Training and Resources........................................................................123
Limitations of the Study...................................................................................124
Conclusion........................................................................................................125
REFERENCES...............................................................................................................130

APPENDIX

A. APPROVAL LETTER FROM MINISTRY OF EDUCATION IN SAUDI ARABIA TO CONDUCT SURVEY AND INTERVIEW.............................................161
B. RESEARCH STUDY CONSENT FORM...............................................................163
C. SURVEY INSTRUMENT....................................................................................168
D. MODEL SUMMARY FROM LINEAR REGRESSION.............................................178
LIST OF TABLES

1. Summary of validity evidence.................................................................53
2. Frequencies and percentages of demographic characteristics within sample........57
3. Frequencies and percentages of demographic characteristics within sample........59
4. Frequencies and percentages of demographic characteristics within sample........60
5. Frequencies and percentages of demographic characteristics within sample........61
6. Frequency of Teachers Who Completed an ABA Course..........................62
7. Frequency of Teachers With Prior ABA Training....................................62
8. Frequency of Teachers By Gender and Educational Unit..........................63
9. Frequency of Teachers By Educational Unit and Number of Students in the Autism Programs.................................................................63
10. Participants’ Levels Knowledge of ABA Strategies..................................70
11. Participants’ Frequency of Use of ABA Strategies....................................77
12. Estimates From Linear Regression on the Average of the Participants’ Responses to the Survey.................................................................82
13. Estimates From Ordinal Logistic Regression on the Teachers’ Level of Knowledge of Each (ABA) Strategy...................................................87
14. Estimates From Ordinal Logistic Regression on the Teachers’ Level of Knowledge of Each (ABA) Strategy...................................................92
15. Participants’ Experiences with and Perceptions of the Effectiveness of Learning Opportunities.................................................................97
16. Participants’ Perceptions of the Conditions as Barriers to Implementation........101
17. Percentage of Responses for Desired Training and Resources ........................................ 104

18. Linear Regression on Average of Learning Opportunities, Barriers and Desire for Training .......................................................... 107
DEDICATION

To my parents Ali and Sarra

To my wife Seham and my children Osama, Yara and Jaber.
CHAPTER ONE

Context and Statement of Problem

Autism spectrum disorder (ASD) has become more prevalent in recent decades. The Centers for Disease Control, (CDC, 2014) reported that approximately 1% of the world’s population has ASD. Generally, the annual prevalence for ASD are calculated by dividing the number of children in a specific age group diagnosed as autistic at any given time, by the number of all children in the specific age group in that year. The above global estimate of 1% prevalence rate for ASD is based on children at 8 years old because most children with ASD are identified by this age. The Centers for Disease Control (CDC) reported an increase in ASD in the US from 1 in 86 in 2007 (Halfon and Kuo. 2013) to 1 in 68 by 2014 (CDC, 2014). In 2009, a study indicated higher rates of 157 in 10,000 in the United Kingdom (Baron-Cohen, Scott, Allison, Williams, Bolton, Matthews, & Brayne, 2009).

Studies from outside North America and Europe, however, find lower rates of ASD (Al-Farsi, Al-Sharbati, Al-Farsi, Al-Shafae, Brooks, & Waly, 2011, Zaroff, & Uhm, 2012). In India, the estimated rate of ASD is 1 in 250 (Hughes, 2011); in Bahrain (Al-Ansari and Ahmed, 2013) and the United Arab Emirates (Mostafa, 2011) the rate is 4.3 and 2.9 out of 10,000 children, respectively. Reports from Oman indicate the rate of ASD is 1.4 per 10,000 (95% CI: 1.2 – 1.7) (Al-Farsi et al., 2011). In Saudi Arabia, the rate is 4-6 in every 1,000 children (Aljaralla, Alwazna, Alansary, & Alhazmy, 2006). A recent estimate from Saudi Arabia found a relatively lower rate of 1.8 per 1,000 children (Al-Salehi, Al-Hifthy, & Ghaziuddin, 2009). These lower rates are partly due to under-diagnosis and under-reporting. Published and anecdotal information from Saudi Arabia suggest a variable but higher and increasing rate of
ASD (Zeina, Al-Ayadhi, & Bashir, 2014), suggesting a need for investigation of diagnostic practices and behavioral intervention approaches in these regions.

Perception and understanding of ASD has evolved since it was identified by Leo Kanner in the 1940s. Over the past decade, the fifth edition of the American Psychiatric Association’s Diagnostic and Statistical Manual of Mental Disorders (DSM-5) (Dobson, 2014) has been revised several times, merging diagnoses such as Autistic Disorder (AD); Asperger’s Syndrome/Disorder (AS); Child Disintegrative Disorder (CDD); and Pervasive Developmental Disorder, Not Otherwise Specified (PDD-NOS) into a single umbrella term, Autism Spectrum Disorder (ASD) (Lai, Lombardo, Chakrabarti, & Baron-Cohen, 2013).

Diagnosing ASD requires complex, time consuming, and comprehensive personal behavioral assessments (Blumberg, Bramlett, Kogan, Schieve, Jones, & Lu, 2013). While there is broad agreement in the diagnostic criteria of ASD, cultural differences, means of investigation, parental factors, and interventions influence diagnosis (Zaroff & Uhm, 2012). Diagnostic criteria for ASD were also changed in the DSM-5 (American Psychiatric Association, 2013). Prior to DSM-5, the autism spectrum was identified under the Pervasive Developmental Disorders category, which includes Pervasive Developmental Disorder, Not Otherwise Specified (PDD-NOS), Autistic Disorder, and the Asperger’s Disorder. Since DSM-5, these disorders have a separate diagnostic label with further distinctive characteristics based on their severity and are no longer under Pervasive Developmental Disorder (APA, 2013). In addition, Rett Disorder is no longer under ASD.

The potential for integration of individuals with ASD into the mainstream society greatly depends on appropriateness of educational interventions offered. Effective use of intervention strategies have the potential to reduce substantially the full cost of educating and supporting
children with ASD because interventions can alter the trajectory of the disorder and the needs of these individuals. Most often, when it comes to special education, a limiting factor is the lack of skilled teachers than the intervention approaches (Mazin, 2011). Accordingly, the perceived level of knowledge and use of appropriate educational techniques by teachers of children with ASD has received great attention in developed countries (Al-Wabli, 1996). Yet, this has not been well studied in most developing countries, including Saudi Arabia. To this end, the focus of this dissertation research is on the understanding and use of behavioral intervention approaches by teachers of students with ASD in Saudi Arabia.

Given the increasing prevalence rates of ASD in Saudi Arabia, there is a need for more and better educational services for these children. One aspect of this is a need for well-trained teachers (Mazin, 2011). Teachers with college degrees have been found to be more successful in working with children with ASD than are teachers with less training (Dillenberger, Keenan, Gallagher, & McElhinney, 2004). Effective teachers of children with ASD can adapt and modify the curriculum using a variety of tools and strategies (Gustafson, 2006). The difference between successful and unsuccessful teachers may be as simple as effective use of a variety of strategies and depth of knowledge. However, too few teachers are adequately prepared to meet the needs of these children (Schwartz & Drager, 2008). The preparation of teachers of children with ASD is not well studied (Mazin, 2011). This is true in Saudi Arabia and around the world (Zeina et al., 2014).

A major purpose of special education is to promote meaningful outcomes for children with disabilities (West, 1991). The CDC estimates that 1 in 68 US children are diagnosed with a disorder in the PDD spectrum (CDC, 2014). Due to the rising number of individuals with ASD, the importance of preparing teachers to teach students with PDD cannot be overemphasized
IDEA mandated effective interventions to support learning for children with ASD. Two major intervention approaches are therapeutic and educational (Smith, 1996). Established evidence is lacking to support non-behavioral special education classes, individual therapies, and biological interventions (except major tranquilizers) as effective treatments for children with ASD (Smith, 1996). Treatments such as Facilitated Communication and psychoanalysis, are quite harmful and are not only not recommended for Individuals with ASD, but must be avoided (Smith, 1996). Indeed some major tranquilizers are suggested as alternatives to behavioral treatment for managing disruptive behavior, but have serious major side effects and are not recommended as first-line interventions, but only as a last resort. Additional research is warranted on the effectiveness of some of the new biological treatments (Prozac, Anafranil, naltrexone, and B6 with magnesium) for ASD (Smith, 1996). Accordingly, methods applied for therapeutic intervention are not consistent or universal and only add to the confusion for professionals as well as concerned families regarding their application for children with ASD (Patten, Baranek, Watson, & Schultz 2013). In contrast, behavioral treatments have much more scientific support than other interventions for children with ASD (Maurice, Green, & Luce, 1996). Specifically, applied behavior analysis (ABA) has been found to be the most commonly used educational intervention in a US national survey of 552 participants (Green, Pituch, Itchon, Choi, O’Reilly, & Sigafoos, 2006).

Applied behavior analysis (ABA) is perhaps the most comprehensive and effective approach to improve the lives of children with children with ASD and their families (Lindgren, & Doobay, 2011). The approach also attempts to establish a clear functional relationship
between treatment and outcome, and focuses heavily on generalization of socially important
skills to the natural environment (Boutot, & Hume, 2012). The most successful early
intervention programs for children with ASD to date are based on ABA. ABA relies on teaching
alternative pro-social behavior to manage problems and aberrant behavior such as self-injurious,
ritualistic, repetitive, aggressive, and disruptive behavior and has no serious major side effects.
ABA has been shown to work very effectively not only with children, but also with individuals
of all ages, resulting in significant improvements in social and communication skills in across
settings (Steege, Mace, Perry, & Longenecker, 2007).

The National Professional Development Center on Autism Spectrum Disorders (NPDC-
ASD) (2010) identified the following evidence-based practices for students with ASD as
effective and able to improve outcomes: functional behavior assessment, functional
communication training, picture exchange communication system, discrete trial training, pivotal
response training, antecedent-based interventions, reinforcement, parent implemented
interventions, prompting, reinforcement, and social skills (NPDC- ASD, 2010). However, these
evidence-based practices must be used in concert with professional teachers who have the
wisdom to achieve maximum outcomes for children with ASD (Cook, Tankersly, and Landrum,
2009).

To better assist children with ASD, studies of ABA and of teachers’ knowledge of ASD
are needed. Thus, the goal of this study is to better understand what teachers of students with
ASD know about ABA, and their knowledge and use of ABA strategies in assisting these
children. It is hoped that this study will inform policy development in Saudi Arabia to improve
the knowledge of teachers of children with ASD and to streamline ABA training programs for
teachers.
The Educational System in Saudi Arabia

Four special characteristics that underlie education in Saudi Arabia are an emphasis on Islam, a centralized educational system, a separate education for men and women, and financial support from the state. The Saudi Arabian educational system was founded in 1932. Before establishing modern education, children were taught to read and memorize the Holy Quran and adults were taught Islamic sciences, economics, and other fields in the mosques (Alabdulkareem, 2004). After Saudi Arabia was founded in 1932, there were only 700 students in 12 schools in the whole country (Alamri, 2011) and these schools mostly served children of wealthy families. With the discovery of oil in 1938, however, this system changed rapidly.

The establishment of the Saudi Ministry of Education in 1953 marked the beginning of modern education. King Fahd Ibn Abdulaziz was appointed the first Minister of Education; he guided an unprecedented expansion and modernization of educational resources. Many more schools and school districts were created, expanding public education throughout the country (Saudi Arabian Cultural Mission, 2006). In 1958, Saudi Arabia and other members of the League of Arab States, agreed upon a unified system of education that “provided for a 6-year elementary, a 3-year intermediate and a 3-year secondary cycle with a separate higher education program” (Saudi Arabian Cultural Mission, 2006, p.1). The plan stressed a basic philosophy for the successful modernization of Saudi Arabia. “This philosophy was based on two major principles: 1) developing needed human resources through education and training, and 2) building a comprehensive economic infrastructure. Due to their importance to the National Development Plans, human resources development along with infrastructure, economic resources and social resources, including education, were given high priority” (Saudi Arabian Cultural Mission, 2006, p.1).
The Ministry of Education supervises education for students in Saudi Arabia, along with other government organizations—the Ministry of Labor and Social Affairs and the General Organization for Technical Education and Vocational Training that offers vocational and technical training for students (Althabet, 2002). The Ministry of Education is also responsible for the establishment and maintenance of the schools and development of curriculum (Ministry of Education, 2008). Male and female students study at separate schools and are taught by teachers of the same gender. The Ministry of Education provides free education to all students at all grade levels including students with disabilities.

Today, the educational system comprises 25 public and 27 private universities, about 30,000 schools and a large number of colleges and other institutions. The educational system is open to all citizens, and provides students with free education, books, and health services. Educational levels in Saudi Arabia include pre-school, elementary, secondary, high schools, undergraduate, and postgraduate levels. The core of the Saudi Arabian educational system is still based on Islamic philosophy with students enrolled in Islamic classes from primary grades through higher education. Yet, the modern Saudi educational system also provides quality instruction in diverse fields of arts and sciences. The instructional medium in Saudi Arabia remains Arabic, while English is taught from fourth grade onwards. Educational approaches rely on US and UK curricula (Alquraini, 2011) to better prepare citizens to work in a global economy (Saudi Embassy to the United States, 2013).

**Special education in Saudi Arabia.** “Individuals with disabilities in Saudi Arabia did not obtain any type of special education services prior to 1958” (Alquraini, 2012, p.170). Al-Noor Institute in Riyadh for male students who were blind was the first special education program in Saudi Arabia. Started independently, infrastructure facilities were provisioned by the
Ministry of Education. The success of the program led to the establishment of the first organized special education school in Riyadh, Saudi Arabia by the Ministry of Education in 1960—The Institute of Light for the Education and Training of the Blind (The Directorate General of Special Education, 1981). The Ministry established the Special Education Department in 1962 to provide learning and rehabilitation services for students who are blind, deaf, and for those students with cognitive disabilities (Afeafe, 2000). Two years later, in 1964, the first school for blind students (girls only) was opened. In the same year, the Alamal Institute (Institute of Hope) in Riyadh was established to provide education, training, and care for deaf children, one for boys and another for girls. In 1971, the first specialized institute for students with intellectual disabilities opened (The Directorate General of Special Education, 1981).

In 1974, the Ministry of Education established the General Secretariat of Special Education (GSSE), previously the General Directorate for Special Education Care. Distinct departments organized under GSSE coordinate educational program for students with one or more of the following conditions – intellectual disabilities, hearing impairments, visual impairments, learning disabilities, gifted and talented, emotional and behavioral disorders, speech and language disorders, physical disabilities, or autism disorder (Alfaiz, 2006). Schools for students with disabilities increased from one school in 1960 to twenty seven schools in 1987. Presently, there are 28 schools for the deaf students, 10 schools for the blind students, and 16 schools for students with cognitive disabilities (Saudi Arabian Cultural Mission, 2006). The Ministry of Education is responsible for providing free education and appropriate services for all students with disabilities (Ministry of Education, 2008).

**Educational settings and curriculum.** The type of disability determines the extent of inclusion in Saudi schools. Almost 96% of students with multiple and severe disabilities (e.g.,
ASD) are currently taught in private special education institutions (Saudi Arabian Ministry of Education, 2008) where they do not interact with typically developing students with no disabilities in inclusive settings. Because of this, they miss opportunities to improve communication, social, and academic skills (Alquraini, 2012). In addition to being provisioned with basic services like food and shelter, these students also receive individual education programs (IEPs) based on the special education curriculum designed by the Ministry of Education (Alquraini, 2011). “The IEPs often do not meet their unique and individual needs; instead these students should receive IEPs based upon the general curriculum” (Alquraini, 2011, p.151). Related Services for Students with Disabilities (RSEPI) mandates that all children with disabilities must receive services in either special education institutes or public schools. The private special education institutions lack speech and language pathologists, occupational therapists, and physical therapists who can provide services to those students with disabilities (Al-Wabli, 1996).

Students with mild and moderate cognitive disabilities (including students with ASD) receive their education in classrooms attached to public schools. “They do share some time with their typically developing peers in non-curricular activities such as lunch or recess. The schools provide special education curriculum to these students, which is different than the general curriculum provided their typically developing peers” (Alquraini, 2011, p. 151).

There are approximately 40 ASD programs in the public schools and the Intellectual Education Institutes affiliated with the Ministry of education throughout Saudi Arabia. All of these centers and institutions are located in the main cities and provide services to meet the needs of students with ASD (Zeina et al., 2014). There are about 2000 students with ASD belonging to both genders receiving educational services in these programs in Saudi Arabia (Personal
communication, Special Education Supervisors, Ministry of Education in Saudi Arabia, 2014). All of these centers use a comprehensive Treatment and Education of Autistic and Related Communication Handicapped Children (TEACCH). TEACCH employs one to one support in various intervention approaches for training children with ASD including ABA, Early Intensive Behavioral Intervention (EIBI), Hawaii Early Learning Profile (HELP), Psycho Educational Profile, and the third edition of the Picture Exchange Communication System (PECS) (PEP-3) (Zeina et al., 2014, p.488).

The following are procedures for admitting children with ASD into these programs in the schools and institutes:

- The child should be between 6 and 15 years of age for admission.
- The child should not have any other challenges that prevent him/her from benefitting from the program.
- The child should be diagnosed by a team of specialists.
- Be subject to a period of notice for no less than a full semester before the final acceptance or non-acceptance.
- Approval of the Special Committee should be given to accept the classification of students according to the regulations of the institutions and programs of special education.
- Students remain in the program until the end of the program or until they reach the age of 21, whichever comes first (Ministry of Education, 2014).

**Teacher preparation.** As stated earlier, a major purpose of special education is to promote meaningful outcomes for children with disabilities (West, 1991). Alnahdi (2013)
examined teachers’ attitudes and perceptions toward transition services, one such special education venture, for students with mild intellectual disability in Saudi Arabia. It was found that teachers’ attitudes differed with their level of teaching experience and level of experience with disability. No differences in attitude were found based on gender or educational background. While the teachers’ attitudes toward transition services were positive, overall they felt unprepared to provide transition services.

The attitudes of teachers of students with ASD are not different from other teachers of students with disabilities as far as their opinions regarding the need for training is concerned (Al-Wabli, 1996, Alnahdi, 2014). It is important to meet the professional development needs of teachers who work with children with ASD and to provide appropriate services in schools and institutions. Providers should be highly qualified to teach children with ASD. Consequently, there is a need to survey the knowledge and use of applied behavior analysis among teachers of students with ASD in Saudi Arabia using an in-depth questionnaire.

Laws and Policies Regarding People with Disabilities in Saudi Arabia

Regulations regarding special education programs and institutes (RSEPI). Modeled after US law, the Ministry of Education in Saudi Arabia issued the RSEPI in 2001 to formulate special education policy for people with disabilities and to determine eligibility for special education services (Alquraini, 2011). “Under the RSEPI, all children with disabilities are entitled to a free and appropriate education, individual education programs, early intervention programs, related services, and transition services. The RESPI also specifies how schools must provide these services to students with disabilities. Thus, RSEPI supports the quality of the special education services in Saudi Arabia” (Alquraini, 2011, p.151).
Legislation affecting people with disabilities. The first legislation for individuals with disabilities was passed in 1987 in Saudi Arabia. The legislation contains important provisions that guarantee the rights of people with disabilities and equality with other members of the community without discrimination. The legislation also defines disabilities and procedures for diagnosis, evaluation and description of intervention, prevention, and services to determine the maturity of special education services and training programs to support the independence of people with disabilities (Alquraini, 2011; Ministry of Health Care, 2012).

Code for people with disabilities. The Disability Code of 2000 passed by the government of Saudi Arabia guarantees free educational, medical, and social services for people with disabilities (Alquraini, 2011). This legislation required public agencies to help people with disabilities to find appropriate services (education, health, psychological, social, training, rehabilitation, etc.) (Prince Salman Center for Disability Research, 2012).

Statement of Problem

Research has demonstrated a shortage of teachers qualified to serve children with ASD (Sack-Min, 2008; Simpson, 2004). The number of students with ASD has increased in the last decades (Centers for Disease Control, ADDM, 2014) and teachers are still making efforts to teach these students. There is a lack of research on what teachers of students with ASD need to know to teach their students effectively (Mazin, 2011). In Saudi Arabia, where ASD is more common than other disabilities the prevalence of students with ASD presents a challenge for teachers (Al-Dawaideh & Al-Amayreh, 2013). Before this study, it was not clear how knowledgeable regarding ABA the teachers of students with ASD in Saudi Arabia are or how much they use ABA strategies, if at all. It was also not clear how certain factors, such as demographic characteristics, affect the teachers’ knowledge and use of ABA strategies.
The effect of gender on the teachers’ knowledge and use of ABA strategies is ambiguous. For example, female teachers were reported to have a positive attitudes more than male teachers toward improving the education of students with autism (Al-Abduljabar, 1994), while male teachers showed more positive attitudes than females on issues concerning special education (Al-Ahmadi, 2009; Al- Wabli, 1982). Other studies have no significant differences in attitudes across gender (Hussain, 2010, Alnahdi, 2013). Alnahdi (2014) reported that teachers had negative perceptions of the preparation they received to offer transition services for students with intellectual disabilities. Although, no differences in their perception by gender or educational background were observed, teachers felt unprepared to plan or deliver transition services. It is not clear how knowledge and use of ABA strategies by teachers of students with ASD varies by gender, education, and experience.

**Purpose of the Study**

The purpose of this study was to examine perception of teachers of students with ASD in Saudi Arabia in terms of their knowledge and use of ABA strategies. This study also examined their perceived barriers to the use of ABA. The findings will be disseminated in the field of Special Education and also reported to the Ministry of Education, to inform policy development on the preparation and training of teachers of students with ASD on ABA strategies in Saudi Arabia. It is expected that the findings will help faculty members in special education departments in Saudi Arabian universities develop appropriate training programs in the use of ABA for teachers of students with ASD, both at the preservice and inservice levels. Such programs will help to improve the skills of these teachers and improve classroom performance.
Rationale for the Study

Autism spectrum disorder (ASD), a pervasive development disorder (PDD), is one of the most common disabilities in Saudi Arabia (Al-Dawaideh & Al-Amayreh, 2013). Students with ASD need appropriate services, but also education. Education or special education is a fundamental right. These individuals need teachers who are trained in proven, research-based techniques, such as ABA. Yet, in Saudi Arabia, as in many other countries, little research has been done on the level of knowledge of teachers of students with ASD. Similarly, there is a lack of research that can inform us about appropriate preparation and training programs for teachers of students with ASD in Saudi Arabia.

Currently, limited research in this area points to the need for substantial development to improve the skills and knowledge of Special Education teachers in Saudi Arabia (Aljaralla et al. 2006). There is a shortage of services for children with ASD in Saudi Arabia (Zeina et al., 2014). Additionally, there is a lack of centers to provide services. Given the lack of knowledge about the symptoms and diagnosis of ASD and with nearly half of the country’s population below 15 years of age in a population of 29 million, the total number of ASD cases is likely far higher than current estimates. Furthermore, anecdotal evidence indicates that the rate of ASD is increasing (Zeina et al., 2014). As the number of centers specializing in serving students with ASD increases, so will the need for teachers who are highly qualified and knowledgeable about ASD programs, especially those with knowledge of ABA principles (Jaffe, 2010).

This study seeks to explore the following questions:

1. Which ABA strategies do teachers of students with ASD perceive themselves to be knowledgeable about and to what extent?
2. Which ABA strategies do teachers of students with ASD perceive themselves to use
in their classrooms and how frequently?

3. Are there significant differences in the perceived knowledge of teachers across different demographic variables (gender, teaching experience, teaching certification, and training in ABA)?

4. Are there significant differences in the perception of frequency of use of ABA strategies by teachers across different demographic variables (gender, teaching experience, teaching certificate, and training in ABA)?

5. How effective have learning opportunities been in supporting the teachers learning about the behavior strategies?

6. What conditions do teachers of students with ASD perceive as barriers to their use of behavior management strategies and how frequently do they encounter these barriers?

7. What training and resources on behavior management strategies do teachers of students with ASD perceive as the most desired for successful implementation of ASD programs?
CHAPTER TWO

Literature Review

This chapter presents a review of the literature on areas related to research on the extent of knowledge and use of applied behavioral analysis as an intervention approach by teachers of students with ASD in Saudi Arabia. This chapter includes a discussion of the history, definitions, categories, causes and interventions of ASD. Finally, this chapter contains an analysis of the research on applied behavior analysis, different teaching strategies used in ABA, intervention programs based on ABA and the merits of ABA. The detailed review of literature is presented to furnish a coherent look at the varied aspects of ASD as well as the merits and limitations of various intervention approaches.

History of Autism Spectrum Disorder

The term “autism” has its origin in the Greek word “autos” meaning “self” and describes a condition in which a person is removed from social interaction. The term was used first by Eugen Bleuler, a Swiss psychiatrist around 1911 (Gadia, Tuchman, & Rotta 2004) to refer to a group of symptoms of schizophrenia (Pearson, 2008). Dr. Leo Kanner, from John Hopkins University and the psychiatrist who first used the term “autism” in 1943 to describe a developmental disorder in children with emotional or social problems. In 1943, he studied eleven children who shared several distinctive features before the age of three. His paper, Autistic Disturbances of Affective Contract, described extreme aloneness, the inability to relate to others, and severe social interaction and communication difficulties with restricted, repetitive, and stereotyped patterns of behaviors, interests, and activities as well as delayed echolalia. These children also did not seem to form relationships and appeared to lack imagination, had a tendency to reverse pronouns, and had limited activity (Liedel, 2008).
In 1944, almost at the same time Kanner described autism, Hans Asperger, an Austrian pediatrician studied four children from six to eleven years of age. The study was part of his doctoral research and identified a set of social deficits (now called Asperger’s syndrome) that included poor eye contact, high cognitive abilities, poor nonverbal communication, stereotyped movements, poor motor coordination, and highly esoteric interests (Buckendorf, 2008). Yet the children had levels of intelligence that ranged from very low to very high. Identifying the commonality in unusual gestures and facial expressions, and a variety of speech patterns and vocal characteristics among these four children, Asperger referred to these characteristics as "infantile autism" (Bishop, 2011; Scheuerman & Weber, 2002).

Kanner's definition was used to diagnose ASD for more than forty years. Thirty-three years later, in 1977, ASD was first officially recognized as a unique disorder in the ninth edition of the International Classification Diseases (WHO, ICD-9). For a time, children with ASD were often diagnosed with childhood schizophrenia. However, in 1980, Kanner differentiated between autism and schizophrenia (Bishop, 2011). In the same year, noticing the differences between the theories of Kanner and Asperger regarding onset of developmental delays, Wing Gould used the term “Asperger's syndrome” to describe a group of patients with characteristics similar to those described by Hans Asperger (Bishop, 2011). In 1994, the American Psychiatric Association (APA) extended the concept of PDD in the DSM-4. Nine years later, APA redefined ASD as a spectrum of four main disorders included under pervasive developmental disorder (PDD) in the DSM-5 (APA, 2013): autism, Asperger's syndrome, childhood disintegrative disorder (CDD), and pervasive developmental disorder not otherwise specified (PDD-NOS).
Howlin, Goode, Hutton, and Rutter (2004) studied sixty-eight ASD adults with intelligence quotients (IQ) above fifty. They concluded that majority of the group had poor (46%) or very poor (12%) outcomes. Eight of the participants were employed, fourteen worked in a sheltered setting, and thirty-six individuals were unemployed. Some had no friends, and three adults lived independently with minimal support. In a study of forty-eight young adults with similar indications of ASD, Eaves and Ho (2008) reported that fifty percent had poor outcomes. Forty-four lived with their families, while the remaining four lived separately by the age of twenty-four.

In a survey of more than 700 school workers who served students with a variety of disabilities, including ASD, the participants reported that 86% of the children’s days were spent with facilitators. Insights from the study suggest a paraprofessional may be able to help a child with ASD, with diminishing benefits over time (Giangreco & Broer, 2005).

**Categories of Autism Spectrum Disorders**

In the US, psychiatric diagnoses for both children and adults are categorized by the Diagnostic and Statistical Manual of Mental Disorders (DSM), published by the American Psychiatric Association. The DSM Fifth Edition (DSM-5) defines four main disorders under the term pervasive developmental disorder (PDD): ASD, Asperger's syndrome, childhood disintegrative disorder, and pervasive developmental disorder not otherwise specified (PDD-NOS). These are characterized by deficits in social communication and interaction, and restricted repetitive behaviors, interests, and activities (APA, 2013).

**Autistic disorder.** Autistic Disorder, sometimes called classical ASD, is a developmental disorder of unknown cause in which children show impairments in social interaction, communication, play behavior, and range of interests (Buckendorf, 2008). Autistic
Disorder diagnosis is usually given by 30-36 months but symptoms are more commonly identified through the second year of children’s lives (Tonge & Brereton, 2011). Children with Autistic Disorder have problems with eye contact, facial expressions and they tend to follow their desires without regard to the situation (Vernon & Rhodes, 2009). However, three out of every four children with ASD are characterized with an intellectual disability. These children are also commonly found to have seizures, poor muscle tone, underlying anxious behavior, resistance to change, and obsession with a single idea (Filipek, Accardo, Baranek, Cook, Dawson, Gordon et al. 1999). Nearly half the children diagnosed with ASD never speak, while the rest have difficulty communicating appropriately (Tager-Flusberg & Joseph, 2003). Individuals with ASD may find it difficult to do simple things like hold a cup or play with friends and are typically behind other children of the same age in terms of intellectual and cognitive development (Tager-Flusberg & Joseph, 2003).

**Asperger’s syndrome.** Asperger’s Syndrome was first described in 1944 by the Austrian pediatrician Hans Asperger (Klin, McPartland, & Volkmar, 2005). The direct causes of Asperger’s are unknown, although some research indicates genetic factors (McPartland, & Klin, 2006). Individuals with Asperger’s syndrome were mostly young boys who showed autistic behaviors such as restricted and repetitive activities, but had milder impairment in social interaction than children with ASD (Myles & Simpson, 2003). Unlike other disorders, Asperger’s is more common in teenagers and adults (Frith, 1989). This may be because the symptoms grow more evident under social or communication pressures.

**Pervasive development disorders-not otherwise specified (PDD-NOS).** Pervasive Developmental Disorder Not Otherwise Specified is characterized by severe restricted social interaction; poor verbal and non-verbal communication skills; as well as stereotyped behavior,
interests, and activities but without the full diagnostic criteria of ASD (APA, 1994). These criteria do not qualify as characteristics of specific Pervasive Developmental Disorders (PDD) and may not appear early in children except in some cases after the age of three (Gray & Tonge, 2001). Walker, et al. (2004) said that as a result of their study, “Children with PDD-NOS could be placed into one of three subgroups: a high-functioning group (24%) who resembled AS but had transient language delay or mild cognitive impairment; a subgroup resembling autism (24%) but who had late age of onset or too severe cognitive delays or were too young to potentially meet the full diagnostic criteria for ASD; and a group (52%) not fulfilling the criteria for ASD because of fewer stereotyped and repetitive behaviors” (p.172).

**Childhood disintegrative disorder (CDD).** Childhood Disintegrative Disorder (CDD) is rare and was officially recognized only very recently. Children with CDD experience loss of social, communication, and repetitive behaviors, which usually occur during first two years of age (Phetrasuwan, Miles, Mesibov, & Robinson, 2009). A characteristic of this disorder is severe regression after several years of normal development followed by a more dramatic loss of skills as compared to children with ASD who usually gain skills over time. Children with CDD may have seizures and tuberous sclerosis (Murray-Slutsky & Paris, 2000).

**Causes of Autism Spectrum Disorder**

The cause of ASD is still a mystery (Frith, 2008). Until the early 1970s, it was believed that methods of child rearing were the cause, although there is no support for this theory. Three decades later, Wing (2001) suggested that causation was to be found in interrelated areas. The theory of ASD causation is incomplete. Advances made in research on ASD suggest that multiple factors may be responsible for causing ASD (Trottier, Srivastava, & Walker 1999).
ASDs may result from anything that damages the developing brain (Buckendorf, 2008). The main factors identified to cause ASD are categorized as genetic and environmental.

**Genetic.** Studies on twins and families with ASD have concluded that genetic factors are important determinants of ASD. When an identical co-twin has ASD, the other is also likely to be diagnosed with ASD (Bailey, Gottesman, Bolton, Simonoff, Yuda, & Rutter, 1995). Estimates that do not identify the responsible genes suggest that 90% of ASD cases are caused by genetic factors (Schendel, Grønborg, & Parner, 2014). ASD could be the result of abnormality in multiple genes or an interaction between the environment and particular genes. As many as fifteen different genetic loci are thought to be responsible for ASD (Hallmayer, Spiker, Lotspeich, McMahon, Petersen, Nicholas et al., 1996). Paternal and maternal characteristics are also associated with greater risk of ASD (Gardener, Spiegelman, & Buka, 2009). One hypothesis is that older sperm are more prone to mutation and convey a greater risk of ASD. Older males have greater probability of fathering children with ASD (Christophersen, 2012).

Folic acid intake during pregnancy has also been linked to ASD. An untested hypothesis (Muskiet & Kemperman, 2006) suggests that folic acid may cause genetic mutations through an epigenetic mechanism that then causes ASD. Studying the family history of 164 children with ASD, researchers noted genetics as the significant factor that might explain ASD (Brimacombe, Ming, & Parikh, 2007). Other studies suggest that genetics account for only 10% of the factors leading to ASD (Herman, Butter, Enrile, Pastore, Prior, & Sommer 2007).

**Environmental.** Researchers have also examined the role of environmental risk factors for ASD (Daniel, 2006). There are some environmental factors linked to ASD such as lead and mercury, drug abuse, smoking, alcohol consumption, exposure to valproic acid or thalidomide
very early in pregnancy, and pre- or perinatal anoxia/asphyxia, as well as various types of intrauterine viral infections (Daniel, 2006). Deth, Muratore, Benzecry, Power-Charnitsky, & Waly, (2008) found that oxidative stress due to environmental factors can lead to neurological deficits.

Severe maternal vitamin D deficiency also increases the risk of ASD (Cannell, 2008). Kinney, Miller, Crowley, Huang, & Gerber (2008) attributed prenatal exposure to severe natural storms as potential causative factor of ASD. Anti-thyroid agents that cause low thyroid levels in the mother also increase the likelihood of ASD (Román, 2007). Increased risk of ASD in children with older parents was noted by Croen, Najjar, Fireman, and Grether (2007) and Kolevzon, Gross, and Reichenberg (2007). The risk of having a child with ASD is also higher where maternal relatives experience anxiety disorders and when paternal relatives have attention-deficit disorders (Lajiness-O’Neill & Menard, 2008).

Characteristics of Children with Autism Spectrum Disorder

In 1943, Kanner described ASD as a complex, serious, biologically based disorder of brain development. The most pronounced characteristics of children with ASD are impaired communication and social interactions, limited interests and activities, and repetitive behaviors (American Psychiatric Association, 2013). The disability usually occurs in early development (Kanner, 1943).

The effects of ASD vary with individuals. For example, some children with ASD exhibit language disabilities, while others do not; some may experience mental retardation, while others have poor intellectual abilities. The continuum of diagnostic characteristics among children with ASD explains why ASD is described as a spectrum (APA, 2000).

Individuals with ASD typically show signs of the disorder in the first three years of life, although parents may notice unusual characteristics from infancy (Myers, & Johnson, 2007).
Symptoms can be mild to severe (Scherer & Dawson, 2011) but diagnosis is difficult before the child is one and a half years old or before the manifestation of behavioral symptoms (Klinger, Dawson, & Renner, 2003). Some students with ASD have normal or above normal intelligence, and are able to attend a typical school and eventually hold a job (Cohen, 1998; Dunlop & Bunton-Pierce, 1999). The symptoms of ASD vary from one to individual to another and can be mild to moderate to severe, but in general, individuals with ASD demonstrate difficulties in three main areas: Communication deficits, Social Skill deficits and Behavioral deficits.

**Communication deficits.** Children with ASD may experience significant language delays and hesitate to start conversations with parents, peers, and teachers. They may also have difficulty ending conversations (Myers & Johnson 2007). Children with ASD may also experience difficulty playing with other children particularly when make-believe is part of the game (Myers & Johnson 2007). However, not all children who experience communication problems have ASD. For instance, a child with delayed language abilities who uses signs or other means to communicate with family members does not have ASD as demonstrated by their desire to communicate (Nunes & Hanline, 2007).

It is widely acknowledged that children with ASD lack communicative and language abilities (Lord & Paul, 1997; Tager-Flusberg & Cooper, 1999; Wetherby, 1986) and have poor narrative and conversational skills (Tager, Flusberg, & Sullivan, 1995). More than half of children with ASD do not develop functional speech, which is the most handicapping characteristic of ASD (Schreibman, 2000).

**Social skills deficits.** Impaired social interaction is a defining feature of ASD. Unlike children without ASD who look at a speaker’s eyes, children with ASD may instead look at the speaker’s mouth (Jones, Carr, & Klin, 2008). Children with ASD tend to make little eye contact,
make little contact with others, often fail to respond to others, do not share enjoyment with others, and have unusual responses to the emotions of others (DSM-IV-TR; American Psychiatric Association, 2000).

It is also difficult to understand the body language of a child with ASD because the movements, facial expressions, and gestures of these children may not reflect or align with what they say (Frith, 1989). As they grow, children with ASD may begin to speak in a unique (robotic or sing-song) tone of voice (APA, 2000). Unlike children with typical developmental patterns, children with ASD also experience difficulty understanding the point of view of others (Jones et al., 2008) and are often unable to interpret others actions.

**Behavioral deficits.** Children with ASD may have behavioral difficulties including fixation and obsession (APA, 2000). They tend to adopt repetitive behaviors and movements such as rocking back and forth (Howlin et al., 2004). Children with ASD typically find change distressing, with most preferring routine activities, and they often develop unusual body movements (hand flapping, body rocking, spinning, toe walking, finger flicking). They may also have limited sensory abilities (touch, sight, smell). These behavioral deficits present major challenges for their families and teachers (Hopf, 2007). Children with ASD clearly require help to develop communication and social skills and overcome behavioral difficulties. Fortunately, a range of interventions is available for individuals with ASD.

**Prevalence of Autism Spectrum Disorder**

The prevalence of ASD has increased dramatically in recent decades; though the reasons for this remain unclear and it has led to increased awareness of ASD (DSM-5, 2013). Additionally, recognition of the prevalence of ASD has helped to raise awareness among parents and professionals and has led to better health care and access to diagnostic services for
individuals with ASD (Blumberg, et al., 2013). Most studies on the prevalence of ASD were conducted in the western world (Williams, Higgins, Brayne, 2006). The incidence of ASD in Saudi Arabia has not been specifically studied up to now (Alsalehi et al., 2009).

Some studies have shown increases in pervasive developmental disorders to between 30 and 90 in every 10,000 as in the United Kingdom (Baird, Simonoff, Pickles, Chandler, Loucas, Meldrum, & Charman, 2006). Tincani, Crozier, and Alazetta, (2006) reported that “autism is one of the fastest growing disability categories in the United States” (p.177). They also noted that the number of children with ASD who receive special education services in the US has increased more than 400% since 1990. A report published in March 27, 2014, by the CDC estimated that 1 in 68 US children are diagnosed with an ASD. This is 30% over the 2012 estimate. Autism Spectrum Disorder is five times more common among boys than girls (Autism Science Foundation, 2014).

Prevalence of autism spectrum disorder (ASD) in USA. The prevalence of ASD was 1 in 2,000 children in the 1970s and it has increased rapidly since then. Rates of ASD increased from 1 in 200 by the late 1990s to 1 in 86 by 2007 (Halfon & Kuo, 2013). Centers for Disease Control and Prevention reports suggest a further rise in the rate of ASD among US children to 1 in 50 in 2011-2012 (CDC, 2012) or to 1 in 68 in 2014 (CDC, 2014). Empirical studies suggest that changes in diagnostic definitions (e.g., publication of DSM-IV, 1994), diagnostic accretion (i.e., children have started with a diagnosis of mental retardation and receive more diagnosis of ASD), and diagnostic expansion (i.e., children at the higher end of the functional spectrum are included) over time have contributed to rising incidence of ASD (Newschaffer, Falb, & Gurney, 2005). In addition, increased awareness of signs and symptoms as well as increases in risk factors (e.g., greater age of the parents and higher rates of maternal obesity during pregnancy)
are also associated with these trends (Krakowiak, Walker, Bremer, Baker, Ozonoff, Hansen, et al., 2012). A recent study from the California Department of Developmental Services that examines age, cohort, and period effects showed that the odds of being diagnosed as having high-functioning ASD among a 2002 cohort of children were 14.6 times the odds among the 1992 cohort. However, estimates of the rate of ASD will likely be lower under DSM-5 diagnostic criteria than under the DSM-4-TR diagnostic criteria. Diagnostic criteria for ASD were also changed in the DSM-5 (American Psychiatric Association, 2013) which is likely to lower the diagnosis and hence the estimates. As per the DSM-5 criteria, prevalence of ASD per 1000 for 2008 would have been 10.0 (95% CI, 9.6-10.3) compared with the reported prevalence based on DSM-IV-TR criteria of 11.3 (95% CI, 11.0-11.7).

**Prevalence of autism spectrum disorder (ASD) in Saudi Arabia.** Autism Spectrum Disorder (ASD) is one of the most common disabilities in Saudi Arabia (Aldawaideh & Alamayreh, 2013). Yet, ASD studies from Saudi Arabia and the Middle East are rare (Hussein, Taha & Almanasef, 2011). In 2002, 42,500 confirmed cases of ASD were diagnosed in Saudi Arabia (Alsalehi et al., 2009). An extensive survey of literature revealed a dearth of information on the current number of confirmed cases of children with ASD in Saudi Arabia (Murshid, 2014). Anecdotal information suggests an increase in the prevalence of ASD in Saudi Arabia (Ziena et al., 2014).

**Intervention for Autism Spectrum Disorders**

**Evidence-based interventions.** Evidence-based practices (EBPs) should form the basis for ASD interventions (Samuel, Lana, Sally, & Deborah, 2010). Interventions based on scientific research have led to unhealthy and unrealistic outcomes in the past (Simpson, 2005). The US No Child Left Behind Act (2001) emphasized the need for effective interventions to
support the learning of children with disabilities including those with ASD. There currently exists no medical interventions to treat or cure ASD (Rotatori, Bakken, Obiakor, Burkhardt, & Sharma, 2014). Existing medical interventions, rather, are targeted to treat the behavioral symptoms associated with ASD and are one component of a therapeutic program that involves educational and behavioral interventions. Among the several therapies designed for individuals with ASD, three major subcategories are drug therapy, behavior therapy, and communication therapy (Thomas, Morrissey, & McLaurin, 2007). Patten et al., (2013) contend that while categorizing therapeutic interventions is thought to be helpful in studying outcome patterns, the methods applied are not consistent or universal. To compound the problem, parents of children with ASD also often lack immediate access to physicians experienced in ASD to acquire timely prescriptions. Indeed those aspects only add to the confusion for professionals as well as concerned families regarding the application of these methods for children with ASD (Patten et al., 2013).

Clear trends have, however, emerged in the use of interventions in the last few decades; the most commonly used interventions being the therapeutic and educational interventions (Thomas, Ellis, McLaurin, Daniels, & Morrissey, 2007; Green et al., 2006). Among the various therapeutic interventions, Speech Language Therapy (SLT) is considered the most widely used one, though interventions such as occupational therapy (OT) and physical therapy (PT) are also commonly used (Thomas et al., 2007). Communication deficits are a major characteristic of ASD; these include an inability to speak, difficulty in sustaining conversation, and language peculiarities (e.g., echolalia) and hence it is not surprising why therapists frequently turn to SLT as an intervention approach. As children with ASD reach adolescence, they lack functional
language (Sigman & McGovern, 2005). More than 80% of children with ASD between 6 and 8 years have received SLT (Thomas et al., 2007).

Occupational therapy is often used to help with sensory processing problems in children with ASD (Hodgetts & Hodgetts, 2007). However, empirical evidence for how therapies are selected by or recommended to families is lacking. Multiple factors affect therapy selection. For instance, Latino children are six times more likely to use nontraditional strategies than children of other ethnicities (Levy, Mandell, Merhar, Ittenbach, & Pinto-Martin, 2003).

In contrast, behavioral treatments are found to be most promising for individuals with ASD because of their ease of access and efficacy. Among an array of behavioral approaches to treat ASD, Applied Behavioral Analysis (ABA) was found to be the most commonly applied educational intervention in a national survey of 552 participants (Green et al., 2006), supporting its efficacy in treatment of ASD. However, regional bias exists. For instance, in a study of 383 North Carolina families, TEACCH (Treatment and Education of Autistic and Related Communication Handicapped Children) was the most frequently utilized educational intervention (Thomas et al., 2007). Green et al., (2006) found specific interventions (e.g., visual schedules) were applied more commonly than ABA.

The cost of caring for one child with ASD over his/her lifetime is almost $3.2 million (Ganz, 2007). This comes at a time when resources are already scarce. Early identification and intervention increases the likelihood of positive outcomes for children with ASD (Eikeseth, Smith, Jahr, & Eldevik, 2007). Early and effective treatment offers reduced costs and greater improvements through recuperated productivity of individuals with ASD and their caregivers (Ganz, 2007).
For individuals with ASD and an intellectual disability, the average cost of the disability over the lifespan is estimated at $2.4 million in the US and £1.5 million (US $2.2 million) in the United Kingdom (Buescher et al., 2014). The corresponding cost to support an individual with ASD without an intellectual disability is estimated at $1.4 million in the US and £0.92 million (US $1.4 million) in the UK. Special education services and parental productivity loss were identified as the largest cost components thereby highlighting the need for greater attention to interventions early in life. Specifically, appropriate early interventions have the potential to reduce the overall cost of educating and caring for individuals with ASD by changing the trajectory of the disorder and the needs associated with it. A few, but not all, of the ABA interventions are described in detail below.

**Applied behavior analysis (ABA).** The history of ABA is as old as the beginning of human civilization when individuals began to influence the behavior of another. The science of applied behavior is assumed to be first formulated by John B. Watson, who tied together basic principles of experimental psychology to applied work (e.g. conditioning experiments with simple phobias with a small child). However, it was B. F. Skinner who is credited with codifying and popularizing ABA (Morris, Smith, & Altus, 2005).

The experimental branch of behavior analysis, now often refereed to simply as “behavior analysis,” began in 1938 with the publication of B.F. Skinner's first major treatise *The Behavior of Organisms.* Skinner's research identified two types of behavior: respondent and operant (Cooper, Heron, & Heward, 2007). Consistent with the Ivan Pavlov’s ideas, respondent behavior is reflexive. Respondent behaviors are involuntary behaviors elicited by stimuli that immediately precede them. Operant behaviors, in contrast, are not elicited by preceding stimuli but instead are influenced by stimulus changes that have followed the behavior in the past
(Cooper et al., 2007). Skinner observed that operant behaviors have a unique relationship to the environment and merited a separate field of research (Cooper et al. 2007). Skinner, in his attempt to provide a scientific basis for different types of behavior, noted that the S–R paradigm is insufficient to explain most behavior, especially those behaviors that lacked obvious antecedents (Cooper et al., 2007).

The middle of the 20th century, particularly the late 1950s through the 1960s, saw the growth of ABA. In 1959, Ayllon & Michael published the first paper on ABA, “The Psychiatric Nurse as a Behavioral Engineer”. This article investigated the effect of special training in strategies based on the principles of behavior imparted to personnel in a state hospital to improve the functioning of residents with schizophrenia and mental handicaps. Later, the same principles of behavior were applied to a variety of research on socially problematic behaviors and developmental disabilities (Dixon, Vogel & Tarbox 2012).

Credit for the first successful demonstration of the use of ABA as an intervention for children with ASD rests with Ferster and DeMeyer (1961). They demonstrated that these children could learn complex skills by gradually increasing the complexity of tasks and by promoting learning with the aid of durable reinforcers (now known as pivotal responses). Since then, several studies have demonstrated the effectiveness of ABA as an intervention for children with ASD. Now ABA is one of the top treatment choices for students with ASD because of the 40 years of evidence that it is effective (Lovaas, 1987).

In (1968) Baer, Wolf, and Risely described some of the defining characteristics of ABA, distinct from experimental analysis. This was followed by the first publication of the journal of ABA as well as Baer, Wolf, and Risely’s landmark paper “Some current dimensions of Applied
Behavior Analysis”. The *Journal of Applied Behavior Analysis* was the first journal in United States to deal with applied problems (Cooper et al. 2007).

Cooper et al., (2007) identified seven elements that must be essential components of every ABA program. First, the ABA program must be applied in order to bring about improvements in behaviors. Second, the target behavior selected for study must be the behavior in need of improvement, it must be measurable, and the corresponding behavioral change must be reflected in the recipient. Third, ABA is analytic in that a functional relation between the manipulated events and a reliable change in the targeted behavior exists. Fourth, ABA is technological such that all of its operative procedures should be identified and described with sufficient clarity. Fifth, ABA should be systematic, in that the procedures used and their effectiveness should be described with sufficient reasoning based on relevant principles. Sixth, an effective application of techniques employed in ABA must enhance the target behavior to a meaningful degree. Seventh, a change in targeted behavior should be observed in a variety of environments (Cooper et al., 2007).

*How ABA works.* ABA is based on the operant conditioning principles. Operant conditioning is the process where environment and behavior interact to shape the behavior of an individual (Skinner, 1953). ABA relies on teaching alternative pro-social behaviors to replace self-injurious, ritualistic, repetitive, aggressive, or disruptive behaviors. In ABA, children with ASD learn social protocols to increase socially appropriate behaviors and decrease maladaptive behaviors (Quill, 1995). Therapists, parents, and teachers can use ABA. Most often, this involves a functional analysis to determine individual behaviors, including the events that precede behaviors (antecedents) and the stimuli that follow the behavior (consequences) (Jaffe, 2010). It involves identification and requisition of a specific target behavior from a child based
on where he or she falls in the ASD continuum and then rewarding the child for producing the target behavior. The child’s current level of behavior is assumed as a benchmark. The child’s behavior is closely monitored during the intervention to ensure progress toward a target behavior and the success of the intervention. Finally, the generalization and maintenance of acquired skills across settings, people, and materials are assessed following completion of the intervention (Naoi, 2009).

Selection of target behavior. Selection of appropriate target behaviors is necessary for a successful intervention and is subject specific, depending on where he or she is on the ASD continuum. Rosales-Ruiz and Baer (1997) defined the concept of “behavioral cusp” for appropriate selection of target behaviors. A behavioral cusp is a point at which changes in behavior will have far-reaching consequences for the individual.

To identify a behavioral cusp, changes in target behavior must: (1) help to get new reinforcers, environments that not previously encountered, (2) meet the demands of the social community of which the individual is a part, (3) facilitate learning by functioning as a prerequisite or component have more complex response, (4) it must interfere with or replace socially maladaptive behaviors, and (5) must benefit all members in the society of which the student is a part, be it parents, siblings, or teachers (Bosch, & Fuqua, 2001). The targeted behavioral cusp must be objective, observable, and quantifiable. For instance, saying “Good morning” to friends in the morning is more acceptable than just being nice to friends, for selection as target cusp (Naoi, 2009).

ABA based teaching strategies. A number of consequence based and antecedent based ABA teaching strategies have been identified for the treatment of individuals with ASD. For instance, ABA includes strategies that are designed to increase desired behaviors (e.g.,
reinforcement), reduce undesired behaviors (e.g., punishment, extinction, response cost, time out, overcorrection), maintain desired behaviors (e.g., fixed ratio, variable ratio, fixed interval, variable interval) and develop new behaviors (e.g., shaping, chaining, fading, strategies for data recording) (Prior, 2003).

Positive and negative reinforcements (or avoidance) occur when the likelihood of a certain target behavior increases due to the presentation of a stimulus and the removal of a stimulus, respectively. On a similar note, positive and negative punishments occur when the probability of a target behavior decreases due to presentation of a stimulus and the removal of a stimulus, respectively, as a behavioral consequence Skinner (1938). However, punishment procedures have to be used only when positive procedures alone ineffective in order to reduce maladaptive behaviors (Matson & LoVullo, 2008). Further, when a positively reinforced behavior is no longer reinforced, the likelihood that the behavior will occur in the future decreases; this is referred to as extinction. Likewise, an antecedent stimulus that does not directly elicit or cause the behavior, but instead influences the likelihood that the behavior will occur is called a discriminative stimulus (Naoi, 2009).

Shaping is used to condition a new behavior using small sequential approximations of the desired target behavior as a gradual reinforcer. For instance, in teaching a child with a disability to write, the individual is reinforced to pick up the pencil, scribble, draw a line, and finally to begin writing. Ricciardi, Luiselli, and Camare (2006) used a shaping procedure to successfully help a child with ASD approach a phobia stimuli. Prompting involves different types of assistance (e.g., verbal instruction, modeling, gestures, and physical guidance) to help the child develop a target behavior. For example, a physical prompt is used to help the child discriminate between two objects and the prompt is continued when the child has learned to independently
choose the appropriate object of interest. Prompting has been used to teach children with ASD to imitate facial expressions such as a smile, a frown, surprise, and anger (DeQuinzio, Townsend, Sturmey, & Poulson, 2007).

In chaining the child learns to produce a sequence of new behaviors to accomplish a desired task. For instance, “putting on a shirt” can be accomplished in small steps of holding the shirt, unbuttoning the shirt, putting the right hand into the sleeve, putting the left hand into the left sleeve, and fastening the buttons. Forward (teaching first to last step in sequence) or backward (last to first steps in sequence) chaining could be used to teach the same task, depending on the severity of the disorder and the skill level of the individual. A chaining procedure was used by Jerome, Frantino, and Sturmey (2007) to teach internet skills to adults with ASD.

Effectiveness of ABA based intervention programs. Early evidence-based interventions using ABA principles had a remediating effect on the social, intellectual, adaptive, and linguistic deficits of individuals with ASD. Lovaas (1987) reported major improvements in IQ levels and enhanced social functioning in a group of children who received 40 hours per week of early intensive behavioral intervention in their homes. Later, Lovaas et al., (1993) reconfirmed that the IQ levels and social functioning of children with ASD were significantly higher than that of a control group that received a lower level of intensive behavioral intervention, this was maintained through 11.5 years of age.

Stahmer, Ingersoll, and Carter (2003) studied a variety of techniques based on applied behavior analysis to increase and improve play skills of children with autism. Harris and Delmolino (2002) reported that ABA techniques could produce improvements for children with
autism. Early intensive intervention using ABA strategies enabled the students to enter the educational mainstream and achieve normal intellectual functioning.

Only a few studies have used randomized control trials. For example, two studies (Smith, Groen, & Wynn, 2000; Sallows & Graupner, 2005) compared the influence of early intervention delivered via parent-directed and clinical models. Smith et al., (2000) reported that twenty-five hours of clinical interventions per week had a greater impact than five hours of an intensive parent-guided intervention per week. However, children differed very little in visual spatial skills and language at three years of age, but the differences became more apparent for children who underwent clinical intervention at 7 to 8 years. In contrast, no major differences between the two interventions were observed even after four years of treatment in a study by Sallows and Graupner (2005). The contrasting results highlight the need for replicated and carefully designed studies over longer period to gain more insights on the outcomes of interventions availed through parent-directed and clinical models.

Howard, Sparkman, Cohen, Green, and Stanislaw (2005) and Cohen, Amerine-Dickens, and Smith (2006) suggested that interventions in typical community settings tend to be more beneficial for Individuals with disabilities to enhance their socially adaptive behaviors. Thus, intervention settings may affect the efficacy of behavioral interventions, while age and ability are not strict barriers to application of behavioral based intervention (Steege et al., 2007).

However, the best results are stated to occur when ABA techniques are applied early in development, before 5 years of age for 15 to 40 hours per week (Lindgren & Doobay, 2011). Shade-Monteaux (2003) demonstrated that intensive early interventions that integrated ABA and floor time methods were effective in improving communication, joint attention, and social skills in children with autism. Lindgren and Doobay (2011) reported that one hour per week of parent
training helped change inappropriate behaviors in children with autism. Dillenburger et al., (2004) revealed a remarkably higher perceived effectiveness of ABA among parents of children with autism. The parents found that ABA was effective in improving the quality of life for their children and identified the age of the child and the early start of intervention as important factors in achieving benefits.

**Lovaas method.** “Lovaas Therapy” is named after O. Ivar Lovaas, PhD, a psychologist who has studied ABA methods for over 30 years. A 1987 study conducted with children with ASD earned Lovaas mainstream recognition as pioneer in the field of ABA. Lovaas concluded that intensive behavioral intervention (including the use of Discrete Trial Training (DTT)) offered much hope for improving the outcomes of children with ASD (Lovaas, 1987).

Dr. Lovaas, while working at the University of California, Los Angeles (UCLA), used ABA principles to develop a model of behavior modification as an ASD intervention (Rivera, 2008). Lovaas’ method consists of two stages. The first stage improves skills associated with basic self-help and language. The second stage includes working on expressive and early abstract language and interactive play with peers. To achieve the goals and efficacy in training, the treatment must be performed on a one–on–one basis for 6-8 hours per day, 5-7 days per a week, for two years or more (Rivera, 2008). Lovaas (1987) studied children with autism at the Young Autistic Project. He concluded that ABA strategies were the most effective in teaching social skills. Use of these strategies for 40 hours per week offered the most significant improvements in behavior.

**Discrete trial training (DTT).** Discrete trial training (DTT) is guided by behavioral learning therapy and ABA. Taught in a structured, controlled, and systematic way, “Discrete Trial Training is one of the most important instructional methods for children with autism”
DTT is used when a learner needs to learn a new skill best taught in small repeated steps (Bogin, 2008). In DTT the child is presented with a discriminative stimulus, and upon responding to the stimulus, he or she receives a consequence (e.g., a reward) depending on the response (Delprato, 2001). The basic premise of DTT is to prompt skill acquisition through error-less learning, correction, shaping, and reinforcement of the target behavior (Stahmer et al., 2003).

Ivar Lovaas strongly supported the use of DTT as an early intervention for children with ASD. Lovaas demonstrated that forty hours of DTT per week on a one to one basis for children with ASD under 4 years of age significantly improved the IQ scores of 47% of the treatment group compared to control groups. Several researchers later reconfirmed the results of Lovaas (Harris, Handleman, Gordon, Kristoff, & Fuentes, 1991; Harris Handleman, JKristoff, Bass, & Gordon, 1990; Sheinkopf & Siegel, 1998). Further, in a follow up study on their original treatment group, Lovaas, et al., (1993) established that 42% continued to maintain gains in IQ and behavior at a mean age of 11.5 years. Discrete trial training was shown to aid preschoolers with ASD to initiate appropriate functional play in their classroom (Nuzzolo-Gomez, Leonard, Ortiz, Rivera, & Greer 2002).

A number of factors explain the increased motivation and learning in children with ASD using DTT (Smith, 2001). First, each trial is very short, hence many teaching trials can be completed in a short time frame to allow for numerous learning opportunities. Second, one-to-one teaching is completely individualized to meet the needs of each child. Third, the “procedural” format of a discrete trial helps the child gain clarity on aspects of the learned skill; “DTT maximizes children’s success and minimizes their failures” (Smith, 2001, p. 87) by breaking down the task into short manageable trials using suitable prompts and antecedents. The
whole trial is kept simple and at an appropriate level, with a clear beginning and end to each trial. Above all, a major benefit of DTT is that it can be used for children of all ages and ability levels.

Two major disadvantages of DTT are that (1) skills acquired in DTT are not initiated in the absence of previously learned contingencies and (2) outcomes cannot be generalized across different settings, people, or materials. These limitations of DTT highlight the need for better alternatives that can promote initiation and generalization of skills to new settings (Kaiser, Ostrosky, & Alpert, 1993). However, Crockett, Fleming, Doepke, and Stevens (2007) reported strong behavioral outcomes in diverse areas such as language, academics, motor skills, play behavior, emotions, and aggressive behaviors among individuals who underwent DTT but emphasized that administering DTT requires special training on the part of teachers or parents.

**Functional communication training (FCT).** Functional communication theory addresses the behavioral and communication needs of individuals with ASD (Mancil, 2006). Originally functional communication training (FCT) was developed to provide interventions in clinical as opposed to natural settings (Lalli, Casey, & Kates, 1995). FCT falls under the umbrella of behavioral methodology and seeks to replace damaging or unsuitable behavior with effective social interaction and communication skills (Wacker, Steege, Northup, Sasso, Berg, Reimers, et al., 1990, Lalli et al., 1995).

FCT emerged as one of the most common and effective intervention to reduce severe problem behavior such as aggression (Tiger, Hanley, & Bruzek, 2008). FCT works with children of all ages, including those with limited language and cognitive skills who tend to have positive results from this intervention. FCT is very effective for children with ASD when delivered in weekly sessions with parents and children (Durand & Carr, 1992). FCT has also proven
successful as part of an early intervention strategy in generating positive communication and behavior results for individuals with ASD.

**Pivotal response training (PRT).** Pivotal Response Training (PRT) was developed by Lynn and Robert Koegel and Laura Schreibman at the University of California, Santa Barbara (UCSB). It is based on the principles of ABA. PRT enhances initiation and generalization of skills in children with ASD (Koegel, Koegel, Harrower, & Carter, 1999; Koegel, O’Dell, & Koegel, 1987). A pivotal response is one associated with the major skills necessary for functioning in children with ASD and one that influences many different behaviors (Koegel, Koegel, Harrower, et al., 1999; Prizant & Rubin, 1999). Unlike DTT, where the focus is on teaching individual target behaviors one at a time in a series of steps, PRT focuses on pivotal responses such as responsivity to multiple cues, self-management, motivation and self-initiated activities (Koegel, Koegel, Shoshan, & McNerney, 1999).

Components of PRT include clear and appropriate prompts, child choice, turn-taking, presentation of maintenance tasks, reinforcing the child's attempts, responding to multiple cues, and a direct response–reinforce relationship (Ingersoll, 2008). Because this intervention is implemented in natural settings, it saves time and is cost efficient (Pierce & Schreibman, 1995). The method has been proven to produce good results for pre-school age children, adults with mild cognitive impairment, and individuals who have a minimum level of expressive and receptive language. There are some evidences reported that pivotal response training is a successful treatment for communication and social skills of children with ASD (Patterson, Smith, & Mirenda, 2012).

**Picture exchange communication system (PECS).** Bondy and Frost (1994) is credited for the development of Picture Exchange Communication System (PECS). One of the most
popular picture-based strategies (Mirenda, 2003), it has shown promise in teaching functional communication to children with poor or no verbal communication skills. Taught in a structured environments, the PECS method begins with teaching the ASD child to place a request for a desired item (Bondy and Frost, 2002) and progresses through sentence use, basic conversational skills, and commenting on questions (Tincani et al., 2006, Sulzer-Azaroff, Hoffman, Horton, Bondy, & Frost, 2009). “A key element in teaching communication to persons with such difficulties is to increase their motivation through choice-making opportunities” (Conklin & Mayer, 2011, p.155). PECS help ASD children initiate social communication with parents or teachers, aided by the use of items that serve as reinforcers (Howlin, Gordon, Pasco, Wade, & Charman, 2007).

PECS training involves six phases organized in a hierarchical manner. The phases are: (1) teaching the physically assisted exchange, (2) expanding spontaneity, (3) simultaneous discrimination of pictures, (4) building sentence structure, (5) responding to the question “What do you want?” and (6) making comments. This procedure of breaking down the training of a desired task into several smaller components helps identify the specific phase of the skill the child is struggling with, and to ensure proficiency in mastering the skill with the aid of prompts (Yokoyama, Naoi, & Yamamoto, 2006).

PECS is an effective tool to train individuals of any age who struggle to communicate (Travis & Geiger, 2010), especially verbally, with the peers and has resulted in significant improvements (Magiati and Howlin, 2003). PECS capitalizes on simple motor skills that are easy to acquire or are already possessed by children, but that only need reinforcement (Bondy & Frost, 2001). Unlike sign language, PECS is a picture based tool. Hence, the PECS require no
steep learning curve on the part of the teachers and parents and can be used in a variety of settings, including home, classroom or even a broader setting to train the children with ASD.

In a review of PECS studies, children and adults with ASD (and other developmental disabilities) who do not have speech or communication problems were found to benefit from PECS training (Preston, 2009). Charlop-Christy, Carpenter, LeBlanc, and Kelley (2002) reported positive outcomes using PECS, including improvements in social communicative behaviors and decreases in problem behaviors, and that several informational reports suggests “a large number of children who learn PECS also develop spoken language” (p.214). Al-Dawaideh and Al-Amayreh (2013) investigated the effectiveness of PECS with Arabic-speaking children with ASD in Saudi Arabia. All participants in their study improved after using PECS, but only two out of six increased vocalization skills. Children who initially had spontaneous vocal repertoires also reported to improve after PECS training (Schwartz, Garfinkle, & Bauer, 1998), but there were no gains with PECS in the case of children who lacked initial spontaneous vocalizations (Bondy, & Frost, 1994). Howlin et al., (2007) also reported significant effects of PECS on communicative initiations but however stated that treatment effects were not sustained with the cessation of intervention.

**Video modeling.** Video modeling intervention for children with ASD has received considerable support (Ganz, Cook, & Earles-VoUrath, 2007). Maione and Mirenda (2006) reported that video modeling enhances relevant social interaction. It can also enhance conversational skills (Sherer, Pierce, Paredes, Kisacky, Ingersoll, & Schreibman, 2001), develop daily life skills (Keen, Brannigan, & Cuskelly, 2007), improve play skills (Nikopoulos & Keenan, 2003; 2007), and reduce problem behaviors (Luscre & Center, 1996). Video modeling is most effective in increasing social initiating, stimulating task oriented behaviors, mitigating
problem behaviors, and improving communication skills. Skills acquired through video modeling tend to be long lasting (MacDonald, Clark, M., Garrigan, & Vangala, 2005; Maione & Mirenda, 2006) in children who also apply them to new or unfamiliar settings (Gena, Couloura, & Kymissis 2005). Young children (e.g., preschool, elementary) have shown significant improvements from video modeling (Sherer et al., 2001). Video modeling can be used in conjunction with other interventions as well such as with auditory trainers (Baharav & Darling, 2008), Social Stories (Scattone, 2008), and positive reinforcement strategies (Keen et al., 2007).

**Social stories.** The concept of Social Stories are based on the hypothesis that ASD children lack theory of mind which would to better comprehend another person’s viewpoints, desires and beliefs (Baron-Cohen, Leslie, & Frith, 1985; Frith & Frith, 2003). As a consequence, children with ASD find it difficult to react appropriately in social situations. Carol Gray developed and introduced Social Stories in the early 1990’s, which are individualized short stories that describe a social situation encountered by children with autism to better cope with social situations in day to day life (Weiss, LaRue, & Newcomer, 2009). These stories are most often supplemented with pictorial cues or photos in addition to textual information (Reynhout & Carter, 2006) to explain social rules and contingencies for children with ASD.

Social Stories are created by the practitioners to both increase and decrease behavior. Social Stories are often used to help these children easily face multi-element situations, fear situations, and to reduce challenging behaviors (Weiss et al., 2009). For instance, Social Stories can be used to explain the actions required to deposit a check at the bank or to purchase a shoe from a retail shop, without displaying any aggressive behavior.

At present, the efficacy of Social Stories as an appropriate intervention for children with ASD is widely debated. Specifically, there exist limited data to support the efficacy of these
intervention approach for ASD children (Weiss et al., 2009). Parents and teachers not only like Social Stories as a very popular intervention tool for ASD children (Burke, Kuhn, & Peterson, 2004; Dodd, Hupp, Jewell, & Krohn, 2008), but often create and review Social Stories to help ASD children face new social situations and emergencies. A widely held argument is that the Social Stories increase attention of parents and teachers to targeted behaviors, and enhance the likelihood that desirable behaviors in children with ASD are prompted and reinforced. Besides the fact that perceived effects of Social Stories for children with ASD are positive, there exists discrepancy on the future use of the Social Stories by practitioners. For instance, two parents who were unsure of the beneficial effect of the Social Stories on the target behaviors in children with ASD were reported to not only continue using Social Stories, but also create new stories to enhance desired skills in their children with disabilities. However, Crozier and Tincani (2007) reported that teachers who liked using Social Stories as an intervention approach for children with disabilities and found the outcomes beneficial to these children did not continue to use the Social Stories after the termination of research study.

Treatment and education of autism and communication related handicapped children (TEACCH). The TEACCH program has been used with children with ASD for over four decades. Developed as a professional program at the University of North Carolina at Chapel Hill (Mesibov & Shea, 2009), TEACCH emphasizes structured teaching using visual support strategies to enhance independent functioning of children with autism. The program is composed of four structured teaching elements: (a) physical structure and workspace organization, (b) schedules indicating details about the required task, (c) work system (d) task organization. The program requires that the environment be arranged to meet student needs (Ringdahl, Kopelman, & Falcomata, 2009).
Most of studies have confirmed the effectiveness of the TEACCH program for children with ASD. Recognizing the needs of ASD individuals, TEACCH develops an individualized, family-centered plan for each student, assigns spatial orientation to start and end each task, and uses visual schedules to support individual tasks (Mesibov & Shea, 2009). Ozonoff and Cathcart (1998) compared pre- and post-test treatment of skills development in 11 children with autism against a control group. Parents in the experimental group received 8-12 sessions of individualized TEACCH training at home. The group that received TEACCH treatments improved significantly over the control group. Welterlin (2009) evaluated the effectiveness of a 12-session TEACCH intervention for parents of two children with autism. The findings indicated increased fine motor skills, decreased maladaptive behaviors, increased independence, and increased receptive skills in children with ASD. It also considerably decreased parental distress.

**Conclusion**

The Centers for Disease Control, (CDC, 2014) reported a global estimate of 1% prevalence rate for ASD based on diagnosis of children at 8 years old. In Saudi Arabia, the prevalence rate of ASD is 2-6 in every 1,000 children (Aljaralla, Alwazna, Alansary, & Alhazmy, 2006; Al-Salehi, Al-Hifthy, & Ghaziuddin, 2009), suggesting a highly variable, but increasing rate for ASD (Zeina et al., 2014). The symptoms of ASD vary from one to individual to another and can be mild to moderate to severe. In general, these individuals demonstrate deficits in communication skills, social skills and behavioral skills.

Increasing prevalence rates of ASD in Saudi Arabia suggest a need for effective educational intervention by teachers with adequate behavior management skills for integration of these children into the mainstream society. If effective interventions are not implemented early
on in their education, children will develop disruptive behaviors that may aggravate later in life to transform them to antisocial individuals, who have difficulty living as a member of family or community. In addition, early and effective treatment offers reduced costs and greater improvements through recuperated productivity of individuals with ASD and their caregivers (Ganz, 2007). Accordingly, there exists a need for adequate training for teachers of students with ASD in appropriate adoption and use of a suitable behavioral intervention approach.

Applied behavior analysis (ABA) has been found to be the most commonly used educational intervention in a US national survey of 552 participants (Green et al., 2006). It is also the most successful early intervention programs for children with ASD to date and is considered the most comprehensive and effective approach to improve the lives of children with children with ASD and their families (Lindgren, & Doobay, 2011). Previous research based on a meta-analysis have shown three ABA based intervention strategies, i.e., group contingencies, self-management, and differential reinforcement, as the most effective in reducing disruptive behavior of approximately 85% of the students in public education settings (Stage & Quiroz, 1997). Another meta-analysis study published in the Journal of Applied Behavioral Analysis, ABA strategies that involve the token economy system and differential reinforcement were shown to be very effective in the elimination of disruptive behaviors (Chen & Ma, 2007). Therefore, teachers of students with ASD, with adequate training in the use of ABA strategies can effectively manage the disruptive behavior of students’ in a classroom setting.

Effective teachers of students with ASD can also adapt and modify the curriculum using a variety of tools and strategies (Gustafson, 2006). The difference between successful and unsuccessful teachers may be as simple as effective use of a variety of strategies and depth of knowledge. However, too few teachers are adequately prepared to meet the needs of these
children (Schwartz & Drager, 2008). The preparation of teachers of children with ASD is not well studied (Mazin, 2011). Accordingly, a research gap exists on level of knowledge and frequency of use of different ABA strategies by teachers to manage the disruptive behaviors in students with ASD in Saudi Arabia. In addition, little is known on the barriers perceived by teachers to use these strategies, and their most desired training programs.
CHAPTER THREE

Methods

The current study aims to assess what do teachers of students with ASD in Saudi Arabia know about Applied Behavior Analysis (ABA) and barriers to the use of ABA strategies. The study also aims to assess the relationship between teachers’ knowledge and use of ABA strategies and demographic information (gender, teaching experience, teaching certification, and training in ABA). This chapter describes the research design, participants, instruments and materials, and data collection and analysis.

Research Design

This study has been designed as a quantitative survey investigation. The main purpose of a descriptive survey is to examine a hypotheses or survey a large group of people regarding their opinions or specific issues. Descriptive surveys can be used as a research strategy to systematically collect quantitative information from a relatively large sample taken from a selected population (Scheuren, 2004). Questionnaires are used frequently today, for survey research as many are/can be web-based and reach large numbers of participants. The teachers I surveyed them were familiar with this type of web-based survey and data collection.

There are some advantages in using a web-based questionnaire. These include cost (usually low), rapid responses, and also data analysis (through software). These types of surveys can be reliable and be completed at the respondent's convenience without being influenced by an interviewer (Fraenkel, Wallen, & Hyun, 2012). “Internet surveys have the great advantage of all self-administered forms: that of eliminating unwanted interviewer effects and providing more privacy when answering sensitive questions” (De Leeuw, Hox, & Dillman 2008, p.250). Usually a researcher would want to obtain a random sample of a population, which is difficult to do in a
web-based survey study. However, Cresswell (2009) notes that if the researcher is interested in obtaining specific data from a specific population, then random sampling is not always necessary. The researcher designed the web-based survey on a representative sample from a population of teachers of students with ASD.

The study explored the perceptions of teachers of students with ASD regarding their extent of knowledge about ABA strategies and the teachers’ perceptions of their use/frequency of use of ABA strategies. Additionally, the researcher explored how different demographic variables (gender, teaching experience, teaching certificate, and training in ABA etc.) relates to the perceived level of knowledge of these teachers as well as their frequency of use of different ABA strategies. The researcher explored the teachers’ perspectives on the effectiveness of learning opportunities as well. The learning opportunities include courses, professional development, and trainings the teachers have had in the past. The researcher also examined what the teachers feel as barriers to their use of the ABA behavior management strategies when teaching students with ASD and the frequency with which they encounter these barriers.

The study explored the following questions:

1. Which ABA strategies do teachers of students with ASD perceive themselves to be knowledgeable about and to what extent?

2. Which ABA strategies do teachers of students with ASD perceive themselves to use in their classrooms and how frequently?

3. Are there significant differences in the perceived knowledge of teachers across different demographic variables information (gender, teaching experience, teaching certification, and training in ABA)?

4. Are there significant differences in the perception of frequency of use of ABA
strategies by teachers across the main effect of different demographic information (gender, teaching experience, teaching certificate, and training in ABA)?

5. How effective have learning opportunities been in supporting the teachers learning about the behavior strategies?

6. What conditions do teachers of students with ASD perceive as barriers to their use of behavior management strategies and how frequently do they encounter these barriers?

7. What training and resources on behavior management strategies do teachers of students with ASD perceive as the most desired for successful implementation of ASD programs?

Participants

The participants in this study were drawn from the population of male and female teachers of students with ASD who are teaching at institutes, and ASD programs attached to public schools in Saudi Arabia. There are about 400 teachers of students with ASD and approximately 40 ASD programs in the public schools and in the Institutes of Intellectual Education affiliated with the Ministry of education throughout Saudi Arabia (Personal communication, Special Education Supervisors, Ministry of Education, 2014). A representative study sample obtained from various ASD public schools and institutes in the seven major cities (Riyadh, Jeddah, Makkah, Al-Madinah, Al-Dammam, Abha, and Hail) in Saudi Arabia. These cities represent the most populated cities in Saudi Arabia and the majority of the institutes and public schools for students with ASD in Saudi Arabia are located in these cities.

Estimation of sample population. Borg and Gall (1989) suggest the same number of samples in each subgroup be considered in survey research. In this study, the researcher wanted to ensure equal numbers of participants from the subcategories of the male and female teachers.
However, the global estimate of male to female ratio for children with ASD is approximately 4:1 (Newschaffer, Croen, Daniels, Giarelli, Grether, Levy et al., (2007). Therefore, the researcher assumed that there are more male students with ASD than female students with ASD in Saudi Arabia. Assuming that above ratio also holds true for male to female teachers of students with ASD, the researcher estimated a minimum sample size of about 165 participants. The researcher obtained a sample size of 158 teachers of students with ASD as survey studies always experience low response rates.

**Instrumentation**

**The survey.** The survey consisted of five sections: (a) participants’ demographic information, (b) teachers' knowledge and frequency of use of ABA strategies, (c) the importance of various training activities and experiences, (d) the barriers to use of the ABA behavior management strategies, and (e) type of training/resources that desired to the teachers (Appendix C).

The researcher surveyed the teachers of students with ASD about their knowledge and use of ABA strategies. The researcher obtained a behavior management survey conducted by (Randazzo, 2011) to start with as the foundation for my survey. The researcher modified the items so that the ABA strategies would be understandable to the teachers, and I also added additional items that allow me to explore my research questions. The survey for this study consists of five parts. In part 1 of the survey, participants’ demographic information including gender, experience, courses, training and education were collected. Responses of the participants were scored as: response for gender scored as 0 = female and 1 = male, response for educational unit scored as 0 = public schools and 1 = institutes. In addition, response for courses on behavior management, training on ABA during teaching career and courses on ABA during teachers
undergraduate or graduate education were scored as 0 = no and 1 = yes. The second part asked participants to rate their knowledge of sixteen ABA strategies as well as how often they use each strategy in the classroom. For each item, a Likert scale with three response options were provided. Participants responded by checked a box to indicate how knowledgeable they are about each strategy; they also checked a box to indicate the frequency with which they used each strategy. The response options for the level of knowledge included: (1) Not knowledgeable, (2) Somewhat knowledgeable, or (3) Knowledgeable. Response options for the frequency questions includes: (1) I never use this strategy, (2) I occasionally use this strategy, or (3) I often use this strategy. The third part of the survey asked participants to rate the importance of various training activities and experiences (learning opportunities). A Likert scale with four response options in the survey included: (1) I never experienced this learning opportunity in my teacher training or any other training, (2) I don’t feel the learning opportunity was effective, (3) The learning opportunity was somewhat effective, or (4) The learning opportunity was very effective. In part 4, the survey asked participants to rate how frequently they perceive various conditions as barriers to their use of the ABA behavior management strategies. They indicated how often each condition is perceived as a barrier. Responses coded as: (1) Never a barrier to my use of this behavior strategy, (2) Sometimes a barrier to my use of this behavior strategy, or (3) Very often a barrier to my use of this behavior strategy. The fifth part explored desired training about behavior management, behavior strategies, and any other type of training the teachers would like to receive. Responses to the items in part 5 of the survey include: (1) Most desired training/resource, (2) Desired training/resource, or (3) Not desired.

**Piloting the survey.** Prior to the start of the study, the survey instrument was tested in Saudi Arabia. The instrument was pilot tested with fifteen teachers who are currently teaching
students with ASD in Saudi Arabia. The pilot study served to provide initial evidence for the validity and reliability of the survey. Participants in the pilot study responded to the items and provided feedback regarding any unclear content, reported difficulty in understanding the survey questions, and they indicated whether the time required to complete the survey was sufficient or not. As a result of the pilot study, changes were made to the survey items in order to ensure participants could read and understand the survey.

**Validity.** Validity was measured in various ways in this study. Content validity was supported by a literature review. Expert review by native language speakers in Arabic and English provided substantive validity. The researcher used Rasch’s model to examine the validity of the questions.

Two faculty members from Washington State University who hold Ph.D. degrees in special education reviewed the English version of the instrument. The Arabic version of the same survey was checked by five faculty members with expertise in special education in Saudi Arabia. The researcher checked the survey content, including the translation, and provided feedback regarding the survey. The survey items were edited based on the reviewers’ suggestions.

**Construct validity.** Two reviewers read the survey and agreed on the relevance of the survey topics. Each reviewer has a Ph.D. and an extensive background in the special education field (Lamb, Annetta, Meldrum, & Vallett, 2012). Analysis of reviewer agreement of relevance was calculated using a measure of construct validity as follows:

$$d = \frac{I_D}{\sum_{i=1}^{I_{A-D}}}$$

The analysis of agreement was performed for all the items in the survey and for each section of the survey. Scores of about .70 are considered to be adequate to measure the construct validity coefficient.
The estimated coefficient was .91, which indicates acceptable construct validity.

Validity evidence. (Table 1) shows the summery of validity evidence was used for the survey titled: Knowledge and use of applied behavior analysis’ survey among teachers of students with autism spectrum disorders in Saudi Arabia (Lamb, Vallett, & Annetta, 2014).

Table 1

Summary of Validity Evidence

<table>
<thead>
<tr>
<th>Type of Validity</th>
<th>Sources of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content</td>
<td>Literature review, Examination and rating by expert reviewers of the item-construct appropriateness, examination of construct representativeness of the domain.</td>
</tr>
<tr>
<td>Substantive</td>
<td>Examination and rating by expert reviewers of the item-construct appropriateness, Rasch analysis of item behavior.</td>
</tr>
<tr>
<td>Structure</td>
<td>Fit to the Rasch model, Infit Outfit statistics, Internal consistency reliability.</td>
</tr>
<tr>
<td>Generalizability</td>
<td>Examination of content representativeness, Examination of the instrument outcomes compared to other instruments measuring the same construct.</td>
</tr>
<tr>
<td>External Factors</td>
<td>Rasch item functioning, discriminant analysis and convergence analysis.</td>
</tr>
</tbody>
</table>

Instrument reliability. The reliability estimate for the constructs was .91 using the Rasch Reliability. Questions with low reliability in the survey were revised based on the pilot study results. In part one, six questions were added based on the result of the pilot study. In addition, there were some modifications in part two, three and four to commensurate with the participants' understanding. The researcher added fifth part in order to figure out the trainings and resources desired by participants.
Data Collection and Analysis

To ensure that the research was conducted ethically (Fowler, 2009), the researcher sought permission for the study from the Washington State University (WSU) Internal Review Board (IRB) in Pullman. All IRB requirements were fulfilled before beginning the survey strategies (Appendix B). An invitation letter with all survey items was emailed to potential participants. Codes replaced participant names and participants were informed that all data collected will be kept confidential and their identities will not be revealed.

Assuming near about 40% response rate, invitations were sent to 400 teachers of students with ASD to complete the survey. The survey was administered using Qualtrics, a secure online survey tool. The link for survey was shared electronically by General Secretariat for Special Education in Ministry of Education in Saudi Arabia. Participants were informed that their participation is voluntary and that they could quit the survey at any time. They were also informed that there is no incorrect response for each item in the survey.

To explore the research questions, descriptive statistics (means, standard deviations, percentages) on demographic variables and the responses of participants were generated. A Chi Square test for independence was also carried out on the categorical demographic variables to determine whether there is a significant association between the two categorical variables.

The researcher employed linear regression to explore the relation between the demographic information variables (gender, years of teaching experience, prior participation in a behavior management course, prior completion of an ABA course, prior training in ABA, level of education, type of educational unit employed in, number of students enrolled in class, age range of students taught, level of cognitive impairment in students taught, level of behavior problems in students taught) and average of teachers' knowledge of ABA strategies as well as
average of the teachers frequency of use of ABA strategies (e.g., social positive reinforcement, shaping, behavior contract, modeling, fading, prompting, punishment and time out).

Additionally, the researcher assessed the teachers’ level of knowledge about each ABA strategy as well as their frequency of use by applying ordinal logistic regression on responses of participants to each ABA strategy. Demographic information variables were used as predictors in the analysis. In other words, the ordinal logistic regression was used to identify the demographic variables that influence the level of knowledge and frequency of use of each ABA strategy considered by the participants. Ordinal logistic regression is based on the proportional odds assumption. It assumes that the coefficients that describe the relationship between, say, the lowest versus all higher categories of the response variables in an ordinal logistic regression are the same as those that describe the relationship between the next lowest category and all higher categories. Because the relationship between each pair of outcome groups is the same, there is only one set of coefficients (only one model) to describe their relationship.

The data were analyzed using SPSS 16. For all statistical tests, a confidence level of 95% was assumed and a p value of <= 0.05 indicated a strong evidence against the null hypothesis. More specifically, a p value of <=0.05 suggested a strong association between categorical variables in a Chi Square test, and also a strong effect of a predictor (demographic information) variable in a linear and ordinal regression. For both regressions, a step-wise backward elimination procedure was followed to ensure that the final selected model for each response variable retained only the most influential predictor variable(s).
CHAPTER FOUR

Results

The purpose of this study was to examine the level of knowledge and frequency of use of applied behavioral analysis (ABA) strategies by teachers of students with Autism spectrum disorder (ASD). The researcher also gathered participants’ ratings on the effectiveness of different learning opportunities related to ABA strategies, barriers to the implementation of ABA strategies and the training resources desired by the participants for successful implementation of ASD programs in Saudi Arabia.

Response Rate

The researcher used the Qualtrics online survey management system to administer the survey. A total of 287 teachers of ASD students responded out of a total of 400 surveys disseminated. Only 158 of these participants answered at least one question other than those related to demographic aspects. The remaining 129 surveys were omitted from inclusion in data analysis. Hence the 158 responses provide a snapshot of the teacher population and this figure was used to estimate the response rate to the survey. Accordingly, the adjusted response rate for survey is approximately 40% (158 out of 400). Most importantly, the adjusted rate achieved is close to an acceptable response rate for the online surveys (Nulty, 2008).

Demographic Information

The researcher invited all male and female teachers of students with ASD who are teaching students with ASD in public schools and in institutes of intellectual education in Saudi Arabia to complete the survey. A total of 158 teachers of students with ASD responded to items in the first section of the survey that requested information on their background and other variables of interest including: number of years of teaching experience, teaching qualifications,
number of courses on behavior management and ASD, training in ABA, the number and age of
the students who the participants were teaching, and the level of behavior problems and
cognitive impairment among their students. Descriptive statistics on these demographic
variables and how these factors affect the teachers’ responses to the survey are described in this
chapter.

**Number of years of teaching.** Of the 158 participants who responded to this item,
54.4% and 23.4% had 0-3 years and 4-7 years of teaching experience respectively. Over ten
percent and 10.1% of the responding teachers had 8-11 years or more than 12 years of teaching
experience each, respectively. Two participants (1.3%) did not respond to this item in the survey
(Table 2).

**Gender.** Almost equal representation of males and females. Of those teachers who
responded, 52.5% were females and 47.5% were males (Table 2).

**Academic Attainment.** Of those who responded, 79.1% had a bachelor’s degree, while
13.9% had a master’s degree. A single respondent (0.6%) in the survey had a doctorate degree.
The remaining teachers (6.3%) had completed a diploma program in ASD (Table 2).

**Educational unit.** Participating teachers were either from ASD programs in public
schools or autism programs at the Institute of Intellectual Education. Three of the participants
did not specify their affiliation to public schools or ASD programs at the institutes of intellectual
education. Of the 158 participants, 59 (37.3%) were teachers in public schools and 96 (60.8%)
were teachers from ASD programs at the Institutes of Intellectual Education (Table 2).

Table 2
Frequencies and Percentages of Demographic Characteristics within Sample (n=158)

<table>
<thead>
<tr>
<th>Demographic characteristic</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>75</td>
<td>47.5</td>
</tr>
</tbody>
</table>
Female 83 52.5

Academic degree
- Bachelor’s 125 79.1
- Master’s 22 13.9
- PhD 1 .6
- Others 9 5.7
- No response 1 .6

Years of teaching experience
- 0-3 86 54.4
- 4-7 37 23.4
- 8-11 17 10.8
- >12 16 10.1
- No response 2 1.3

Educational unit
- Public schools 59 37.3
- Institute of Intellectual Education (IIE) 96 60.8
- No response 3 1.9

**Number of students with autism in teachers’ programs.** A breakdown of the number of teachers by number of students with ASD in their school program or autism center is provided in the Table 3. Among the 158 participants, 48.1% of the participants had 1-5 students, 18.4% had 6-10 students, 8.9% had 11-15 students, 4.4% had 16-20 students and 18.4% had more than 20 students in their program. Three participants did not respond to this item (Table 3).

**Students’ age.** A breakdown of the number of teachers who participated in the survey by age of the students with ASD is provided in the Table 3. Among the 158 participants who responded to this question, 64.6% of the participants had students in the age group of 6-9, 15.8% had students in the age group of 10-12, 11.4% had students in the age group of 13-15, and 6.3% had students in the age group of 16-21 in their program. Three participants did not respond to this item as well (Table 3).
Table 3

Frequencies and Percentages of Demographic Characteristics within Sample (n=158)

<table>
<thead>
<tr>
<th>Demographic characteristic</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6-9</td>
<td>102</td>
<td>64.6</td>
</tr>
<tr>
<td>10-12</td>
<td>25</td>
<td>15.8</td>
</tr>
<tr>
<td>13-15</td>
<td>18</td>
<td>11.4</td>
</tr>
<tr>
<td>16-21</td>
<td>10</td>
<td>6.3</td>
</tr>
<tr>
<td>No response</td>
<td>3</td>
<td>1.9</td>
</tr>
</tbody>
</table>

| Students in ASD programs   |           |         |
| 1-5                        | 76        | 48.1    |
| 6-10                       | 29        | 18.4    |
| 11-15                      | 14        | 8.9     |
| 16-20                      | 7         | 4.4     |
| >20                        | 29        | 18.4    |
| No response                | 3         | 1.9     |

**Behavior management courses.** As shown in Table 4, 54.4% of the participants completed a course in their undergraduate or graduate education focused primarily on behavior management related to students with ASD. This comprised a total of 52 female teachers (62.7% of the females) and 34 male teachers (45.3%) who participated in the survey.

**Course on autism behavior management.** However, 59.5% of participants did not take a course in their undergraduate or graduate education focused on ABA. Only 39.9% completed a course focused primarily on ABA in their undergraduate or graduate education. One participant provided no response to this item (Table 4).

**ABA training.** Out of the participants, 53.8% did not complete a training on ABA courses during their teaching career. Forty-five percent did complete at least one training on applied behavioral analysis strategies during their teaching career. One participant provided no response to this item (Table 4).
Table 4

Frequencies and Percentages of Demographic Characteristics within Sample (n=158)

<table>
<thead>
<tr>
<th>Demographic characteristic</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Behavior management course</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Took</td>
<td>86</td>
<td>54.4</td>
</tr>
<tr>
<td>Did not take</td>
<td>72</td>
<td>45.6</td>
</tr>
<tr>
<td>ABA Course</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Took</td>
<td>63</td>
<td>39.9</td>
</tr>
<tr>
<td>Did not take</td>
<td>94</td>
<td>59.5</td>
</tr>
<tr>
<td>No response</td>
<td>1</td>
<td>.6</td>
</tr>
<tr>
<td>ABA training</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Took</td>
<td>72</td>
<td>45.6</td>
</tr>
<tr>
<td>Did not take</td>
<td>85</td>
<td>53.8</td>
</tr>
<tr>
<td>No response</td>
<td>1</td>
<td>.6</td>
</tr>
</tbody>
</table>

**Cognitive impairment.** Using a scale of 1 to 5, where 1 indicates mild cognitive impairment and 5 indicates severe cognitive impairment, the participants in the survey rated the cognitive functioning level of students with ASD in the program taught. A breakdown of respondent teachers by severity of cognitive impairment in their students with ASD is provided in the Table 5. Of all participants, 48.1% of teachers had students with intermediate levels of cognitive impairment, whereas 32.3% and 17.1% of teachers, respectively, had students with above and below intermediate level of cognitive impairment. One out of the participants did not respond to this item (Table 5).

**Behavioral problems.** Using a scale of 1 to 5, where 1 indicates mild behavior problems and 5 indicates severe behavior problems, the participants in the survey rated the behaviors of the students with ASD in the programs taught. A breakdown of the participants by severity of behavioral problems in their students with ASD is provided in the Table 5. Among of the participants, 44.9% of the teachers had students with an intermediate level of behavior problems,
whereas 26.0% and 28.5% teachers, respectively, had students with above and below intermediate level of behavior problems. One of the participants did not respond to this item (Table 5).

Table 5

Frequencies and Percentages of Demographic Characteristics within Sample (n=158)

<table>
<thead>
<tr>
<th>Demographic characteristic</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cognitive impairment</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No response</td>
<td>4</td>
<td>2.5</td>
</tr>
<tr>
<td>Mild cognitive</td>
<td>15</td>
<td>9.5</td>
</tr>
<tr>
<td>2</td>
<td>36</td>
<td>22.8</td>
</tr>
<tr>
<td>3</td>
<td>76</td>
<td>48.1</td>
</tr>
<tr>
<td>4</td>
<td>22</td>
<td>13.9</td>
</tr>
<tr>
<td>Severe cognitive</td>
<td>5</td>
<td>3.2</td>
</tr>
</tbody>
</table>

| Behavior Problems          |           |         |
| No response                | 1         | .6      |
| Mild behavior              | 10        | 6.3     |
| 2                          | 35        | 22.2    |
| 3                          | 71        | 44.9    |
| 4                          | 32        | 20.3    |
| Severe behavior            | 9         | 5.7     |

**Relationship between Selected Variables**

The association between gender and other demographic variables were also assessed in the study using Chi Square test for independent.

**Gender and ABA course.** As shown in Table 6, of the 39.9% teachers who took a course primarily focused on ABA, 36 (43.4%) were female teachers, while 27 (36.4%) were male teachers. Of the 59.9% teachers who did not take a course primarily focused on ABA, 50% each (47 teachers each) were males and females respectively. There existed no association among the gender of teachers and their enrollment in a course on autism behavior management (Pearson Chi Square = 0.77; df =1; p=.38).
Table 6

Frequency of Teachers Who Completed an ABA Course (n=158)

<table>
<thead>
<tr>
<th>ABA Course</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
</tr>
<tr>
<td>Females</td>
<td>47</td>
</tr>
<tr>
<td>Males</td>
<td>47</td>
</tr>
<tr>
<td>Total</td>
<td>94</td>
</tr>
</tbody>
</table>

**Gender and ABA training.** Of the 45.6% of all participants who completed at least one ABA training during their teaching career, 41 (49.4%) were female teachers and 31 (41.9%) were male teachers (Table 7). No association existed between teacher gender and their completion of training in applied behavioral analysis (Pearson Chi Square = 0.89; df=1; p=.35).

Table 7

Frequency of Teachers with Prior ABA Training (n=158)

<table>
<thead>
<tr>
<th>ABA Training</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
</tr>
<tr>
<td>Females</td>
<td>42</td>
</tr>
<tr>
<td>Males</td>
<td>43</td>
</tr>
<tr>
<td>Total</td>
<td>85</td>
</tr>
</tbody>
</table>

**Gender and educational unit.** Among all participants, 57 (68.7%) were female teachers and 39 (54.2%) were male teachers in autism programs at the Institutes of Intellectual Education (Table 8). As stated earlier, these comprised 60.8% of the total participants in the study. Public schools had considerably lower, but approximately equal number of female (26) and male (33) teachers. Differences among the number of female and male teachers in autism programs in public schools or at the Institutes of Intellectual Education approached significance (Pearson Chi Square = 3.44; df=1; p=.06).
Table 8

Frequency of Teachers by Gender and Educational Unit (n=158)

<table>
<thead>
<tr>
<th>Educational Unit</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
</tr>
<tr>
<td>Females</td>
<td>26</td>
</tr>
<tr>
<td>Males</td>
<td>33</td>
</tr>
<tr>
<td>Total</td>
<td>59</td>
</tr>
</tbody>
</table>

Educational unit and number of students. As shown in Table 9, about 61% of the teachers who had 1-5 students in their program belonged to the Institutes of Intellectual Education; the remaining 31% of the teachers who had 1-5 students in their program belonged to public schools. Interestingly, 89% of the teachers who had 16-20 students or more than 20 students in their program belonged to institutes of intellectual education; the remaining 11% of the teachers with 16-20 or more than 20 students in their program belonged to public schools. As far as teachers with 6-10 students or 11-15 students in their program, slightly more teachers belonged to public schools than those who belonged to institutes of intellectual education.

Gender specific differences among teachers about the total enrollments of students with ASD were not evident (Pearson Chi Square = 7.11; $df = 5$, $p$ (2 sided) =.21). However, a breakdown of the teachers by total number of students taught differed among autism programs in public schools or autism programs at the institutes of intellectual education (Pearson Chi Square = 18.97; $df = 5$, $p$ (2 sided) =.002).

Table 9

Frequency of Teachers by Educational Unit and Number of Students (n=158)

<table>
<thead>
<tr>
<th>Number of students in Autism programs</th>
<th>Ed Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Public schools</td>
</tr>
<tr>
<td>No response</td>
<td>1</td>
</tr>
<tr>
<td>1-5</td>
<td>29</td>
</tr>
<tr>
<td>6-10</td>
<td>16</td>
</tr>
<tr>
<td>11-15</td>
<td>9</td>
</tr>
<tr>
<td>16-20</td>
<td>1</td>
</tr>
<tr>
<td>&gt;20</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>59</td>
</tr>
</tbody>
</table>
Teachers’ Level of Knowledge of ABA Strategies

In the second section of the survey, the researcher asked teachers of students with ASD how they perceive their own knowledge about ABA strategies. Specifically, teachers of students with ASD were asked to rate their level of knowledge of each of the 16 ABA strategies (Table 10).

As shown in Table 10, teachers of students with ASD were asked if they possibly give students more attention when they demonstrate positive behaviors, to enable an assessment of teachers’ knowledge regarding the social positive reinforcement strategy. Of all teacher respondents, 58.9% indicated that they were “knowledgeable” and 23.4% indicated that they were “somewhat knowledgeable”, comprising 82.3% of all responses. The remaining 3.8% of the participants had no knowledge about this item.

Participants’ level of knowledge on the use of a preferred activity as positive reinforcement to manage students with ASD was also assessed. Specifically, teachers were asked, when he/she demonstrates positive behavior, to let students earn time to spend on a preferred activity, such as computer time or game time. One participant did not respond to this item. The results as to the level of knowledge regarding teachers’ use of the positive reinforcement strategy revealed that 68% indicated that they were “knowledgeable” and 28.5% indicated that they were “somewhat knowledgeable”, comprising 96.9% of the responses. The remaining 2.5% had no knowledge about this item.

To assess the teachers’ level of knowledge on the use of token economy as a positive reinforcement strategy, the teachers of students with ASD were asked if they have a system in
which students can earn tickets, or points, or stars that can later be traded in for larger prizes, when he/she demonstrates positive behavior. Four of the participants did not answer this item. Of all participants, 54.4% responded as “knowledgeable” and 29.7% responded as “somewhat knowledgeable” to collectively form 84.1% of all responses. The remaining 13.3% had no knowledge about this item.

Teachers of students with ASD were also asked if they let students earn candy or food for demonstrating positive behavior, in order to assess their level of knowledge in the use of food as positive reinforcement. Of the total participants, four participants did not respond to this item. Out of the remaining 150 participants, 64.6% responded “knowledgeable” and 27.8% responded as “somewhat knowledgeable” to collectively form 92.4% of all responses. The remaining 5.1% had no knowledge about this item.

To assess their knowledge on the shaping strategy, the researcher asked if the teachers of students with ASD continue to reward students as they achieve small steps toward a more complex/difficult positive behavior until they learn the complex/difficult behavior completely. Four of the participants did not answer this item. Fifty-five percent of the participants responded as “knowledgeable” and 35.4% responded as “somewhat knowledgeable” to collectively form 90.5% of all responses. The remaining 7.0% indicated that they had no knowledge about this item.

To measure their level of knowledge about the behavior contract strategy, the researcher asked if the teachers of students with ASD let their students jointly decide with them what behaviors they will work toward achieving. Ten of the participants did not answer this item. A total of 30.4% responded as “knowledgeable” and 41.8% responded as “somewhat knowledgeable” to collectively form 72.2% of all responses. The survey outcome revealed that
the remaining 21.5% had no knowledge about this item.

Another major component of the behavior contract strategy is how teachers and students make decisions about how to rewards for students who elicit positive behavior. Nine of the participants did not answer when asked if they let their students decide with them what rewards they will earn as they achieve their behavioral goals. About 50% responded as “knowledgeable” and 32.3% responded as “somewhat knowledgeable” to collectively form 81.7% of all responses. The remaining 12.7% had no knowledge about this item.

The modeling strategy used to manage the behavior of students with ASD requires that teachers demonstrate the positive behavior(s) that they want students to learn and perform. Two participated did not respond on their level of knowledge regarding the modeling strategy. A total of 65.8% and 26.6% responded as “knowledgeable” and “somewhat knowledgeable” about modeling strategy to collectively form 92.4% of all responses. The remaining 6.3% had no knowledge about this item.

The researcher asked whether the teachers of students with ASD prompt/guide students all along the way (as needed) as they are learning positive behavior. Two participants did not respond about their level of knowledge regarding prompting strategy. Of the total 158 teachers who participated in the survey, 72.2% responded as “knowledgeable” and 24.1% responded as “somewhat knowledgeable” to collectively form 96.3% of all responses. The remaining 2.5% had no knowledge about this item.

In behavior management programs, the prompting strategy is most often accompanied by a fading strategy to manage the behavior of participants. Four participants who participated in the survey did not answer when asked whether they slowly take away prompts/guidance as the student demonstrates more independently positive behavior. Fifty nine percent and 34.2%
responded as “knowledgeable” and “somewhat knowledgeable” about fading strategy respectively to collectively form 93.7% of all responses. Results revealed that the remaining 3.8% had no knowledge about this item.

The group contingency strategy is often practiced by behavior management professionals or teachers where they reward the entire class when one student or a small group of students demonstrate positive behavior. Levels of knowledge of the participants were almost evenly split when asked about their level of knowledge regarding group contingency strategy. Thirty one percent responded as “knowledgeable” and 37.3% responded as “somewhat knowledgeable” about this strategy to collectively form 68.3% of all responses. The remaining 25.9% had no knowledge about this item. Nine of the participants did not respond to this item.

To assess the level of knowledge of teachers regarding the extinction strategy, the researcher asked whether the teachers of students with ASD stop their actions if they contribute to a student’s inappropriate behavior (For example, the teacher will withdraw their attention, if the attention seems to be rewarding a student’s inappropriate behavior). Three participants did not respond to this item. Sixty percent responded as “knowledgeable” and 29.1% responded as “somewhat knowledgeable” to collectively form 89.2% of the responses. The remaining 8.9% had no knowledge about this item.

Another ABA related strategy is punishment. Though punishment is not generally appreciated as an effective behavior management strategy by teachers in developed countries, it is often used to manage students in developing countries and in particular used to manage students with severe behavioral problems. Teachers of students with ASD were asked if they verbally reprimanded students or took away privileges when behaviors were inappropriate. Six participants did not answer this item. About 45% responded as “knowledgeable” and 35.4%
responded as “somewhat knowledgeable” to collectively form 80.3% of all responses. The remaining 15.8% indicated that they had no knowledge about this item.

Teachers of students with ASD were asked about their level of knowledge regarding the differential reinforcement strategy. Specifically the teachers were asked if they rewarded students’ positive behaviors and at the same time did not reward the students’ inappropriate behavior (For example, I might praise a student for looking at the lesson or attending to the lesson while at the same time I would ignore the same student for kicking his/her desk). Seven participants did not answer this question. Of remaining 151 participants, 59.5% responded as “knowledgeable” and 30.4% responded as “somewhat knowledgeable”. The remaining 5.7% had no knowledge about this item.

The level of knowledge of teachers regarding the time out strategy was assessed by asking if the teachers of students with ASD temporarily separate any student (put them in a different area or setting) from the other students following inappropriate behaviors. Fifty-four percent of the participants responded as “knowledgeable” and 30.4% responded as “somewhat knowledgeable” to collectively form 84.4% of the responses. The remaining 12.7% had no knowledge about this strategy. Four participants did not answer this item.

To measure the participants’ knowledge on the overcorrection strategy, teachers of students with ASD were asked if they required students to practice positive behaviors if the student demonstrates inappropriate behavior (For example, if a student screams a request, such as “In want cookie!” I have the student practice giving the request in an appropriate way; or if a student kicks/shouts when he/she needs something, I have him/her practice how to get his/her needs met in an appropriate way). Of the total participants, 57.6% responded as “knowledgeable” and 27.8% responded as “somewhat knowledgeable” to collectively form
85.4% of all responses. The remaining 12% had no knowledge about this item. Four participants did not respond to this item.

**Summary of Teachers’ Level of Knowledge.** Table 10 shows that 72.2% of participants perceived themselves to be “knowledgeable” about the prompting strategy, followed by other strategies like: using a preferred activity as positive reinforcement (68.4%), earning candy or food as a positive reinforcement (64.6%), modeling (65.8%), and extinction (60.1%) strategy. Approximately 50%-60% of the participants felt “knowledgeable” about the following ABA strategies: social positive reinforcement, using a token economy system as positive reinforcement, shaping, fading, differential reinforcement, time out and overcorrection. For each ABA strategy considered in the survey, nearly one third of the participants (24.1%-41.8%) perceived themselves to be “somewhat knowledgeable”. Compared to all other strategies, a small percentage of participants were “knowledgeable” about the group contingency (31.0%) and behavior contract (30.4%) strategy (where in students and teachers decide together what behaviors they will work to achieve) strategies. In other words, about one quarter of the participants were “not knowledgeable” about these two strategies, the group contingency (25.9%) and behavior contract (21.5%).
Table 10
Participants’ Levels Knowledge of ABA Strategies (n=158).

<table>
<thead>
<tr>
<th>ABA strategy</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not Knowledge able</td>
</tr>
<tr>
<td>Positive Reinforcement – Social: I give students possible attention when the student demonstrates positive behavior.</td>
<td>3.8</td>
</tr>
<tr>
<td>Positive Reinforcement – preferred activity: I let students earn time on a preferred activity, such as computer time or game time, when he/she demonstrates positive behavior.</td>
<td>2.5</td>
</tr>
<tr>
<td>Positive Reinforcement - Token Economy- I have a system in which students can earn tickets, or points, or stars that can later be traded in for larger prizes, when he/she demonstrates positive behavior.</td>
<td>13.3</td>
</tr>
<tr>
<td>Positive Reinforcement- let students earn candy or food for demonstrating positive behavior.</td>
<td>5.1</td>
</tr>
<tr>
<td>Shaping- I continue to reward students as they achieve small steps toward the more complex/difficult positive behavior until they learn the complex/difficult behavior completely.</td>
<td>7.1</td>
</tr>
<tr>
<td>Behavior Contract- let my students decide with me what behaviors they will work to achieve.</td>
<td>21.5</td>
</tr>
<tr>
<td>Behavior Contract- let my students decide with me what rewards they will earn as they achieve their behavioral goals.</td>
<td>12.7</td>
</tr>
<tr>
<td>Modeling- demonstrate the positive behavior(s) that I want students to learn and perform.</td>
<td>6.3</td>
</tr>
<tr>
<td>Technique</td>
<td>Description</td>
</tr>
<tr>
<td>----------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Prompting</td>
<td>I prompt/guide students all along the way (as needed) as they are learning positive behavior.</td>
</tr>
<tr>
<td>Fading</td>
<td>I slowly take away prompts/guidance as the student demonstrates more independently positive behavior.</td>
</tr>
<tr>
<td>Group Contingency</td>
<td>I reward the class when one student or a small group of students demonstrate positive behavior.</td>
</tr>
<tr>
<td>Extinction</td>
<td>I stop my actions if they contribute to a student’s inappropriate behavior (For example is my attention seems to be rewarding a student’s inappropriate behavior, I will withdraw my attention).</td>
</tr>
<tr>
<td>Punishment</td>
<td>I verbally reprimand students or take away privileges when their behaviors are inappropriate.</td>
</tr>
<tr>
<td>Differential Reinforcement</td>
<td>I reward students’ positive behaviors and at the same I do not reward the students’ inappropriate behavior.</td>
</tr>
<tr>
<td>Time Out</td>
<td>I temporarily separate any student (put them in a different area or setting) from the other students following inappropriate behaviors.</td>
</tr>
<tr>
<td>Overcorrection</td>
<td>I require that students practice positive behaviors if the student demonstrates inappropriate behavior.</td>
</tr>
</tbody>
</table>
Teachers’ Frequency of Use of ABA Strategies

Concurrent with the first question, the researcher asked which ABA strategies teachers of students with ASD perceive themselves to use in their classrooms and how frequently. Specifically, teachers of students with ASD were asked to rate 16 ABA strategies based on their frequency of use of each strategy (Table 11).

Table 11 shows how participants responded to the items related to frequency of use of ABA strategies. Three of the participants did not respond to the frequency of use of the *social positive reinforcement* strategy (whether the teachers of students with ASD give students possible attention when the student demonstrates positive behavior). Fifty percent and 41.1% of the participants indicated that they used this strategy “often” and “occasionally” respectively to collectively form 91.7% of all responses. A small percentage of the participants (6.3%) reported that they never used this strategy for teaching students with ASD.

As far as the teacher respondents’ frequency of use of a *preferred activity as positive reinforcement* (whether the teachers of students with ASD let students earn time on a preferred activity, such as computer time or game time, when they demonstrate positive behavior) strategy to manage the students’ behavior, 54% of the participants in the survey indicated that they used this strategy “often” and 39.9% indicated that they ‘occasionally’ did, comprising 93.7% of all responses. Five percent of the participants indicated that they never used this strategy for teaching students with ASD in their career. Two of the participants did not respond to this item.

Seven of the participants did not respond on the frequency of use for the item related to *token economy as a positive reinforcement* strategy (whether the teachers of students with ASD have a system in which students can earn tickets, or points, or stars that can later be traded in for larger prizes, when they demonstrate positive behavior). Of the total participants in the survey,
34.8% used this strategy “often” and 42.4% indicated that they used this strategy “occasionally” to collectively form 77.4% of all responses. Eighteen percent of the participants indicated that they never used this strategy for teaching students with ASD.

When questioned about their frequency of use of using food as a positive reinforcement strategy (whether the teachers of students with ASD let students earn candy or food for demonstrating positive behavior), five participants did not respond to this question. Fifty-one percent of the participants indicated that they used the strategy “often” and 39.2% indicated that they used the strategy “occasionally” to collectively form 90.5% of the responses. A small number of participants 6.3% indicated that they never used this strategy for students with ASD.

Six participants did not respond to the question on their frequency of use of the shaping strategy (whether the teachers of students with ASD continue to reward students as they achieve small steps toward the more complex/difficult positive behavior until they learn the complex/difficult behavior completely). About 47% of the participants indicated that they used this strategy “often” and 39.2% indicated that they used the strategy “occasionally” to collectively form 86.0% of the responses. Ten percent indicated that they never used this item.

Regarding the frequency of use of the behavior contract strategy (whether the teachers of students with ASD let their students decide with them what behaviors they will work to achieve), a total of 17.7% and 44.9% of participants stated they used this strategy “often” or “occasionally” respectively, to collectively form 62.6% of all responses. The remaining 30.4% participants indicated that they never used this item.

When questioned about their frequency of use of the behavior contract strategy (whether the teachers of students with ASD let their students decide with them what rewards they will earn as they achieve their behavioral goals), seven out of 158 participants did not respond, 32.3%
indicated that they used this strategy “often” and 41.1% indicated that they used the strategy “occasionally” to collectively form 73.4% of all responses. Twenty-two percent of the participants indicated that they never used this item.

Sixty-one percent of the participants indicated that they used the modeling strategy (whether the teachers of students with ASD demonstrate the positive behavior(s) that they want students to learn and perform) “often” and 29.7% indicated that they used this strategy “occasionally” to collectively form 91.1% of the responses. Three of the participants did not respond to this item and 7% indicated that they never used this item.

Five of the participants did not respond to the item on their frequency of use of the prompting strategy (whether the teachers of students with ASD prompt/guide students all along the way (as needed) as they are learning positive behavior). About 66% and 27.2% of the participants used the strategy “often” and “occasionally” respectively to collectively form 93.0% of the responses. Four percent indicated that they never used this item.

Of all participants, nine participants did not respond to the item about their frequency of use of the fading strategy (whether the teachers of students with ASD slowly take away prompts/guidance as the student demonstrates more independent positive behavior). A total of 47.5% used the strategy “often” and 39.2% used this strategy “occasionally” to collectively form 84.1% of the responses. Seven percent indicated that they never used this item.

Twelve participants did not respond to the item regarding the frequency of use of the group contingency strategy (whether the teachers of students with ASD reward the class when one student or a small group of students demonstrate positive behavior), while 15.8% and 39.9% of the participants indicated that they used the strategy “often” and “occasionally” respectively to
collectively form 55.7% of all responses. About 37% of the participants indicated that they never used this item.

When questioned about the frequency of use of the *extinction* strategy (whether the teachers of students with ASD stop their actions if they contribute to a student’s inappropriate behavior), six of the participants did not respond to this item. Fifty-two percent indicated that they used this strategy “often” and 33.5% indicated that they used this strategy “occasionally” to collectively form 85.7% of all responses. Ten percent of the participants indicated that they never used this item.

Regarding frequency of use of the *punishment* strategy (whether the teachers of students with ASD verbally reprimand students or take away privileges when their behaviors are inappropriate), 34.8% indicated that they used this strategy “often” and 38.0% indicated that they used this strategy “occasionally” to collectively form 72.8% of all responses. About 20% of the participants indicated that they never used this strategy for teaching students with ASD. Twelve participants did not respond to this item.

When questioned about the frequency of use of the *differential reinforcement* strategy (whether the teachers of students with ASD reward students’ positive behaviors and do not reward the students’ inappropriate behavior), nine participants did not respond to this item, while 50.0% indicated they used this strategy “often” and 37.3% indicated that they used this strategy “occasionally”. Seven percent of the respondents indicated that they never used this item.

Forty percent of the participants indicated that they used the *time out* strategy (whether the teachers of students with ASD temporarily separate any student—from the other students following inappropriate behaviors) “often” and 37.3% used this strategy “occasionally”. Seventeen percent indicated that they never used this strategy for teaching students with ASD to
collectively form 77.8% of all responses. Seven participants did not respond to this item.

Forty eight percent indicated that they used the overcorrection strategy (whether the teachers of students with ASD require that students practice positive behaviors if the student demonstrates inappropriate behavior) “often” and 34.2% indicated that they used this strategy “occasionally” to collectively form 82.3% of the responses. Six out of the participants did not respond to this item. About 14% of the participants indicated that they never used this item for teaching students with ASD.

Summary of Teachers’ Frequency of Use. Table 11 reveals that the prompting strategy was used ‘often’ by the highest proportion of participants (65.8%) compared to all strategies; only 3.8% indicated that they “never used” this strategy. Next to prompting, the participants indicated that they “often” used modeling (61.4%) strategy. Approximately 50%-60% of the participants indicated that they “often” used the following ABA strategies: social positive reinforcement (50.6%), using a preferred activity as positive reinforcement (53.8%), earning candy or food as a positive reinforcement (51.3%), extinction (52.5%) and differential reinforcement (50.0%). Similar to the totals for levels of knowledge, across various strategies participants indicated (24-41%) that they were occasional users of ABA strategies. A small percentage of participants “often” used group contingency (15.8%) and behavior contracts where students decide on behavioral goals (17.7%). Therefore we can see that a high proportion of participants “never used” these two strategies, (group contingency, 36.7%; behavior contract, 30.4%).
Table 11
Participants’ Frequency of Use of ABA Strategies (n=158).

<table>
<thead>
<tr>
<th>ABA Strategy</th>
<th>Percent</th>
<th>I do not use this strategy</th>
<th>I use this strategy occasionally</th>
<th>I use this strategy often</th>
<th>No response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive Reinforcement – Social: I give students possible attention when the student demonstrates positive behaviour.</td>
<td></td>
<td>6.3</td>
<td>41.1</td>
<td>50.6</td>
<td>2.0</td>
</tr>
<tr>
<td>Positive Reinforcement – preferred activity: I let students earn time on a preferred activity, such as computer time or game time, when he/she demonstrates positive behavior.</td>
<td></td>
<td>5.1</td>
<td>39.9</td>
<td>53.8</td>
<td>1.2</td>
</tr>
<tr>
<td>Positive Reinforcement - Token Economy- I have a system in which students can earn tickets, or points, or stars that can later be traded in for larger prizes, when he/she demonstrates positive behavior.</td>
<td></td>
<td>18.4</td>
<td>42.4</td>
<td>34.8</td>
<td>4.4</td>
</tr>
<tr>
<td>Positive Reinforcement- let students earn candy or food for demonstrating positive behavior.</td>
<td></td>
<td>6.3</td>
<td>39.2</td>
<td>51.3</td>
<td>3.2</td>
</tr>
<tr>
<td>Shaping- I continue to reward students as they achieve small steps toward the more complex/difficult positive behavior until they learn the complex/difficult behavior completely.</td>
<td></td>
<td>10.1</td>
<td>39.2</td>
<td>46.8</td>
<td>3.9</td>
</tr>
<tr>
<td>Behavior Contract- let my students decide with me what behaviors they will work to achieve.</td>
<td></td>
<td>30.4</td>
<td>44.9</td>
<td>17.7</td>
<td>7.0</td>
</tr>
<tr>
<td>Behavior Contract- let my students decide with me what rewards they will earn as they achieve their behavioral goals.</td>
<td></td>
<td>22.2</td>
<td>41.1</td>
<td>32.3</td>
<td>4.4</td>
</tr>
<tr>
<td>Modeling- demonstrate the positive behavior(s) that I want students to learn and perform.</td>
<td></td>
<td>7.0</td>
<td>29.7</td>
<td>61.4</td>
<td>1.9</td>
</tr>
<tr>
<td>Behavior</td>
<td>Description</td>
<td>Prompt/Guidance</td>
<td>Positive Behavior</td>
<td>Independent Behavior</td>
<td>Positive Behavior</td>
</tr>
<tr>
<td>----------</td>
<td>-------------</td>
<td>----------------</td>
<td>------------------</td>
<td>---------------------</td>
<td>------------------</td>
</tr>
<tr>
<td>Prompting</td>
<td>I prompt/guide students all along the way (as needed) as they are learning positive behavior.</td>
<td>3.8</td>
<td>27.2</td>
<td>65.8</td>
<td>3.2</td>
</tr>
<tr>
<td>Fading</td>
<td>I slowly take away prompts/guidance as the student demonstrates more independently positive behavior.</td>
<td>7.6</td>
<td>39.2</td>
<td>47.5</td>
<td>5.7</td>
</tr>
<tr>
<td>Group Contingency</td>
<td>I reward the class when one student or a small group of students demonstrate positive behavior.</td>
<td>36.7</td>
<td>39.9</td>
<td>15.8</td>
<td>7.6</td>
</tr>
<tr>
<td>Extinction</td>
<td>I stop my actions if they contribute to a student’s inappropriate behavior (For example is my attention seems to be rewarding a student’s inappropriate behavior, I will withdraw my attention).</td>
<td>10.1</td>
<td>33.5</td>
<td>52.5</td>
<td>3.9</td>
</tr>
<tr>
<td>Punishment</td>
<td>I verbally reprimand students or take away privileges when their behaviors are inappropriate.</td>
<td>19.6</td>
<td>38.0</td>
<td>34.8</td>
<td>7.6</td>
</tr>
<tr>
<td>Differential Reinforcement</td>
<td>I reward students’ positive behaviors and at the same I do not reward the students’ inappropriate behavior.</td>
<td>7.0</td>
<td>37.3</td>
<td>50.0</td>
<td>5.7</td>
</tr>
<tr>
<td>Time Out</td>
<td>I temporarily separate any student (put them in a different area or setting) from the other students following inappropriate behaviors.</td>
<td>17.7</td>
<td>37.3</td>
<td>40.5</td>
<td>4.5</td>
</tr>
<tr>
<td>Overcorrection</td>
<td>I require that students practice positive behaviors if the student demonstrates inappropriate behavior.</td>
<td>13.9</td>
<td>34.2</td>
<td>48.1</td>
<td>3.8</td>
</tr>
</tbody>
</table>
Regression on Average Level of Knowledge and Frequency of Use of ABA Strategy

The researcher assessed the demographic factors that differentiated the level of knowledge of teachers of students with ASD and their frequency of use of ABA strategies. First, the researcher used multiple linear regression to see if there were significant differences in the perceived average knowledge of teachers and average frequency of their use of ABA strategies across different demographic variables (gender, teaching experience, teaching certification, and training in ABA etc.). Next, the researcher used an ordinal logistic regression to assess any significant differences in the perceived knowledge of teachers and frequency of use of each of the 16 ABA strategies described in the survey across different demographic variables. Ordinal logistic regression was used to reveal the effect of demographic factors on teachers’ knowledge and frequency of use of each ABA strategy.

**Multiple Linear Regression.** For both the average level of knowledge as well as frequency of use of ABA strategies, a separate multiple linear regression was carried out using a backward stepwise elimination approach to regress the responses of each participant (averaged over all items) against the main and interaction effect of all demographic information variables (predictor variables). For categorical predictor variables, the researcher used dummy coding to include them in regression analysis. The process of creating dichotomous variables from categorical variables is known as dummy coding. Specifically, categorical variables with k levels were transformed into k-1 variables each having two levels.

Accordingly, the nominal categorical predictor variables included gender (female =0, male =1), prior participation in a behavior management course (No = 0, Yes =1), prior completion of an ABA course (No = 0, Yes =1), prior training in ABA (No = 0, Yes =1), and type of educational unit employed in (Public = 0, IEE =1). For each ordinal categorical
demographic variables (e.g., years of teaching experience), the researcher created an \( n-1 \) dummy variables for their inclusion in the regression analysis, where \( n \) denotes the total number of levels for each variable. The two variables: number of students enrolled in the class and age range of students taught by teachers, were treated as continuous or scale variable for inclusion in the regression analysis. The predictor variables with a significant effect (\( p \leq .05 \)) or slightly significant effect (\( p \leq .10 \)) on the response variable were retained in the final selected model.

For both the level of knowledge as well as frequency of use of behavior management strategies, the responses of each participant averaged over all items was affected by several demographic variables considered in the study. Interaction effects among demographic variables were not evident. Specifically, the level of knowledge held by teachers of students with ASD averaged over all of the ABA strategies considered in the study, was negatively affected by gender. A lower \( R^2 \) for this model suggests that gender explained only 4% of the variance in the average level of knowledge of the teachers (Appendix D). A model containing only gender is likely to be a poor predictor of the average level of knowledge of the teachers, but does not negate the fact that there is a statistically significant difference in the average level of knowledge of male and female teachers. A one unit in increase in the gender (i.e. going from 0 to 1) decreased the average level of knowledge of teachers by 0.20 units (i.e., average level of knowledge for male teachers about ABA strategies were 0.20 units less than that for the female teachers) (Table 12).

The frequency of use of the ABA strategies averaged over all items considered in the study was positively affected by ABA training and negatively affected by the age of students. Holding all other predictor variables in the model constant, a one unit increase in the level of ABA training of teachers of students with ASD resulted in 0.27 units increase in the average
frequency of use of ABA strategies. Specifically, teachers of students with ASD who underwent ABA training in their career used the ABA strategies 0.27 units more frequently than those who never had ABA training in their career. In contrast, one unit increase in the age of students with ASD taught by teachers led to a 0.21 units decline in the frequency of use of ABA strategies. In other words, teachers who taught older students than those who taught younger students with ASD tended to use ABA strategies less often on average. The $R^2$ for this model was 0.11 indicating that these two independent variables (ABA training, student age) explained 11% of the variance in the average frequency of use of ABA strategies by teachers of children with ASD (Appendix D).

**Ordinal Logistic Regression of Each ABA Strategy.**

A separate ordinal logistic regression was conducted to assess the effect of each demographic variable on the level of knowledge as well as frequency of use each of the individual item or ABA strategy in the survey (i.e., response variable) by teachers of students with ASD. The response variables (i.e., the level of knowledge or frequency of use of each item) were treated as ordinal under the assumption that their levels have a natural ordering (low to high), with the distances between adjacent levels are unknown. The response variable is treated as ordinal and not continuous. The dummy coding for different predictor variables (demographic information) followed the same approach as with the multiple linear regression.

**Level of Knowledge of ABA Strategies and Predictor Variables.** Table 13 reports the results of ordinal logistic regression on the level of knowledge of each ABA strategy as proportional odds ratios (the coefficient exponentiated). The proportional odds assume that the coefficients that describe the relationship between the lowest versus all higher categories of the response variable in an ordinal logistic regression are the same as those that describe the
Table 12

Estimates from Linear Regression on the Average of the Participants’ Responses to the Survey (n=158).

<table>
<thead>
<tr>
<th>Average of Response Variable</th>
<th>Predictor Variables</th>
<th>R²</th>
<th>Standardized Coefficients (β)</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level of Knowledge of ABA strategies</td>
<td>Gender</td>
<td>0.04</td>
<td>-0.20</td>
<td>-0.27 to -0.04</td>
</tr>
<tr>
<td>Frequency of Use of ABA strategies</td>
<td>ABA Training</td>
<td>0.10</td>
<td>0.27</td>
<td>0.08 to 0.28</td>
</tr>
<tr>
<td></td>
<td>Students Age</td>
<td></td>
<td>-0.21</td>
<td>-0.03 to -0.01</td>
</tr>
</tbody>
</table>
relationship between the next lowest category and all higher categories.

For the model with *social positive reinforcement* strategy as response variable, the exponentiated coefficient for ABA training (coded 0 = no, 1 = yes) which is the independent variable in the model, is 0.48. In this case, the coefficient has a value of zero (0). Category 1 is the reference category and has a coefficient of 0. Accordingly, for a one unit increase in ABA training (e.g., going from teachers without ABA training (0) to teachers with ABA training (1) the odds of being “Knowledgeable” about *social positive reinforcement* strategy were 0.48 times the combined categories of “Somewhat knowledgeable” and “Not knowledgeable”, given that all of the other variables in the model are held constant. Likewise, the odds of the combined categories of “Somewhat knowledgeable” and “Knowledgeable” about *social positive reinforcement* strategy were 0.48 times higher than the “Not knowledgeable” category, given that all of the other variables in the model are held constant. Thus, teachers with ABA training were likely to have 2.08 (i.e., 1/0.48) times more knowledge about *social positive reinforcement* strategy than teachers without ABA training.

The female teachers’ knowledge about using a *preferred activity as positive reinforcement* strategy were found to be 2.33 times higher than corresponding knowledge for male teachers. For the model with the response variable *token economy as positive reinforcement* strategy, the odds of teachers without ABA training having higher knowledge about this strategy tended to be 0.55 times of the odds for teachers with ABA training. Stated differently, the teachers with ABA training tended to have 1.82 times higher knowledge about using *token economy as positive reinforcement* strategy than those teachers without ABA training.
The odds of teachers’ knowledge of using *food as positive reinforcement* strategy were 3.32 times higher for the females than for the males. Teachers’ level of knowledge about using *food as positive reinforcement* were also marginally influenced by their years of teaching experience. The teachers with 0-3 years or more than 4-7 years of teaching experience tended to have 3.33 times lower knowledge about using *food as positive reinforcement* than teachers with 4-7 years of teaching experience.

A marginal influence of the severity of behavioral problems in students taught on the teachers’ level of knowledge about using *food as positive reinforcement* were also evident. The teachers of students with severe behavioral problems compared with those with mild behavioral problems also tended to have 1.40 times higher knowledge about using *food as positive reinforcement* strategy.

The level of knowledge on the use of *shaping* strategy (students earn reward) was 3.22 times higher for the female teachers over male teachers. The level of knowledge of teachers regarding the *behavior contract* strategy where (teachers and students work together to decide what behaviors the students will work to achieve) was not significantly affected by any of the demographic variables.

The level of knowledge of teachers with ABA training on the use of *behavior contract* strategy where in ‘students and teachers decide together the reward earned by student were approximately 3.03 times higher than that for teachers without ABA training. Contrary to the expectations, the chances of teachers of students with severe behavioral problems to have higher knowledge about *behavior contract* strategy (let students and teachers decide together the reward earned by students) were approximately 0.62 times the chances than for teachers of students with mild behavioral problems.
Teachers with ABA training also tended to have a slightly higher knowledge regarding the use of overcorrection strategy by 1.79 times (i.e., 1/0.56) compared to teachers without ABA training. The female teachers also evinced 2.57 times higher knowledge about the modeling strategy than the male teachers. The knowledge of the female teachers about the prompting strategy was 3.18 times higher than that for the male teachers. In contrast to the male teachers, the female teachers had 2.31 times higher knowledge about the fading strategy. The teachers’ level of knowledge about the extinction strategy was influenced by the intensity of behavioral problems in the students taught by the teachers. The teachers of students with severe behavioral problems registered 1.41 times higher knowledge about using the extinction strategy than the teachers of students who had mild behavioral problems. The teachers’ level of knowledge about the extinction strategy was significantly influenced by the age of the students enrolled in the program. The odds of teachers having higher knowledge about using the extinction strategy decreased as the age of the students they taught. A one unit increase in the age of students enrolled in the program decreased the level of knowledge on use of the extinction strategy 0.90 times by the teachers of the students with ASD.

The chances of female teachers having more knowledge about group contingency strategy (class reward depends on one student or one small group of students demonstrating positive behavior) are 0.56 times that for corresponding odds for male teachers. As a positive spin, the male teachers tended to have marginally higher level of knowledge about the use of group contingency strategy (i.e., by 1.79 times) than the female teachers.

Teachers’ level of knowledge about the punishment strategy was also significantly influenced by the age of the students enrolled in the program. The teachers’ degree of knowledge about using punishment strategy tended to decrease with student age. A one unit
increase in the age of the students enrolled in the program decreased the level of knowledge on teachers’ use of *punishment* strategy 0.91 times by the teachers of students with ASD.

The chances of female teachers having higher knowledge about using *differential reinforcement* as a behavior management strategy are 2.35 times higher than those for male teachers. The teachers’ level of knowledge about using *differential reinforcement* as a behavior management strategy were affected by their previous enrollment in a course on applied behavior analysis. In addition, the teachers who never attended a course on applied behavior analysis evinced approximately 2.09 times higher knowledge about the use of *differential reinforcement* as a behavior management strategy than the teachers who attended a course on ABA in their graduate or undergraduate curriculum.

The odds of female teachers having higher knowledge about using *time out* as a behavior management strategy were 1.99 times higher than those for male teachers. Likewise, the teachers of students with severe behavioral problems also evinced 1.37 times higher knowledge about using the *time out as* behavior management strategy than the teachers of students with mild behavioral problems. The teachers’ level of knowledge about using the *time out* strategy were also significantly influenced by the type of educational units (public / IIE) with which they work with. The level of knowledge about the using the *time out as* behavior management strategy is 2.93 times higher for teachers who work at the public schools than for teachers who work at the Institutes of Intellectual Education. Female teachers who have higher knowledge about the *overcorrection* strategy are likely to be 1.78 times more than male teachers.
### Table 13

Estimates from Ordinal Logistic Regression on the Teachers’ Level of Knowledge of Each (ABA) Strategy (n=158).

<table>
<thead>
<tr>
<th>Response Variable (ABA Strategy)</th>
<th>Predictor Variables</th>
<th>Estimate (β)</th>
<th>Exp. (β)</th>
<th>Std. Error</th>
<th>Wald</th>
<th>Df</th>
<th>Sig.</th>
<th>95% Confidence Interval</th>
<th>Lower</th>
<th>Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive Reinforcement – Social</td>
<td>ABA Training</td>
<td>-0.74</td>
<td>0.48</td>
<td>0.33</td>
<td>5.01</td>
<td>1</td>
<td>0.03</td>
<td>-1.39</td>
<td>-0.92</td>
<td></td>
</tr>
<tr>
<td>Positive Reinforcement – Preferred Activity</td>
<td>Gender</td>
<td>0.84</td>
<td>2.33</td>
<td>0.35</td>
<td>5.78</td>
<td>1</td>
<td>0.02</td>
<td>0.16</td>
<td>1.53</td>
<td></td>
</tr>
<tr>
<td>Positive Reinforcement – Token Economy</td>
<td>ABA Training</td>
<td>-0.59</td>
<td>0.55</td>
<td>0.32</td>
<td>3.38</td>
<td>1</td>
<td>0.07</td>
<td>-1.22</td>
<td>0.04</td>
<td></td>
</tr>
<tr>
<td>Positive Reinforcement – Food</td>
<td>Behavior Problems</td>
<td>0.34</td>
<td>1.39</td>
<td>0.19</td>
<td>3.16</td>
<td>1</td>
<td>0.08</td>
<td>-0.03</td>
<td>0.70</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Gender</td>
<td>1.20</td>
<td>3.32</td>
<td>0.37</td>
<td>10.49</td>
<td>1</td>
<td>0.001</td>
<td>0.47</td>
<td>1.93</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4-7 years of experience</td>
<td>-1.22</td>
<td>0.30</td>
<td>0.49</td>
<td>6.26</td>
<td>1</td>
<td>0.01</td>
<td>-2.17</td>
<td>-0.26</td>
<td></td>
</tr>
<tr>
<td>Shaping</td>
<td>Gender</td>
<td>1.17</td>
<td>3.22</td>
<td>0.33</td>
<td>12.39</td>
<td>1</td>
<td>0</td>
<td>0.52</td>
<td>1.82</td>
<td></td>
</tr>
<tr>
<td>Behavior Contract (Reward)</td>
<td>Behavior Problems</td>
<td>-0.47</td>
<td>0.62</td>
<td>0.17</td>
<td>7.56</td>
<td>1</td>
<td>0.01</td>
<td>-0.81</td>
<td>-0.14</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ABA Training</td>
<td>-1.10</td>
<td>0.33</td>
<td>0.34</td>
<td>10.54</td>
<td>1</td>
<td>0.001</td>
<td>-1.76</td>
<td>-0.43</td>
<td></td>
</tr>
<tr>
<td>Modeling</td>
<td>Gender</td>
<td>0.95</td>
<td>2.57</td>
<td>0.35</td>
<td>7.44</td>
<td>1</td>
<td>0.01</td>
<td>0.27</td>
<td>1.62</td>
<td></td>
</tr>
<tr>
<td>Prompting</td>
<td>Gender</td>
<td>1.16</td>
<td>3.18</td>
<td>0.38</td>
<td>9.18</td>
<td>1</td>
<td>0.002</td>
<td>0.41</td>
<td>1.91</td>
<td></td>
</tr>
<tr>
<td>Fading</td>
<td>Gender</td>
<td>0.84</td>
<td>2.31</td>
<td>0.33</td>
<td>6.28</td>
<td>1</td>
<td>0.01</td>
<td>0.18</td>
<td>1.49</td>
<td></td>
</tr>
<tr>
<td>Group Contingency</td>
<td>Gender</td>
<td>-0.58</td>
<td>0.56</td>
<td>0.31</td>
<td>3.60</td>
<td>1</td>
<td>0.06</td>
<td>-1.18</td>
<td>0.02</td>
<td></td>
</tr>
<tr>
<td>Extinction</td>
<td>Behavior Problems</td>
<td>0.34</td>
<td>1.41</td>
<td>0.17</td>
<td>4.02</td>
<td>1</td>
<td>0.05</td>
<td>0.01</td>
<td>0.68</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Students Age</td>
<td>-0.11</td>
<td>0.90</td>
<td>0.05</td>
<td>5.56</td>
<td>1</td>
<td>0.02</td>
<td>-0.20</td>
<td>-0.02</td>
<td></td>
</tr>
<tr>
<td>Punishment</td>
<td>Students Age</td>
<td>-0.09</td>
<td>0.91</td>
<td>0.04</td>
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**Frequency of Use of ABA Strategies and Predictor Variables.** Table 14 reports the results of ordinal logistic regression as proportional odds ratio (the coefficient exponentiated) for the models where the response variable frequency of use of each ABA strategy was regressed against the demographic variables.

The frequent of using of the *social positive reinforcement* strategy by teachers without ABA training were approximately 0.30 times those for teachers with ABA training. Stated differently, the teachers with ABA training were nearly 3.32 times (i.e., 1/0.30) more likely to do so in terms of their use of the *social positive reinforcement* strategy than the teachers without ABA training. The frequency of applying a *preferred activity* to students as *positive reinforcement* strategy by teachers without ABA training were approximately 0.46 times more likely to do so than teachers with ABA training. In other words, teachers with ABA training frequently let the students do a preferred activity as *positive reinforcement* behavior management strategy 2.16 times (1/0.46) more than the teachers without ABA training. The frequency of using a *preferred activity as positive reinforcement* strategy by the teachers decreased with the age of students. One unit increase in the age of students decreased the frequency of use of this strategy by approximately 0.92 times among the teachers of students with ASD.

The chances of teachers without ABA training using the *token economy as social positive reinforcement* strategy more frequently in their programs were nearly 0.52 times those for teachers with ABA training. In other words, the odds of teachers with ABA training using *token economy as social positive reinforcement* strategy were 1.93 times more likely to do so relative to those teachers without ABA training. The odds of using *food as positive reinforcement* to students with ASD among teachers who taught students with severe cognitive impairment were only 0.71 times those for teachers who taught students with mild impairment. The odds of using
food to students with ASD as positive reinforcement were 1.46 times higher more among teachers who taught students with severe behavioral problems than mild behavioral problems.

The frequency of use of the shaping strategy by teachers of students with ASD was significantly influenced by the main effect of gender, ABA training and completion of master’s degree. Female teachers using shaping as a behavior management strategy for students with ASD were nearly 2.52 times more likely to do so than those for male teachers. Teachers without ABA training who used the shaping as a behavior management strategy for students with ASD were nearly 0.36 times more likely to do so than for teachers with ABA training. In other words, teachers with ABA training used the shaping strategy nearly 2.75 times more frequently than teachers without ABA training to manage the behaviors of students with ASD. The use of the shaping strategy by teachers of students with ASD who have completed a master’s degree were 3.13 times more likely to do so than teachers with bachelor’s degree.

The use of the behavior contract strategy (let students and teachers decide together the behavior to work on) by female teachers was 0.54 times that for male teachers. In other words, the frequency of use of the behavior contract strategy by male teachers were higher than those for female teachers of students with ASD. The frequency of use of the behavior contract (let students and teachers decide together the behavior they want to work with) by the teachers of students with ASD were slightly influenced by their teaching experience. Teachers with 4-7 years of teaching experience using this behavior contract strategy were 1.97 times more likely to do so than teachers with 0-3 years or more than 4-7 years of teaching experience. The use of the behavior contract strategy (let students and teachers decide together the behavior to work on) was 1.41 times (i.e., 1/0.71) among teachers of students with mild cognitive impairment than the odds for teachers of students with severe impairment.
Teachers without ABA training who used the behavior contract strategy (let students and teachers decide together the reward earned by students) were approximately 0.34 times the odds for teachers with ABA training. Teachers with ABA training reported to use this strategy 2.98 times more frequently than the teachers without ABA training. The frequency of using the behavior contract strategy (let students and teachers decide together the reward earned by students) was 1.54 times (i.e., 1/0.65) more likely to do so among teachers who taught students with mild cognitive impairment than for teachers who taught students with severe impairment.

Female teachers who used the modeling strategy to manage the behavior of students with ASD were nearly 2.74 times more likely to do so than the corresponding odds for male teachers. The use of the modeling strategy by teachers with ABA training were 2.78 times more likely to do so than for teachers without ABA training. Female teachers who used the prompting strategy to manage the behaviors of students with ASD were 2.97 times more likely to do so than the male teachers who used the prompting strategy. The use of the fading strategy by female teachers was 1.82 times more likely to do so than male teachers. The frequency of use of group contingency strategy is significantly influenced by the gender of teachers and their participation in an ABA course. The use of the group contingency strategy by female teachers was 0.34 times more likely to do so than for male teachers. The frequency of use of the group contingency strategy by the male teachers was 2.86 times higher than those used by the female teachers of students with ASD. The use of the group contingency strategy by the teachers who never attended a course on ABA were 0.41 times more likely to do so than for teachers who attended a course on ABA in their graduate or undergraduate curriculum. Conversely, the teachers who attended a course on ABA used the group contingency strategy were 2.46 times more likely to do so than those who had no previous enrollment in ABA course. The use of the group contingency strategy
strategy 1.34 times more among teachers who taught students with severe behavioral problems than those teachers with students who had mild behavioral problems.

Female teachers who frequently used the extinction strategy were 4.33 times more likely to do so than male teachers. A one unit increase in the number of students enrolled in the program also resulted in a marginal decrease of 0.96 times of likelihood in teachers’ use of the extinction strategy. The use of the punishment strategy by teachers with bachelor’s degrees was 3.03 times more likely to do so than for teachers with master’s degrees. Teachers with bachelor’s degrees used the punishment strategy nearly 3.03 times more likely to do so than those with a master’s degree.

The use of the punishment strategy by the teachers decreased with the increasing age of the students. One unit increase in the age of students resulted in a marginal reduction in the frequency of use of this strategy by approximately 0.91 times among the teachers of students with ASD.

Among the teachers of students with ASD, the use of the differential reinforcement strategy by female teachers was 2.38 times more likely than for male teachers. The frequency of the use of the differential reinforcement strategy by teachers of students with ASD increased with the number of students enrolled in the program. A one unit increase in the number of students enrolled in the program resulted in an increase of 1.05 times in the frequency of use of differential reinforcement strategy by teachers.

The use of the time out strategy by teachers was significantly influenced by the type of educational units (public / IIE) in which they worked and their educational degree. Public school teachers who used the time out as behavior management strategy were 1.98 times more likely to do so than teachers who worked at the Institutes of Intellectual Education. The use of the time
Table 14

Estimates from Ordinal Logistic Regression on the Teachers’ Frequency of Use of Each (ABA) Strategy (n=158).

<table>
<thead>
<tr>
<th>Response Variable (ABA Strategy)</th>
<th>Predictor Variables</th>
<th>Estimate (β)</th>
<th>Exp. (β)</th>
<th>Std. Error</th>
<th>Wald</th>
<th>df</th>
<th>Sig.</th>
<th>95% Confidence Interval Lower</th>
<th>95% Confidence Interval Upper</th>
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<td>Positive Reinforcement – Social</td>
<td>ABA Training</td>
<td>-1.20</td>
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<td>0.33</td>
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<td>0</td>
<td>-1.85</td>
<td>0.54</td>
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<td>0.05</td>
<td>2.96</td>
<td>1</td>
<td>0.09</td>
<td>-0.17</td>
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<td>1</td>
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<td>0.01</td>
<td>-1.45</td>
<td>-0.16</td>
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</table>
strategy was lower among teachers with master’s degrees than among those with bachelor’s degrees. Teachers with bachelor’s degrees used the time out strategy nearly 2.77 times more frequently than those with master’s degrees. Teachers who had not completed an ABA course were less likely to use the overcorrection strategy than those teachers who completed an ABA course. The corresponding odds for teachers who had not completed an ABA course was 0.45 times those for teachers with a completed ABA course. In other words, teachers who previously completed a course on behavior management related to children with autism were 2.24 times more likely to use the overcorrection strategy than the teachers who had not completed a behavior management course.

Importance of Activities and Learning Opportunities

As shown in Table 15, the researcher asked the participants about the effectiveness of different learning opportunities received as part of teacher training or any other training programs to support their learning about behavior strategies. When asked about their experiences with the effectiveness of reviewing case studies of students with behavior challenges or problems, four of the participants did not respond to this item, while 83.0% of the participants indicated that they had some experience in learning from case studies. Of these, 43% indicated that the case study approach was “very effective” and 34.8% felt this approach was “somewhat effective” in supporting their learning about behavior strategies. Four percent considered case studies to be an ineffective approach. The remaining 14.6% indicated that they had never experienced this learning opportunity as a part of teacher or other training.

When the participants were asked about their experiences with and the effectiveness of listening to lectures about behavior strategies, five of the participants did not respond to this item, while 83.7% of participants experienced the strategy and 40.5% considered it “very
effective”. Of those who experienced listening to lectures, 36.1% felt it was “somewhat”
effective in supporting their learning about behavior strategies, whereas 7.6 % considered it an
“ineffective” approach. The remaining 12.7% indicated that they never experienced this learning
opportunity as part of either teacher training or other trainings.

When the participants were asked about their experiences with and the effectiveness of
reading books/articles about behavior strategies, seven of the participants did not respond to this
item. Eighty-one percent of the participants indicated that they had experienced the learning
opportunity of reading books/articles about behavior strategies. Twenty-nine percent considered
the learning opportunity as “very effective” while 43.0% felt it was “somewhat effective” in
supporting their learning about the behavior strategies, and 8.9 % considered it an “ineffective”
approach. The remaining 14.6% of the participants indicated that they had never experienced
this learning opportunity as part of either teacher training or other trainings.

When the participants were asked about their experiences with and the effectiveness of
observing mentor teachers or supervising teachers dealing with behavior problems using
behavior strategies, six of the participants did not respond to this item. Eighty-six percent of the
participants indicated that they had experienced this strategy, of which 48.1% considered it to be
“very effective” and 31.6% felt it “somewhat effective” in supporting their learning about
behavior strategies, while 6.3% considered it an “ineffective” approach. The remaining 10.1%
of the participants indicated that they had never experienced this learning opportunity as part of
either teacher training or other trainings.

The participants were asked about their experiences with and the effectiveness of
receiving feedback on how behavior strategies are implemented as a learning opportunity. Five
of the participants did not respond to this item, while 82.9% of the participants had experienced
this learning opportunity. Forty percent of the participants who had experienced this type of learning considered it to be “very effective” and 31.6% felt it “somewhat effective” in supporting their learning about behavior strategies, whereas 10.8% considered it to be an ineffective approach. About fourteen percent indicated that they had never experienced this learning opportunity as part of either teacher training or other trainings.

Participants were also asked about reflective journal writing as a way to learn about behavior strategies. Eight participants did not respond to this item, 74.1% indicated that they had experienced this type of learning, but only 22.8% consider it very effective. Thirty-six percent felt this type of learning was “somewhat effective” in learning about behavior strategies, and 14.6% considered this type of learning ineffective. The remaining 20.9% indicated that they had never experienced this learning opportunity as part of either teacher training or other trainings.

When the participants were asked about their experiences with and the effectiveness of watching and reflecting on videos that show the implementation of behavior strategies, eight of the participants did not respond to this item. About 80% of the participants experienced this type of learning, of which 41.1% considered it to be “very effective” and 29.1% felt it was “somewhat effective” in supporting their learning about the behavior strategies, whereas 9.5% considered this type of learning to be “ineffective”. The remaining 2% indicated that they had not experienced this type of learning opportunity.

When the participants were asked about their experiences with and the effectiveness of role-playing scenarios about using behavior strategies as a learning opportunity, seven of the participants did not respond to this item. Seventy two percent of the participants indicated that they had experienced learning opportunity, of which 32.9% considered it to be “very effective”
Table 15
Participants’ Experiences with and Perceptions of the Effectiveness of Learning Opportunities (n=158).

<table>
<thead>
<tr>
<th>Instructional technique</th>
<th>Percent</th>
</tr>
</thead>
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<td>I never experienced this learning opportunity</td>
<td>I don’t feel the learning opportunity was effective</td>
</tr>
<tr>
<td>Reviewing case studies of students with behavior challenges or problems</td>
<td>14.6</td>
</tr>
<tr>
<td>Listening to lectures about behavior strategies</td>
<td>12.7</td>
</tr>
<tr>
<td>Reading books/articles about behavior strategies</td>
<td>14.6</td>
</tr>
<tr>
<td>Observing mentors teachers or supervising teachers dealing with behavior problems using these behavior strategies.</td>
<td>10.1</td>
</tr>
<tr>
<td>Receiving feedback on how I implement behavior strategies</td>
<td>13.9</td>
</tr>
<tr>
<td>Reflective journal writing about behavior strategies</td>
<td>20.9</td>
</tr>
<tr>
<td>Watching and reflecting on video that show the implementation of behavior strategies</td>
<td>15.2</td>
</tr>
<tr>
<td>Role-playing scenarios about using behavior strategies</td>
<td>22.8</td>
</tr>
<tr>
<td>Completing group projects related to behavior strategies</td>
<td>44.3</td>
</tr>
<tr>
<td>Completing portfolios related to behavior management</td>
<td>43.0</td>
</tr>
</tbody>
</table>
and 29.7% felt it was “somewhat effective” in supporting their learning about the behavior strategies, 10.1% considered role-playing to be an “ineffective” approach. Twenty two percent indicated that they had never experienced this learning opportunity.

The participants were also asked about their experience with and the effectiveness of completing group projects related to behavior strategies as a learning opportunity, six participants did not respond to this item. Fifty two percent of the participants experienced role-play learning, of which only 14.6% found it to be “very effective” while 25.3% felt it was “somewhat effective” in supporting their learning about the behavior strategies, 12.0% considered role-playing to be an “ineffective” approach, while 44.3% had never experienced role-playing as a part of learning.

Participants were also questioned about completing portfolios. Seven participants did not respond, 52.5% responded that they had experienced this type of learning. Of those participants who had experienced this type of learning, 13.9% considered it to be “very effective” and 25.3% felt portfolios were “somewhat effective” in supporting their learning about the behavior strategies. About 14% considered portfolios to be an “ineffective” approach to learning about behavior strategies. Forty three percent indicated that they had never experienced this type of learning opportunity.

**Summary of Learning Opportunities.** Table 15 indicates that many of the participants rated observing teacher mentors or supervising teachers dealing with behavior problems as the “most effective” learning opportunities (48.1%). Forty percent of the participants also identified the following learning opportunities as “effective”: reviewing case studies (43.7), watching and reflecting on videos (41.1), listening to lectures (40.5%), and receiving feedback (40.5%). Forty-four percent had not experienced completing group project, 43% had not experienced portfolios
as learning opportunities, while only a small number of participants identified these two techniques (14.6% and 13.9% respectively) as “effective” learning opportunities.

**Frequency of Conditions as Barriers to Implementation**

As shown in Table 16, the researcher asked the participants about the frequency with which different factors were experienced as barriers to their use of behavior strategies. The participants were asked about their perception of their own knowledge or skill as a barrier to use of behavior strategies. Five of the participants did not respond to this item. Thirty-two percent and 53.8% of the participants felt that their own knowledge or skill was a barrier “very often” and “sometimes”, respectively, in using behavior strategies (86.1% of the participants). About 11% of the participants indicated that their knowledge and/or skills were never a barrier to their use of behavior strategies.

Five of the participants did not respond to the survey item about their perception of support from the administration being a barrier to the use of behavior strategies. Fifty-five percent and 34.2% of the participants felt that the support levels from the administration were “very often” and “sometimes,” respectively, a barrier to their use of behavior strategies. Seven percent of the participants did not feel that the administration was a barrier to their use of behavior strategies.

Five of the participants did not respond to the item regarding feedback/guidance being a barrier to their use of behavior strategies. Twenty-eight percent and 57.0% of the participants experienced this factor as a barrier “very often” and “sometimes”, respectively, to their use of behavior strategies. Eleven percent of the participants did not see feedback/guidance as a barrier to their use of behavior strategies.

The participants were asked about the availability of supplies and whether or not that was
seen as a barrier to their use of behavior strategies. Five of the participants did not respond to this item, while 48.7% and 36.1% of the participants experienced this factor as a barrier “very often” and “sometimes”, respectively, to the use of behavior strategies. Twelve percent of the participants never experienced availability of supplies as a barrier to the use of behavior strategies.

Thirty-six percent and 45.6% of the participants felt that support from colleagues was a barrier “very often” or “sometimes”, respectively, while 17.1% and 39.2% felt that that the general approach they were using was “very often” or “sometimes” a barrier to their use of behavior strategies. Nineteen and 37.3% of the participants felt that the time to administer behavior strategies was a barrier to their use of behavior strategies “very often” or “sometimes”, respectively, while 40.5% of the participants did not perceive time as a barrier. However, 50.6% of the participants did not feel that ineffective behavior strategies were a barrier to their use of effective strategies while 44.3% felt they were “very often” or “sometimes” a barrier. Fifty-six percent of the participants did not feel that colleagues who have used and thought behavior strategies were ineffective was a barrier to their use of behavior strategies. Thirty-nine of the participants thought this was “very often” or “sometimes” a barrier to their use of behavior strategies.

Participants were asked if using behavior strategies would get in the way of achieving their goals and over fifty percent said that they did not perceive that as a barrier to their use of behavior strategies but 42% felt that it was somewhat of a barrier. The participants were also asked if they felt that behavior strategies that are not appropriate for their students have been a barrier to their use of behavior strategies. Over 50% felt that this was a barrier to their use of behavior strategies but 39.9% felt that this factor was not a barrier.
Table 16

Participants’ Perceptions of the Conditions as Barriers to Implementation (n =158).

<table>
<thead>
<tr>
<th>Barrier to implement ABA strategies</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Never a barrier</td>
</tr>
<tr>
<td>My knowledge or skill regarding the behavior strategy.</td>
<td>10.8</td>
</tr>
<tr>
<td>Support from administration for using the behavior strategy.</td>
<td>7.6</td>
</tr>
<tr>
<td>Feedback/guidance for using the behavior strategy.</td>
<td>11.4</td>
</tr>
<tr>
<td>Supplies for using the behavior strategy.</td>
<td>12.0</td>
</tr>
<tr>
<td>Support from colleagues to use the behavior strategy.</td>
<td>14.6</td>
</tr>
<tr>
<td>My general approach does not help me.</td>
<td>39.2</td>
</tr>
<tr>
<td>Takes too much time and effort to use the behavior strategy.</td>
<td>40.5</td>
</tr>
<tr>
<td>Perception that the behavior strategy is not effective.</td>
<td>50.6</td>
</tr>
<tr>
<td>Other teachers have tried the behavior strategy and they thought it was ineffective.</td>
<td>56.3</td>
</tr>
<tr>
<td>The behavior strategy would not help me achieve my work goals.</td>
<td>53.2</td>
</tr>
<tr>
<td>The behavior strategy was not appropriate for the students in my class(es) and their specific problems.</td>
<td>39.9</td>
</tr>
</tbody>
</table>
Summary of Barriers. Table 16 reveals that 55.1% of the participants perceived the lack of support from administration as a very often barrier to their use of behavior management strategies. The next important factor related to the implementation of behavior management strategies was identified by 48.7% of the participants as a very often barrier. When aggregated, the proportion of participants who identified a factor being both a “very often barrier” and “sometimes a barrier” for implementation of behavior management strategies was collectively considered, the following five barriers were the barriers most frequently cited by the participants (from highest down): support from administration (89.3%), knowledge or skill of participants (86.1%), feedback or guidance (85.5%), supplies (84.8%) and support from colleagues (82.3%).

The participants perceived the following factors as “never a barrier” for implementation of behavior management strategies: other Teachers’ perception of behavior management strategies as ineffective (56.3%), behavior strategies would not help achieve work goals (53.2%), self-perception that behavior management strategies are not effective (50.6%), time and effort needed to use behavior management strategies (40.5%), behavior management strategies are not appropriate for the students in class and their specific problems (39.9%), and perception that use of general approaches does not help (39.2%).

Importance of Desired Training and Resources

Table 17 reports that the participants’ responses to items related to the type of training they would like to receive on behavior management or behavior strategies. About 63% of the participants identified training on the use of effective behavior management strategies as the “most desired”, while 26.6% identified that type of training as “desired”. Four percent identified training on behavior management as “not a desired”, while the other participants did not respond to this item. Sixty-three percent of the participants identified training on how to manage severe
behavior problems as “most desired”, while 25.3% identified this type of training as “desired”. Four percent identified this type of training as “not desired”. Seventy-two percent of the participants wanted training on specific characteristics of disabilities; 84.8% percent desired training on working with parents; and 88% wanted training that involved working with expert teachers in the classroom. Eighty-six percent of the participants desired training on developing appropriate interventions, while 84.1% desired training in developing appropriate behavioral goals for their students. Eighty-one percent of the participants desired training about how to obtain materials and resources for their classroom and 82.2% wanted more training on understanding administrators’ and teachers’ roles related to behavior management. Finally, 84.8% of the participants desired a teaching assistant in their classroom.

**Summary of Desired Training.** Table 17 reveals that more than 60% of the participants identified certain trainings as “most desired”: how to manage severe behavior problems (63.3%), how to use effective behavior management strategies (62.7%), and how to work with parents to develop appropriate home/school programs (61.4%). Similarly, more than 50% of the participants in the survey identified all of the training and resources listed in the survey as “most desired” training / resource, except for the training tailored to understanding specific characteristics of a disability. Only 33.5% of the participants felt training tailored to understanding specific characteristics of a disability as the “most desired” training resource and this training also resulted in the highest percentage of trainings identified as “not desired” training (20.3%).
Table 17
Percentage of Responses for Desired Training and Resources (n=158)

<table>
<thead>
<tr>
<th>Desired Training/Resources</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Most desired training/resource</td>
</tr>
<tr>
<td>How to use effective behavior management strategies.</td>
<td>62.7</td>
</tr>
<tr>
<td>How to manage severe behavior problems.</td>
<td>63.3</td>
</tr>
<tr>
<td>Specific characteristics of a disability.</td>
<td>33.5</td>
</tr>
<tr>
<td>Working with parents to develop appropriate home/school programs.</td>
<td>61.4</td>
</tr>
<tr>
<td>Having expert teachers working with me in the classroom to implement behavior strategies.</td>
<td>57.0</td>
</tr>
<tr>
<td>Developing appropriate behavior interventions for my students.</td>
<td>54.4</td>
</tr>
<tr>
<td>Identifying appropriate behavioral goals for my students.</td>
<td>54.4</td>
</tr>
<tr>
<td>Obtaining materials and resources for my classroom.</td>
<td>58.2</td>
</tr>
<tr>
<td>Understanding administrators’ and teachers’ roles related to behavior management.</td>
<td>54.4</td>
</tr>
<tr>
<td>Having teaching assistants in the classroom to help.</td>
<td>53.2</td>
</tr>
</tbody>
</table>
**Regression on Average Effectiveness of Learning Opportunities**

The effectiveness of the learning opportunities for teachers of students with ASD (averaged over all responses in Part-3 of the questionnaire) was affected mainly by teachers’ enrollment in a behavior management course related to students with autism, ABA training, and severity of behavioral problems of students taught by teachers. The best fit model with these three predictor variables explained 21% of the variance in the average effectiveness of learning opportunities available to teachers (Appendix D). The teachers who completed a behavior management course related to autism perceived the learning opportunities 0.27 units more effective on average than those who did not complete a course. Likewise, the average effectiveness of learning opportunities in supporting their learning about the behavior strategies were perceived as 0.32 units higher by teachers of students with ASD who underwent ABA training relative to those who never had ABA training in their career. Teachers of students with ASD who taught students with increasingly severe behavior problems perceived the average effectiveness of learning opportunities lower by 0.14 units in contrast to teachers who taught students with mild behavior problems (Table 18).

**Regression on Average Barrier to Use ABA strategies**

Barriers to the use of ABA strategies (averaged over all response items in Part -4 of the questionnaire) were affected only by the main effect of categorical predictor variables created from years of teaching experience, degree of completion, and also by the continuous predictor variable of the age of the students taught. Together, these three demographic variables explained 9% of the variance in the average of the teachers’ perceived barriers to use of ABA strategies (Appendix D). Teachers of students with ASD, in general those with 0-3, 4-7, and 8-11 years of teaching experience perceived 0.32, 0.28 and 0.24 units fewer average barriers, respectively, to
the use of ABA strategies. Teachers with a bachelor’s or master’s degree also perceived 0.23 and 0.36 units fewer average barriers, respectively, to the use of ABA strategies than teachers without these degrees (e.g., diploma holders). There was only one PhD holder among the teachers surveyed in the study and hence the data was pooled with the data for MS degree holders for the purpose of analysis. Average of the perceived barriers to the use of ABA strategies by teachers who taught more elder students with ASD was 0.15 units fewer than those who taught younger students (Table 18).

**Regression on Average Desire for ABA Training**

Teachers’ desire for ABA training (averaged over all the responses in Part-5 of the survey) was slightly positively affected positively by gender ($\beta = 0.33$, p < 0.01, 95% CI: 0.15 – 0.42). On average, the male teachers had 0.33 units higher desire to enroll in training programs than the female teachers. Desire to undertake training was 0.15 units higher for teachers who completed a course in autism behavior management than those without it (Table 18). Gender explained 12% of the variance in the average of the teachers’ perceived barriers to use of ABA strategies (Appendix D).
Table 18

Linear Regression on Average of Learning Opportunities, Barriers and Desire for Training (n=158).

<table>
<thead>
<tr>
<th>Average of Response Variable</th>
<th>Predictor Variables</th>
<th>R²</th>
<th>Standardized Coefficients (β)</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Lower</td>
</tr>
<tr>
<td>Learning Opportunities</td>
<td>ABM Course</td>
<td>0.21</td>
<td>0.27</td>
<td>0.17</td>
</tr>
<tr>
<td></td>
<td>ABA Training</td>
<td></td>
<td>0.32</td>
<td>0.25</td>
</tr>
<tr>
<td></td>
<td>Behavior Problems</td>
<td></td>
<td>-0.14</td>
<td>-0.20</td>
</tr>
<tr>
<td>Barrier to Use of ABA strategies</td>
<td>0-3 years of teaching</td>
<td></td>
<td>-0.32</td>
<td>-0.45</td>
</tr>
<tr>
<td></td>
<td>4-7 years of teaching</td>
<td></td>
<td>-0.28</td>
<td>-0.47</td>
</tr>
<tr>
<td></td>
<td>8-11 years of teaching</td>
<td>0.12</td>
<td>-0.24</td>
<td>-0.55</td>
</tr>
<tr>
<td></td>
<td>Bachelor</td>
<td></td>
<td>-0.23</td>
<td>-0.47</td>
</tr>
<tr>
<td></td>
<td>Master (MS)</td>
<td></td>
<td>-0.36</td>
<td>-0.71</td>
</tr>
<tr>
<td></td>
<td>Students Age</td>
<td></td>
<td>-0.15</td>
<td>-0.04</td>
</tr>
<tr>
<td>Desire for Training/ Resources</td>
<td>Gender</td>
<td></td>
<td>0.33</td>
<td>0.15</td>
</tr>
<tr>
<td></td>
<td>ABM Course</td>
<td>0.12</td>
<td>0.15</td>
<td>-0.01</td>
</tr>
</tbody>
</table>
CHAPTER FIVE

Discussion

The significance of teachers’ perceptions to the successful implementation of new strategies for students with disabilities were demonstrated by previous researchers (Auramidis & Norwich, 2002). Most notably, teachers who are engaged in the education of students with severe disabilities should have positive perspectives for the success of intervention programs or implemented strategies (Cross, Traub, Hutter-Pishgahi, & Shelton, 2004). Few studies have explored perspectives of teachers of students with severe disabilities in Saudi Arabia (Alquraini, 2011). The current study is the first of its kind in Saudi Arabia to assess teachers’ perceptions about their level of knowledge and frequency of use of Applied Behavior Analysis (ABA) strategies among teachers of students with Autism Spectrum Disorder (ASD). Recent studies in the domain of ASD by Randazzo (2011), independently examined elementary school teachers’ knowledge and use of ABA strategies in the United States. This study sought to evaluate the outcomes from this study against the survey outcomes of Randazzo’s (2011), while keeping in mind the significant religious and cultural differences among these stakeholders and those in Saudi Arabia.

Knowledge of ABA Strategies

In this study the first question the researcher sought to answer was: What are the ABA strategies do teachers of students with ASD perceive themselves to be knowledgeable about and to what extent? A review of literature suggests there is no single intervention as universal formula for educating children with ASD because most students with severe ASD require individually designed interventions that meet their needs. However, various strategies based on ABA have been found to be very effective in students’ disruptive behaviors and in reinforcing
positive behaviors. The quality of the teachers is as important as the quality of the strategy used in the classrooms to manage the behaviors of disabled students. Recognizing the importance of teacher quality, No Child Left Behind Act of 2001 (NCLB) and the Individuals with Disabilities Improvement Act (IDEA, 2004), set the goal that "highly qualified teachers" (HQT) must be sought after to teach all students with disabilities. The teachers of children with ASD should have broad knowledge about the different strategies and work along with parents to design evidence-based approaches (National Research Council, 2001; Olley, 1999) to effectively facilitate positive behaviors in children with ASD.

The professional literature contains a large collection of information on evidence-based ABA strategies that work well with individuals with ASD. Prior to my study, knowledge of ABA strategies among teachers of students with ASD has not been investigated in Saudi Arabia. Many teachers, teachers-in-training, mentor teachers, and school principals in Saudi Arabia and elsewhere who deal with students with ASD have expressed concerns about teachers’ poor behavior management skills and lack of confidence in their ability to effectively manage classrooms (Cassady, 2011, Haimour and Obaidat, 2013, Lindroos, 2012). Low self-efficacy has also been reported by teachers in implementing behavioral techniques (Baker, 2005; Walter et al., 2006).

Levels of knowledge of teachers of students with ASD could be thought of as one factor that influences teachers’ behavior management skills and confidence levels. Nearly one third of the participants (24.1%-41.8%) in Randazzo’s study (2011) among elementary teachers in two New Jersey school districts in the United States and the current study perceived themselves to be ‘somewhat knowledgeable’ about each ABA strategy considered in the survey. However, discrepancies in the level of knowledge of teachers existed among the two studies. Levels of
knowledge of teachers of students with ASD in Saudi Arabia in this study were fairly knowledgeable compared to high level of knowledge observed by Randazzo (2011). In this study, five out of the 16 ABA strategies (prompting (72.2%), using a preferred activity as positive reinforcement (68.4%), earning candy or food as a positive reinforcement (64.6%), modeling (65.8%), and extinction (60.1%)), had more than 60% of the teachers rated themselves as “knowledgeable”. Of the participants, 55-60% identified themselves to have lower knowledge about the remaining seven strategies (social positive reinforcement, using a token economy system as positive reinforcement, shaping, fading, differential reinforcement, time out and overcorrection). In contrast, Randazzo’s (2011) results indicated that most teachers perceived themselves to be either “knowledgeable” or “very knowledgeable” about one-third of the 15 ABA strategies accounted in their study including the behavior contract. Not surprisingly, 7 out of 15 ABA strategies (Positive reinforcement – social, Positive reinforcement – preferred activity, Positive reinforcement – token economy, Behavior contract, Modeling, Punishment, Time out) considered by Randazzo (2011) had less than 2% the participants who were “Not at all knowledgeable” or “Slightly knowledgeable”.

Other discrepancies between this study findings and other research regarding what strategies teachers feel knowledgeable about were also evident. For instance, Randazzo’s study identified five out of 15 ABA strategies (shaping, differential reinforcement, prompting/fading, extinction and group contingency) with only nearly 6%-10% of participants reported being either ‘not at all knowledgeable’ or ‘slightly knowledgeable’ about. As opposed to Randazzo, only 4 out of 16 ABA strategies (Positive reinforcement – social, Positive reinforcement – preferred activity, prompting, fading) in this study had less than 5% of the participants reported as being either “not at all knowledgeable” or “slightly knowledgeable” about. One-quarter of the
participant teachers in this study identified two out of the 16 ABA strategies, *group contingency* (25.9%) and *behavior contract* (21.5%) as the least knowledgeable ABA strategy; while percentages of teachers who reported being either “not at all knowledgeable” or “slightly knowledgeable” about *group contingency* and *behavior contract* in Randazzo’s study were 1.9% and 7.5% respectively.

A major reason for the discrepancy in the results with that of Randazzo’s (2011) is possibly due to the difference in the participants surveyed. While Randazzo’s study focused on the elementary school teachers (K-5) of students with ASD, the current study included both elementary and secondary teachers. Specifically, while 64.6% of the teachers who participated in this study had students in the age group of 6-9, 15.8% had students in the age group of 10-12, 11.4% had students in the age group of 13-15, and 6.3% had students in the age group of 16-21 in their program. Randazzo cites that younger students’ disruptive behaviors are probably easier to manage than the older students; therefore, the elementary teachers may consider themselves as more knowledgeable about ABA strategies than secondary teachers. In contrast, secondary school teachers may perceive a higher difficulty in managing adolescents’ and teenagers’ behaviors. Accordingly, in general, secondary school teachers of students with ASD surveyed in this study are likely to consider themselves as less knowledgeable than elementary teachers.

Randazzo (2011) hypothesized significant differences between elementary and secondary teachers’ perceptions about their knowledge of ABA strategies and recommended future research investigation in this direction. Results from this study corroborate the aforementioned hypothesis of Randazzo (2011). The current study found no significant differences in the average level of knowledge of teachers of students with ASD among elementary and secondary school teachers. However, this study found evidences for increased levels of knowledge about
extinction and punishment strategy among teachers who taught younger students with ASD as compared to teachers who taught older students with ASD in Saudi Arabia. In addition, more convincing evidence to support the above hypothesis was found in this study when the elementary and secondary teachers’ frequency of use of different ABA strategies averaged over all items was considered (see next part of discussion under).

Another probable reason why this study found lower levels of knowledge among teachers of students with ASD relative to previous research is because of the nearly equal proportion of the males and female teachers sampled in the survey. Randazzo’s study had a significantly higher proportion of female participants (91.6%) than this study and found evidence that female teacher had significantly higher average levels of knowledge about ABA strategies than the male teachers. Because the sample size of males in their study was small (n = 9), the researchers recommended that future research assess a larger sample of male teachers in order to determine more information about their perceived knowledge of ABA strategies. The current study not only had a comparatively larger sample size (n= 158; 1.47 times higher), but also had nearly equal proportion of male and female participants. The results from this study concurred with Randazzo’s research in terms of the lower perceived level of knowledge among males. A higher frequency of male participants and their responses in the current study influenced the average level of knowledge percents/scores lower than Randazzo’s findings.

Randazzo also recommended that future research be designed to investigate the reason for these gender specific differences in perceived knowledge of ABA strategies. No evidence was found in the current study in favor of an association between gender and enrollment in either behavior management courses, or courses on ABA or training on ABA or even educational degree attained by the participants. In other words, there were no differences among males and
female teachers who participated in the current study in terms of their educational or training background. A low frequency of male participants in Randazzo’s study suggests that the possible difference in attitudes of male and female teachers toward students with disabilities which may indicate a decline in their interest in the profession. Such trends are increasingly evident among male teachers in Saudi Arabia as well which may lead to greater implications for male students than female students.

A potential final reason this investigation found different results compared to prior research is perhaps due to differences in religion, culture, and level of education among the stakeholders in Saudi Arabia in this study and those in previous research. Saudi Arabian society is based on the Islamic faith and the cultural values deal with disabilities based on the policies in the Quran and the Sunnah. A disability is often perceived as a punishment or test of patience by Allah to reward Paradise (Alquraini, 2011). Although recently Saudi Arabian citizens tend to increasingly undertake higher education, motivation to attain higher perceived levels of education was quite limited among the previous generation of stakeholders in Saudi Arabian society. For instance, while 79% of the participants in the current study hold a bachelor’s degree, a mere 15% hold a master’s degree. In contrast, 60% of the participants in Randazzo’s survey held a master’s degree and 38% held a bachelor’s degree.

A recent study on the knowledge about ASD among school teachers in Saudi Arabia (Haimoun and Obaitadi, 2013) and also another descriptive study about knowledge, practices employed, and training needs of special education teachers serving students with ASD by Hendricks (2007) corroborates the higher level of knowledge among teachers with master’s degree than those with a higher diploma or bachelor’s degree. Such differences might have influenced the teachers’ perceptions, in this study, about the operational definitions of each ABA
strategy in comparison to participants in prior investigations. However, considering the differences in religious, cultural, and educational levels of the teachers in Saudi Arabia, the results of this study on teachers’ perceived knowledge about evidence-based ABA strategies to manage students’ behaviors are still encouraging.

**Frequency of Use of ABA Strategies**

The second question this study aimed to answer was: Which ABA strategies do teachers of students with ASD perceive themselves to use in their classrooms and how frequently? Prior research outcomes suggest more frequent use of punitive than positive behavior management strategies by the teachers to inculcate adaptive behaviors and suppress the disruptive behaviors in students with disabilities. For instance, Shin & Koh (2008) observed that teachers used time out and punishment more frequently than positive reinforcement strategy to manage the students. Another study documented that teachers frequently use reward and punishment techniques in order to manage their students’ behaviors, such as time out, incentive systems and removal of privileges (Love, Henderson, & Hanshaw, 1996).

ABA is very effective with students with ASD and is focused on using positive reinforcement to shape and change behavior rather than using the means of punishment (Boutot and Hume, 2012). Consistently and in agreement with Randazzo (2011), the current study also found that the ABA strategies that were most frequently implemented by the teachers of students with ASD were all positive rather than punitive strategies (e.g., prompting, modeling, social positive reinforcement, preferred activity as positive reinforcement, earning candy or food as a positive reinforcement, extinction, differential reinforcement). All of the above 7 positive strategies were reported as used often by teachers in my study too. More specifically, about 60% of teachers of students with ASD in this study reported using prompting and modeling strategies
often, while nearly 50% of the teachers reported the remaining five positive ABA strategies as used often.

However, a small percentage of teachers of students with ASD used the two positive strategies – *group contingency* (15.8%) and *behavior contracting* (17.7%) often. Nearly one third of the teachers indicated that they “never used” two strategies, *group contingency* and *behavior contract* in their classrooms. Randazzo’s (2011) study also had many teachers who never used the *group contingency* strategy and it was attributed to the likely perception of teachers that a relatively a small number of students in their class required the use of such an incentive system to manage their behavior. In addition, the use of the *group contingency* strategy requires creating groups to work with and rewarding an entire class or large group of students which requires more resources such as time, effort, supplies and cost. Difficulty securing increased resources was also attributed as a reason for teachers’ hesitance to use this strategy (Randazzo, 2011). Students with disabilities, particularly those with cognitive or severe behavioral impairments, may also have difficulty understanding the contract and the expectations.

The patterns of average frequency of use of ABA strategies were similar to the patterns evident for the level of knowledge of teachers regarding these strategies. This finding was corroborated with the significantly higher degree of Pearson correlations (78%) observed among participants’ average level of knowledge and average frequency of use of each ABA strategy. These significant positive correlations also concurred with the similar outcomes of Randazzo’s study (2011) and indicate that generally the teachers who perceive themselves to be more knowledgeable about ABA strategies also tended to use these strategies more frequently (or they indicated they did).
A contrasting output in this study regarding the frequency of use of ABA strategies is that a relatively greater proportion of the teachers were found to use two punitive strategies ‘often’ more than was reported by Randazzo (2011). Specifically, the *time out* and *punishment* strategies were used by approximately one-third of the participants in this study compared to only one-fifth of the participants in Randazzo’s (2011) study. These results highlight the need for professional development for the teachers in Saudi Arabia emphasizing the benefits of positive strategies over punitive strategies in reducing the target behavior and enhancing the alternative behaviors.

The frequency of use of ABA strategies was higher among the teachers who underwent training in ABA programs as opposed to those who never had this training. Intensive ABA-based training for teachers of students with ASD has been proven to be effective in enhancing the teachers’ skills as well as student outcomes (Arick, Young, Falco, Loos, Krug, Gense, Johnson, et al., 2003; Lerman, Tereault, Hovanetz, Strobel, & Garro, 2008). Consistent with the demands of NCLB (2001) and IDEA (2004) for highly qualified teachers in the US, Saudi Arabia is also focusing on teacher qualifications. A call for more training and professional development of teachers of students with ASD in Saudi Arabia would be a logical progression.

Significant differences in the average frequency of use of ABA strategies were also observed among the teachers of older students with ASD and teachers of younger students with ASD. Early and effective behavioral treatment has been found to reduce the cost of treatment and help attain greater improvements through recuperated productivity of individuals with ASD and their caregivers (Ganz, 2007). Older students with ASD are thus more likely to have developed adaptive strategies, especially if they are trained early on in their career and are less prone to exhibit inappropriate behaviors than younger students. Routine interaction with peers
over time can also help older students behave in appropriate ways in the classroom and demand less intervention from the teachers. In contrast, younger students with ASD who are still on the steep curve towards learning socially adaptive behaviors would demand a more frequent use of most of the ABA strategies by their teachers.

**Demographic Characteristics and Knowledge and Frequency of Use of ABA Strategies**

**Gender and knowledge and frequency of use of ABA strategies.** The teachers’ levels of knowledge and frequency of use regarding their application of *shaping, modeling, prompting* and *differential reinforcement* were affected by their gender. The teachers’ levels of knowledge about using *a preferred activity as positive reinforcement using food as positive reinforcement, time out* and *overcorrection* were affected by their gender. Likewise, the frequency of use of *group contingency* and *extinction* was affected by gender of the teachers. Gender also slightly affected teachers’ level of knowledge about using the *group contingency* strategy and the frequency of use of the *behavior contract* and *fading*.

Consistent with the findings of Randazoo (2011), female teachers in this study perceived themselves to be significantly more knowledgeable about and likely to use the aforementioned ABA strategies in contrast to male teachers. As cited by Randazoo, these results differed from the study of Moore (2003) that found no significant difference between male and female preservice teachers in their perceived ability to manage students’ behaviors. Unlike Moore’s study, all participants in this study were practicing teachers and no longer teachers-in-training and are thus more likely to have higher knowledge about behavior management skills. It may be possible that female teachers perhaps find themselves are more comfortable with their skills and perceive themselves to be more knowledgeable. Given the mandatory requirements in Saudi Arabia that the gender of the teacher have be the same as the student taught, lower level of
knowledge and frequency of use of ABA strategies by male teachers will have negative consequences for the improved learning of male students with ASD. Future researchers may want to investigate the reason for lower perceived levels of knowledge and frequency of use of ABA strategies by male teachers in Saudi Arabia (compared to the female teachers). The research could explore ways of improving the male teachers’ knowledge, and/or to improve the programs for male students with ASD.

**ABA training / courses on ABA and knowledge and frequency of use of ABA strategies.** Teachers’ level of knowledge and frequency of use *social positive reinforcement strategy* and *behavior* as behavior management were affected by ABA training. The frequency of use of the following ABA strategies *a preferred activity as positive reinforcement strategy*, *shaping*, *behavior contract*, and *modeling* by teachers of students with ASD was affected by ABA training. The teachers’ level of knowledge about using *token economy as positive reinforcement* with teachers of students with ASD was affected only marginally by ABA training. The teachers’ levels of level of knowledge about using *differential reinforcement* and the frequency of use of *group contingency* and *overcorrection* strategy as a behavior management strategy were affected by their previous enrollment in a course on applied behavior analysis.

As opposed to the findings of Randazzo (2011), this study found that teachers who had been trained in ABA or who had taken a course in ABA had higher perceived levels of knowledge and indicated higher frequency of use of the aforementioned ABA strategies. Perhaps the training in ABA or enrollment in a behavior management course in combination with the general coursework, independent reading or other professional development activities enabled the teachers link the theoretical knowledge gained in class with the experiences gained
during supervised training programs / courses (Moore, 2003; Whitney, Golez, Nagel, & Nieto, 2002).

**Years of teaching experience and knowledge and frequency of use of ABA strategies.** The teachers’ levels of knowledge about using *food as positive reinforcement* and the frequency of use of *behavior contract* strategy were slightly higher for the teachers with 4-7 years of experience than for the combined category of those with 0-3 years or more than 4-7 years of teaching experience. The findings of this study differed from the outcomes of Randazzo’s (2011) observation that the teachers with more years of experience tended to perceive themselves as using ABA strategies more often. Instead the findings are consistent with the observations on the level of knowledge of the teachers about ASD in Saudi Arabia found by Hairmour and Obaidat (2013). These researchers found that teachers with less experience (< 5 years) had higher levels of knowledge about ASD than the teachers with more (>10 years) teaching experience, and the teachers with intermediate levels of experience (5-10 years) had higher level of knowledge about ASD relative to those with less than 10 years of experience. A higher level of retention of knowledge attained by younger teachers and the accompanied motivation of these younger teachers to use these strategies as compared to the older teachers were attributed for the increased level of knowledge about ASD among young teachers. This is also a likely explanation for the marginally higher level of knowledge about using *food as positive reinforcement* and the frequency of use of *behavior contract* strategy among young teachers in this study.

**Behavioral problems in students and knowledge and frequency of use of ABA strategies.** Behavior contracting is recommended as strategy especially when students exhibit persistent behavioral problems, are very unorganized, defiant, and/or oppositional. However,
contrary to the expectations, the teachers’ levels of knowledge about using behavior contract were significantly influenced negatively by the severity of behavioral problems in the students taught. In this study, chances of success with the teachers who have entered into a contract with students having severe behavioral problems were less likely. While the actual reason for the lower success experienced with behavior contract strategy in this study is unknown, it partly explains the lack of knowledge among the teachers about using behavior contract strategy in this study.

The current study also observed a marginally positive influence of the severity of behavioral problems in students taught on the teachers’ levels of knowledge about using food as positive reinforcement and the frequency of use of group contingency strategy. The teachers’ levels of knowledge about using extinction, and time out strategy and the frequency of use of food as positive reinforcement strategy were significantly influenced positively by the severity of behavioral problems in the students taught in the program. Provisioning reward and punishment were considered as popular techniques to manage behavior of students with disabilities in this study. Use of strategies such as, food as positive reinforcement, time out and extinction to manage the behavior of students with disabilities have been previously observed to result in increased positive student behaviors (Love et al., 1996).

Cognitive impairment in students and knowledge and frequency of use of ABA strategies. None of the ABA strategies considered in this study were significantly influenced by the severity of cognitive impairment in the students taught in the program. However, the frequency of use of the following ABA strategies, use of food as positive reinforcement, and behavior contract by the teachers of students with ASD were marginally influenced by the severity of cognitive impairment in the students taught in the program. In this study, 48% of the
teachers of students with ASD reported intermediate level of cognitive impairment among their students with ASD; while only 17% of the teachers had students with more severe cognitive impairment. Future studies of teachers who work with more severely cognitively impaired students with ASD might help unravel the effect of this demographic variable on the level of knowledge and frequency of use of different ABA strategies.

**Educational unit and knowledge and frequency of use of ABA strategies.** The teachers’ levels of knowledge and the frequency of use of the *time out* strategy were higher among teachers in public schools as compared to teachers in Institutes of Intellectual Education. These results are encouraging because it has been documented that personnel in Saudi public schools are not as well trained as those in the Institutes (Mazin, 2011). This study and these participants in particular indicated that public school teachers use these ABA strategies (National Research Council, 2001; Scheuermann, Webber, Boutot, & Goodwin, 2003).

**Student age and knowledge and frequency of use of ABA strategies.** As the age of the student taught increased, the teachers of students with ASD had lower levels of perceived knowledge about *extinction and punishment* strategy. Perhaps this is because older students are more likely to have developed socially adaptive behavior than younger students with more challenging behavior. Hence it may be more likely that teachers of older students use the *extinction* and *punishment* strategy less frequently and they perceive themselves to have low levels of knowledge about these strategies in contrast to the teachers of younger students.

**Teachers’ degree program and knowledge and frequency of use of ABA strategies.** The level of degree program completed by the teachers influenced the frequency of use of the following ABA strategies, *shaping, punishment* and *time out*, by the teachers of students with ASD. The teachers with higher educational degrees tended to have higher appreciation about
different ABA strategies and also indicated higher frequency of use of the previously mentioned strategies compared to those with lower level diplomas or a bachelor’s degree. Haimour and Oabidat (2013) also obtained similar outcomes when they studied school teachers’ knowledge about ASD in Saudi Arabia.

**Effectiveness of Instructional Techniques**

The current study also sought to answer the following question: How effective have learning opportunities been in supporting the teachers learning about the behavior strategies? Previous research has indicated that observing teacher mentors and supervising teaching practice are more effective methods of learning compared to lectures (Merrett & Wheldall, 1993). In the current study, teachers of students with ASD rated observing teacher mentors or supervising teachers (48.1%), reviewing case studies (43.7), watching and reflecting on videos (41.1), listening to lectures (40.5%), and receiving feedback (40.5%) as the most effective instructional techniques to support their learning about the behavior strategies. These instructional techniques were perceived as more effective than other instructional techniques such as completing group projects and completing portfolios related to behavior management strategies which were identified by participants as not experienced.

Participants in the current study identified a mixture of instructional methods such as observing others implementing ABA techniques, along with some of the more reflective techniques such as reviewing case studies, watching and reflecting on videotapes, listening to lectures, and receiving feedback as very effective instructional techniques. Emmer and Stough (2001) had participants who identified reflective techniques, such as journal writing and portfolios, as effective techniques to improve beginning teachers’ management skills. In contrast, Randazzo had the participants identify the instructional techniques such as teachers
practice employing ABA strategies, observe others implementing ABA techniques, and/or read about ABA strategies as the most effective techniques to improve teachers’ management skills. The results of this study on effectiveness of instructional techniques as identified by participants were thus partly in agreement with the findings of Emmer and Stough (2001) and that of Randazzo (2011).

**Frequency of Conditions as Barriers to Implementation**

In this study, another question to which answers were sought was: What conditions do the teachers of students with ASD perceive as barriers to their use of behavior management strategies and how frequently do they encounter these barriers? Prior research found that a lack of support from administration and a lack of feedback/guidance as barriers to using certain behavior strategies (Kincaid, Childs & Blase, & Wallace, 2007; Lohrmann, Forman, Martin, & Palmieri, 2008) as major barriers to teachers implementation of behavioral management strategies. In the current study, the following five factors were identified as major barriers to use of behavior management strategies: support from administration (89.3%), knowledge or skill of participants (86.1%), feedback or guidance (85.5%), supplies (84.8%) and support from colleagues (82.3%). These findings in the current study are similar to the findings of Randazzo (2011). As stated by Randazzo, the enhanced level of knowledge about the ABA strategies and the accompanying increase in the confidence of the teachers might have led them to perceive the various factors considered in the study as not being a major barrier to the use of ABA strategies.

**Desired Training and Resources**

A final question that this study sought to answer was: What training and resources on behavior management strategies do the teachers of students with ASD perceive as the most desired for successful implementation of ASD programs? Several previous studies indicated that
receiving training in ABA with evidence-based practice is important for the teachers to be able to manage and educate students with ASD (Callahan, Henson, & Cowan, 2008; Callahan, Shukla-Mehta, Magee, & Wie, 2010, Simpson, 2001). Training in ABA certainly equips the teachers with appropriate skills to meet the needs of students with ASD (Scheuermann, Webber, Boutot, & Goodwin 2003) and the findings in the current study support these observations.

The current study had 63% of the participants identify training on the use of the majority of the behavior management strategies as the “most desired”. More than 80% of the participants also identified one of the other types of training and resources as “desired” and “most desired”. The high level of desire among the teachers of students with ASD in Saudi Arabia for advanced training on behavior management strategies is encouraging. The prevalence rate for ASD is very high in Saudi Arabia higher than ever before. Because of the increasing prevalence of ASD, every public school teacher in Saudi Arabia is likely to serve students with ASD. Further, gender specific restrictions in teaching (male teachers teach male students and vice-versa) in Saudi Arabia demand qualified female as well as male teachers of students with ASD. The relatively low knowledge of ABA strategies and their frequency of use among male teachers in Saudi Arabia also warrants attention to the enhancement of training programs designed for the stakeholders, especially those involving male teachers.

**Limitations of the Study**

This self-report survey study is limited because it is based on information obtained voluntarily from participants. It leaves out questions about the participants’ actual knowledge of ABA and actual use of ABA strategies. We now know their perceptions of knowledge and use, but we don’t know if these are actualized in the classroom. The study cannot tell us if the teachers implement the strategies with fidelity (accurately) or if what they think is, for example,
differential reinforcement, is actually what they think it is/what they think they are using. We also don't know if the teachers are truly knowledgeable about ABA (it's the participants’ perceptions only). Future research could explore if the teachers are truly knowledgeable about and using these strategies, how often, and how correctly they are using these strategies through observational research. Another limitation is that the lack of an appropriate public database on Special Education teachers in Saudi Arabia made the selection of candidates difficult and hence the study sample represented a non-random sample of teachers.

**Conclusion**

This study was designed to examine the knowledge of the teachers of students with ASD and their frequency of use of ABA strategies in Saudi Arabia. This study also examined teachers’ perceived barriers to the use of ABA. The teachers participated through an online web-based survey using Qualtrics program. However, the survey instrument was pilot tested with fifteen teachers who were currently teaching students with ASD in Saudi Arabia. A total of 158 teachers of students with ASD responded and completed the survey.

This study is first of its kind in Saudi Arabia to examine the knowledge of the teachers of students with ASD and their frequency of use of ABA strategies. It also provides great insights into the various demographic factors that affected the level of knowledge and frequency of use of teachers with ASD on each of 16 ABA strategies via ordinal logistic regression. Unlike Randazzo’s study (2011), this study reported demographic variables that were found to have a significant effect on response variable of interest at a level of confidence, $\alpha = 95\%$. Yet, through ordinal logistic regression, the study was able to unravel the effect of each of the demographic variable considered on the level of knowledge or frequency of use of one or other ABA strategy included in the survey.
The linear regression indicated that two demographic characteristics emerged as the most important among all predictor variables considered in the study. Specifically, gender and ABA training merged out as the most important predictors to have an effect on the level of knowledge and frequency of use averaged over all ABA strategies, respectively. Female teachers were superior to male teachers in terms of knowledge scores and teachers with ABA training were superior to those without training in terms of frequency of use of ABA strategies in the classrooms. Together, these results highlight the need for ABA training focused on positive strategies for teachers of students with ASD to be effective at eliminating disruptive behaviors in the classroom setting, and in particular for the male teachers to help male students to better adapt for a social life in the community.

Consistent with Randazzo (2011), the current study found elementary teachers are more likely to consider themselves as more knowledgeable and more frequent in their use of ABA strategies than secondary teachers. Younger students’ disruptive behaviors are probably easier to manage than adolescents’ behaviors which may explain the observed outcome. This indeed signifies the need for scheduling additional appropriate training in ABA for secondary school teachers of students with ASD and it could be investigated in future research studies.

The results of ordinal logistic regression almost concurred with the findings from linear regression and highlighted the role played by gender and ABA training in enhancing the level of knowledge and frequency of use of most of the 16 ABA strategies considered in the study. Beyond gender and ABA training, some strategies were significantly influenced by other demographic variables. Knowledge of behavior contract strategy (reward) was lower and that of extinction strategy was higher among teachers of students with severe behavioral problems. Knowledge of time out strategy was higher among teachers in public schools, but the level
knowledge of other ABA strategies were not differentiated among teachers in public schools and institutes of intellectual education. In contrast to positive strategies, punitive strategies are less often recommended for use by teachers of students with ASD. The results signify the need to adopt relevant policy formation to curtail the use of these punitive strategies among teachers of students with behavioral problems, and in particular the need to train teachers in public schools to restrain the use of the *time out* strategy.

Similar results were found when the effects of demographic variables on frequency of use of each ABA strategy by teachers of students with ASD were taken into account. Gender and ABA training had significant effect on the frequency of use of most of the 16 ABA strategies. Few other demographic variables were found to have significant effect on the frequency of use of some ABA strategies. Frequency of the use of the *shaping* strategy was lower among teachers with master’s degree than among the combined categories of teachers with bachelor’s and diploma degree. The *Behavior contract* strategy (reward) was used less frequently used by teachers of students with severe cognitive impairment than those teachers of students with milder cognitive impairment. Teachers who completed a course on applied behavioral analysis frequently used the *group contingency* and *overcorrection* strategies more often than those who did not complete it. As was the case with level of knowledge of the *time out* strategy, the frequency of use of *time out* strategy was higher among teachers in public schools; the frequency of use of other ABA strategies were also not differentiated among teachers in public schools and institutes of intellectual education. The results emphasize the need to adopt relevant policy formation to curtail the use of these punitive strategies among teachers of students with ASD, and in particular the need to train teachers in public schools to restrain the use of the *time out* strategy.
The study findings on the strategies included / not included in their training, highlight the need for additional research to identify the potential reasons for non-inclusion or restrictive use of following learning opportunities including completing group projects, and completing portfolios followed by reflective journal writing, role-playing scenarios etc. in their teacher preparation courses. The findings suggest the potential importance of providing teachers with opportunities to appreciate the utility of the aforementioned instructional techniques (e.g., practicing employing ABA strategies through role-playing) to increase their knowledge of ABA strategies. Future training programs must cast light on the utility of these strategies as effective learning opportunities among teachers of students with ASD as ways to enhance their knowledge of ABA strategies and their appropriate frequency of use to increase socially adaptive skills of students. Likewise, teachers perceived the lack of support from administration, the lack of supplies, the lack of support from administration and the lack of feedback / guidance for using behavior strategy as the most important barriers to the implementation of ABA strategies. Efforts must be directed to accommodate the needs of teachers promptly and reduce the teacher’s perceptions about these aspects as barriers to implementation of ABA strategies. It would be advantageous to examine the knowledge and training in the use of ABA among administrators. Nearly 55-60% of the teachers perceived all training resources listed in the survey as most desired, except for the training meant to deal with special characteristics of a disability. This result is perhaps indicative of the ignorance of the teaching community on the special needs of students with specific disability, though this needs to be verified with future investigations.

Because the ABA strategies are important for teachers of students with ASD to enhance or change the students with ASD behaviors, the outcomes of this study will be beneficial. The findings from this study will be shared with the teachers of students with ASD, the researchers in
the department of special education and the policy makers in the Ministry of Education in Saudi Arabia. It is expected that study findings will inform the research and teaching communities of the advantages and disadvantages associated with: the use of different ABA strategies for teaching students with ASD in Saudi Arabia, the selection of teachers for special education schools, and the design of ABA training programs, based on gender, type of educational unit, and severity of behavioral or cognitive problems in the students taught.

To be the most effective in teaching students with ASD, educators have to be exposed to the most effective and up-to-date evidence based approaches available. The teachers need to be trained to be responsive to student needs and contexts dependent upon the optimal strategies selected for them (collectively and individually). Future researches may also investigate the reason(s) for lower perceived levels of knowledge and frequency of use of ABA strategies by male teachers in Saudi Arabia (compared to female teachers). The research could explore ways of improving the male teachers’ knowledge, in or to improve the programs for male students with ASD. Administrators need to be cognizant of what barriers to the use of ABA strategies that may be encountered by teachers. Perhaps this could be addressed in training for administrators, as well as how to address such obstacles and to derive the greatest degree of conceptual and practical learning for their students’ successful and meaningful application. The analytical approach used in this study is also expected to serve as a yardstick to guide future research related to special education, and undeniably the policy formation to streamline the education for students with ASD in the Kingdom of Saudi Arabia.
References


Alquraini, T. A. (2012). Factors related to teachers' attitudes towards the inclusive education of


Christopheresen, O. A. (2012). Should autism be considered a canary bird telling that Homo sapiens may be on its way to extinction?. *Microbial ecology in health and disease, 23*.


(UMI No. 862552944).


doi:10.1080/0305569930190106.


No Child Left Behind Act of 2001, NCLB 9101, Title XI of Section 9101(23).


Randazzo, M. E. (2011). *Elementary teachers’ knowledge and implementation of applied behavior analysis techniques*. RUTGERS THE STATE UNIVERSITY OF NEW JERSEY, GSAPP.


http://www.saudiembassy.net/about/country-information/government/


APPENDIX A

APPROVAL LETTER FROM MINISTRY OF EDUCATION IN SAUDI ARABIA TO CONDUCT SURVEY STUDY
السلام عليكم ورحمة الله وبركاته وبعد:

طلب الدراسة المذكور ببياناته أعلاه وبعد دراسة الاستفادة المستخدمة نفيدكم

بموافقة على عنوان الدراسة والمكاني تطبيقها والتي بعنوان:

( معرفة واستخدام استراتيجيات تحليل السلوك التطبيقي بين معلمي التوحد في السعودية 

والمواعيد من عدم استخدامها. )

والله ولي التوفيق.

مدير عام التربية الخاصة

د. عبد الله بن فهد العقيل
APPENDIX B

RESEARCH STUDY CONSENT FORM
WASHINGTON STATE UNIVERSITY  
College of Education, Department of Teaching and Learning  

Research Study Consent Form  

Study Title: Knowledge and Use of Applied Behavior Analysis among Teachers of Students with Autism Spectrum Disorders (ASD) in Saudi Arabia.  

Researchers:  
PI: Dr. Darcy Miller  
CO PI: Abdulhadi Alotaibi  

Sponsor: NA  

You are being asked to take part in a research study carried out by Darcy Miller and Abdulhadi Alotaibi. This form explains the research study and your part in it if you decide to join the study. Please read the form carefully, taking as much time as you need. Ask the researchers to explain anything you don’t understand (darcymiller@wsu.edu; abdul.alotaibi@email.wsu.edu). You can decide not to join the study. If you join the study, you can change your mind later or quit at any time. There will be no penalty or loss of services or benefits if you decide not to take part in the study or quit later. This study has been reviewed and certified as exempt for human subject participation by Washington State University’s Institutional Review Board Staff.  

What is this study about?  

The purpose of this study is to examine the knowledge of teachers of students with Autism Spectrum Disorders (ASD) and their use of Applied Behavior Analysis (ABA). The study will also explore from teachers’ perspectives what the barriers might be in their use of ABA strategies. The findings will be disseminated in professional educational journals, and also reported to the Saudi Arabian Ministry of Education, to inform concerned officials on the degree of knowledge and use of ABA strategies by teachers of these students in the Kingdom. It is expected that the findings will: a) improve educational programs for students with ASD by improving teacher training, b) help faculty members in special education departments in Saudi Arabian universities develop appropriate training programs in the use of ABA for teachers of students with ASD (both inservice and preservice teachers), and, c) add to the knowledge in the field of special education.
You are being asked to participate in this because you can provide a teachers’ perspective on the use of ABA strategies, and what you think are the barriers to using these strategies. The study results could potentially benefit you through professional development offered to teachers in Saudi Arabia. In addition, students with ASD will benefit from the study results because the outcomes of the study may lead to better quality programs for those with ASD in Saudi Arabia. Taking part in the study will take about 20 minutes.

**What will I be asked to do if I am in this study?**

If you take part in the study, you will be asked to participate by completing the survey about your knowledge and use of ABA strategies.

**Are there any benefits to me if I am in this study?**

There is no direct benefit to you from being in this study, other than the fact that you will be contributing to the eventual improvement of both teacher training and educational programs for students with ASD in Saudi Arabia.

It is expected that the findings will: a) improve educational programs for students with ASD by improving teacher training, b) help faculty members in special education departments in Saudi Arabian universities develop appropriate training programs in the use of ABA for teachers of students with ASD (both inservice and preservice teachers), and, c) add to the knowledge in the field of special education.

**Are there any risks to me if I am in this study?**

The potential risk involved in this study is minimal. Participants might not want to contribute their knowledge and that could make some feel uncomfortable. If you are not comfortable at any time during the survey you can quit any time, with no penalties or problems.

**Will my information be kept private?**

The data for this study will be kept confidential to the extent allowed by federal and state law. No published results will identify you, and your name will not be associated with the
findings. Under certain circumstances, information that identifies you may be released for internal and external reviews of this project. All of the participants will be treated in accordance with ethical guidelines of the Washington State University Institutional Review Board. Although there is only a minimal risk identified for participating in this study, a number of considerations will be kept in mind; for example, health and safety issues. There will be adequate action to ensure safety, comfort, and the freedom to withdraw from the study if desired. All files will be protected using a password known to only the researchers and saved on a password protected laptop computer kept in a locked office that can only be accessed by the researchers. The results of this study may be published or presented at professional meetings, but the identities of all research participants will remain confidential. The data for this study will be kept for three years after which time they will be destroyed.

**Are there any costs or payments for being in this study?**

There will be no costs to you for taking part in this study.

You will not receive money or any other form of compensation for taking part in this study.

**Who can I talk to if I have questions?**

If you have questions about this study or the information in this form, please contact the researcher (Dr. Darcy Miller, Phone: (509) 335-5027, darcymiller@wsu.edu or Abdulhadi Alotaibi., 509-339-4354, abdul.alotaibi@email.wsu.edu). If you have questions about your rights as a research participant, or would like to report a concern or complaint about this study, please contact the Washington State University Institutional Review Board at (509) 335-3668, or e-mail irb@wsu.edu, or regular mail at: Albrook 205, PO Box 643005, Pullman, WA 99164-3005.

**What are my rights as a research study volunteer?**

Your participation in this research study is completely voluntary. You may choose not to be a part of this study. There will be no penalty to you if you choose not to take part. You may choose not to answer specific questions or to stop participating at any time.
Voluntary Participation:

Your participation in this research study is completely voluntary. You may choose not to be a part of this study. There will be no penalty to you if you choose not to take part. You may choose not to answer specific questions or to stop participating at any time.

What does my signature on this consent form mean?
Your signature on this form means that:

- You understand the information given to you in this form.
- You have been able to ask the researcher questions and state any concerns.
- The researcher has responded to your questions and concerns.
- You believe you understand the research study and the potential benefits and risks that are involved.
APPENDIX C
SURVEY INSTRUMENT
Cover Letter and Survey

Dear Colleagues:

I would like to inform you that I am a graduate student at Washington State University in the United States and am currently conducting research in the field of special education. I am interested to investigate knowledge and use of Applied Behavior Analysis (ABA) among Teachers of Students with Autism Spectrum Disorders (ASD) in Saudi Arabia.

The attached questionnaire is designed to collect background data about your perceptions, Knowledge of ABA. Codes will replace participant names so that there is no way to identify the respondent. By completing the survey through a secure online tool you are giving me permission to use the data and acknowledging that your cooperation is voluntary without any reward or penalty. I realize that your time is very valuable and limited and your participation in this study is very much appreciated.

Please complete the questionnaire and attempt to answer all questions as soon as you can. Please do not write your name on the questionnaire. All information you give and opinions you express will remain anonymous and confidential. Please note that the survey will be destroyed after the completion of the need for it. Thank you very much for your consideration and cooperation.
Survey Questions

Part 1

Demographic Information

1. How many years have you been teaching? _____0-3_____4-7_____8-11_____more than 12.
2. What is your gender: _____Male ______Female
3. What academic degree(s) have you obtained? (please check all that apply)
   _____Bachelor's_____Master's_____Doctorate_____Other
4. In your undergraduate or graduate education, did you take a course that focused primarily on behavior management related to children with autism?  
   ______Yes ______No
5. In your undergraduate or graduate education, did you take a course that focused primarily on applied behavior analysis? ______Yes ______No
6. Have you completed any training during your teaching career on applied behavior analysis strategies? _____Yes ______No
7. In which type of educational unit do you teach? 
   _____Autism programs in public schools _____Autism programs at the Institute of Intellectual Education
8. What is the total enrollment of students with autism in your school program or autism center?  
   _____1-5_____6-10_____11-15_____16-20_____more than 20
9. What is the age range of the students with autism that your program/center serves?  
   _____6-9_____10-12_____13-15_____16-21
10. Using a scale of 1 to 5, where 1 indicates mild cognitive impairment and 5 indicates severe cognitive impairment, rate the cognitive level of functioning of the students with autism that
171

your program serves and you teach?

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>Cognitive Impairment</td>
<td>Severe Cognitive Impairment</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

11. Using a scale of 1 to 5, where 1 indicates mild behavior problems and 5 indicates severe behavior problems, rate the behaviors of the students with autism that your program serves and you teach?

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>Behavior Problems</td>
<td>Severe Behavior Problems</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Part 2**

Please rate the following strategies according to how knowledgeable you are about the strategies and the frequency with which you use them in your classroom.

On the left side of the questionnaire, please check (√) the box that best describes your level of knowledge of behavioral management strategies. Use this rating scale: (1) Not knowledgeable, (2) Somewhat knowledgeable, or (3) Knowledgeable.

On the right side of questionnaire, please check (√) the box that best describes how often you use the behavioral strategies. Use this rating scale: (1) I do not use this strategy, (2) I use this strategy occasionally, or (3) I use this strategy often.

<table>
<thead>
<tr>
<th>Level of Knowledge</th>
<th>Strategies</th>
<th>Frequency of Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Positive Reinforcement – Social:</td>
<td>I give students possible attention when the student demonstrates positive behavior.</td>
<td></td>
</tr>
<tr>
<td>Positive Reinforcement – preferred activity:</td>
<td>I let students earn time on a preferred activity, such as computer time or game time, when he/she demonstrates positive behavior.</td>
<td></td>
</tr>
<tr>
<td>Positive Reinforcement - Token Economy:</td>
<td>I have a system in which students can earn tickets, or points, or stars that can later be traded in for larger prizes, when he/she demonstrates positive behavior.</td>
<td></td>
</tr>
<tr>
<td>Positive Reinforcement - Food:</td>
<td>I let students earn candy or food for demonstrating positive behavior.</td>
<td></td>
</tr>
<tr>
<td>Shaping:</td>
<td>I continue to reward students as they achieve small steps toward the more complex/difficult positive behavior until they learn the complex/difficult behavior completely.</td>
<td></td>
</tr>
<tr>
<td>Behavior Contract:</td>
<td>I let my students decide with me what behaviors they will work to achieve.</td>
<td></td>
</tr>
<tr>
<td>Behavior Contract:</td>
<td>I let my students decide with me what rewards they will earn as they achieve their behavioral goals.</td>
<td></td>
</tr>
</tbody>
</table>
| Modeling: | I demonstrate the positive behavior(s) that I
want students to learn and perform.

(Prompting):
I prompt/guide students all along the way (as needed) as they are learning positive behavior.

(Fading):
I slowly take away prompts/guidance as the student demonstrates more independently positive behavior.

(Group Contingency):
I reward the class when one student or a small group of students demonstrate positive behavior.

(Extinction):
I stop my actions if they contribute to a student’s inappropriate behavior (For example is my attention seems to be rewarding a student’s inappropriate behavior, I will withdraw my attention).

<table>
<thead>
<tr>
<th>Level of Knowledge</th>
<th>Frequency of Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

(Punishment):
I verbally reprimand students or take away privileges when their behaviors are inappropriate.

(Differential Reinforcement):
I reward students’ positive behaviors and at
<table>
<thead>
<tr>
<th>the same I do not reward the students’ inappropriate behavior (For example, I might praise a student for looking at the lesson or attending to the lesson while at the same time I would ignore the same student for kicking his/her desk).</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Time Out): I temporarily separate any student (put them in a different area or setting) from the other students following inappropriate behaviors.</td>
</tr>
<tr>
<td>(Overcorrection): I require that students practice positive behaviors if the student demonstrates inappropriate behavior (For example, if a student screams a request, such as “In want cookie!” I have the student practice giving the request in an appropriate way; or if a student kicks/shouts when he/she needs something, I have him/her practice how to get his/her needs met in an appropriate way).</td>
</tr>
</tbody>
</table>

**Part 3**

How effective have the following learning opportunities been in supporting your learning about the behavior strategies described in this survey in either your teacher training or any training that you have received?

Please check (√) the box that best describes the effectiveness of the instructional techniques
below. Please use the following rating scale: (1) I never experienced this learning opportunity in my teacher training or any other training, (2) I experienced the learning opportunity but I don’t feel the learning opportunity was effective, (3) I experienced the learning opportunity and was somewhat effective, or (4) I experienced the learning opportunity and it was very effective.

<table>
<thead>
<tr>
<th>Learning Opportunities</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Reviewing case studies of students with behavior challenges or problems.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Listening to lectures about behavior strategies.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Reading books/articles about behavior strategies.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Observing mentors teachers or supervising teachers dealing with behavior problems using these behavior strategies.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Receiving feedback on how I implement behavior strategies.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 Reflective journal writing about behavior strategies.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 Watching and reflecting on video that show the implementation of behavior strategies.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 Role-playing scenarios about using behavior strategies.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 Completing group projects related to behavior strategies.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Part 4**

How frequently are the following factors experienced as barriers to your use of the behavior strategies described in this survey?

Please check (\(\checkmark\)) the box that best describes if the factor is: (1) Never a barrier to my use of a behavior strategy (2) Sometimes a barrier to my use of a behavior strategy, or (3) Very often a barrier to my use of a behavior strategy.

<table>
<thead>
<tr>
<th>Possible Barriers to Using</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 My knowledge or skill regarding the behavior strategy.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Support from administration for using the behavior strategy.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Feedback/guidance for using the behavior strategy.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Supplies for using the behavior strategy.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Support form colleagues to use the behavior strategy.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 My general approach does not help me.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 Takes too much time and effort to use the behavior strategy.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 Perception that the behavior strategy is not effective.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 Other teachers have tried the behavior strategy and they thought it was ineffective.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 The behavior strategy would not help me achieve my work goals.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 The behavior strategy was not appropriate for the students in my class(es) and their specific problems.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Other factors that influence your use of the behavior strategies described in this survey (explain and rate those factors)

### Part 5

**Desired Training Resources.**

If you could receive training about behavior management, or behavior strategies, what type of training would you like to receive? Please rate the training/resources using the following scale:

(1) Most desired training/resource, (2) Desired training/resource, or (3) Not desired.

<table>
<thead>
<tr>
<th>Training/Resources Desired</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  How to use effective behavior management strategies.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2  How to manage severe behavior problems.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3  Specific characteristics of a disability.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4  Working with parents to develop appropriate home/school programs.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5  Having expert teachers working with me in the classroom to implement behavior strategies.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6  Developing appropriate behavior interventions for my students.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7  Identifying appropriate behavioral goals for my students.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8  Obtaining materials and resources for my classroom.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9  Understanding administrators’ and teachers’ roles related to behavior management.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 Having teaching assistants in the classroom to help.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 Other (Describe the training you desire, or the resources you desire).</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX D
MODEL SUMMARY FROM LINEAR REGRESSION
## Appendix D1

Model Summary for Linear Regression on Average Level of Knowledge of ABA strategies using Backward Elimination Approach

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
<th>R Square Change</th>
<th>F Change</th>
<th>df1</th>
<th>df2</th>
<th>Sig. F Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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<td>0.09</td>
<td>-0.01</td>
<td>0.38</td>
<td>0.09</td>
<td>0.92</td>
<td>14</td>
<td>139</td>
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<td>0.38</td>
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<td>0.01</td>
<td>0.38</td>
<td>0.00</td>
<td>0.03</td>
<td>1</td>
<td>141</td>
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</tr>
<tr>
<td>5</td>
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<td>0.08</td>
<td>0.02</td>
<td>0.37</td>
<td>0.00</td>
<td>0.26</td>
<td>1</td>
<td>143</td>
<td>0.61</td>
</tr>
<tr>
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<td>0.08</td>
<td>0.02</td>
<td>0.37</td>
<td>-0.01</td>
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<td>1</td>
<td>144</td>
<td>0.32</td>
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<td>0.03</td>
<td>0.37</td>
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<td>1</td>
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<tr>
<td>9</td>
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<td>0.02</td>
<td>0.37</td>
<td>-0.01</td>
<td>1.38</td>
<td>1</td>
<td>147</td>
<td>0.24</td>
</tr>
<tr>
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<td>0.23</td>
<td>0.05</td>
<td>0.03</td>
<td>0.37</td>
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<tr>
<td>11</td>
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<td>0.05</td>
<td>0.04</td>
<td>0.37</td>
<td>0.00</td>
<td>0.06</td>
<td>1</td>
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</tr>
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</tr>
</tbody>
</table>
1. Predictors: (Constant), BehavProb, Bachelor, SABA\_CV, SAge\_CV, ABATrain, YrsTeach47, EdUnit, YrsTeach811, BMAutism, CogImpair, Gender, ABACourse, MS, YrsTeach03
2. Predictors: (Constant), BehavProb, Bachelor, SABA\_CV, SAge\_CV, ABATrain, EdUnit, YrsTeach811, BMAutism, CogImpair, Gender, ABACourse, MS, YrsTeach03
3. Predictors: (Constant), BehavProb, Bachelor, SABA\_CV, SAge\_CV, ABATrain, EdUnit, YrsTeach811, CogImpair, Gender, ABACourse, MS, YrsTeach03
4. Predictors: (Constant), BehavProb, Bachelor, SABA\_CV, SAge\_CV, ABATrain, EdUnit, YrsTeach811, CogImpair, Gender, MS, YrsTeach03
5. Predictors: (Constant), BehavProb, Bachelor, SABA\_CV, SAge\_CV, ABATrain, EdUnit, CogImpair, Gender, MS, YrsTeach03
6. Predictors: (Constant), BehavProb, Bachelor, SABA\_CV, SAge\_CV, ABATrain, EdUnit, CogImpair, Gender, MS
7. Predictors: (Constant), BehavProb, Bachelor, SABA\_CV, SAge\_CV, ABATrain, EdUnit, CogImpair, Gender
8. Predictors: (Constant), BehavProb, SABA\_CV, SAge\_CV, ABATrain, EdUnit, CogImpair, Gender
9. Predictors: (Constant), BehavProb, SABA\_CV, SAge\_CV, ABATrain, CogImpair, Gender
10. Predictors: (Constant), BehavProb, SABA\_CV, SAge\_CV, CogImpair, Gender
11. Predictors: (Constant), BehavProb, SABA\_CV, SAge\_CV, Gender
12. Predictors: (Constant), BehavProb, SAge\_CV, Gender
13. Predictors: (Constant), SAge\_CV, Gender
14. Predictors: (Constant), Gender
Appendix D2

Model Summary for Linear Regression on Average Frequency of Use of ABA strategies using Backward Elimination Approach

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
<th>Change Statistics</th>
<th>R Square Change</th>
<th>F Change</th>
<th>df1</th>
<th>df2</th>
<th>Sig. F Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.39</td>
<td>0.15</td>
<td>0.07</td>
<td>0.32</td>
<td>R Square Change</td>
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<td>14</td>
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</tr>
<tr>
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<td>0.15</td>
<td>0.07</td>
<td>0.32</td>
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<td>1</td>
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</tr>
<tr>
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<td>0.31</td>
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</tr>
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<td>147</td>
<td>0.86</td>
</tr>
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<td>0.12</td>
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<td>1</td>
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</tr>
</tbody>
</table>
1. Predictors: (Constant), BehavProb, Bachelor, SABA_CV, SAge_CV, ABATrain, YrsTeach47, EdUnit, YrsTeach811, BMAutism, CogImpair, Gender, ABACourse, MS, YrsTeach03
2. Predictors: (Constant), BehavProb, Bachelor, SABA_CV, SAge_CV, ABATrain, YrsTeach47, EdUnit, BMAutism, CogImpair, Gender, ABACourse, MS, YrsTeach03
3. Predictors: (Constant), BehavProb, Bachelor, SABA_CV, SAge_CV, ABATrain, YrsTeach47, BMAutism, CogImpair, Gender, ABACourse, MS, YrsTeach03
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5. Predictors: (Constant), BehavProb, Bachelor, SABA_CV, SAge_CV, ABATrain, YrsTeach47, BMAutism, CogImpair, MS, YrsTeach03
6. Predictors: (Constant), BehavProb, Bachelor, SABA_CV, SAge_CV, ABATrain, YrsTeach47, CogImpair, MS, YrsTeach03
7. Predictors: (Constant), BehavProb, Bachelor, SABA_CV, SAge_CV, ABATrain, CogImpair, MS, YrsTeach03
8. Predictors: (Constant), BehavProb, SABA_CV, SAge_CV, ABATrain, CogImpair, MS, YrsTeach03
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10. Predictors: (Constant), BehavProb, SABA_CV, SAge_CV, ABATrain, YrsTeach03
11. Predictors: (Constant), SABA_CV, SAge_CV, ABATrain, YrsTeach03
12. Predictors: (Constant), SAge_CV, ABATrain, YrsTeach03
13. Predictors: (Constant), SAge_CV, ABATrain
## Appendix D3

**Model Summary for Linear Regression on Average of Learning Opportunities using Backward Elimination Approach**

<table>
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<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
<th>R Square Change</th>
<th>F Change</th>
<th>df1</th>
<th>df2</th>
<th>Sig. F Change</th>
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<td>0.16</td>
<td>0.64</td>
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<td>1</td>
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<tr>
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<tr>
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<td>0.18</td>
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<td>1</td>
<td>138</td>
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<tr>
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<td>0.18</td>
<td>0.63</td>
<td>0.00</td>
<td>0.20</td>
<td>1</td>
<td>139</td>
<td>0.65</td>
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2. Predictors: (Constant), BehavProb, Bachelor, SABA.CV, SAge.CV, ABATrain, YrsTeach47, EdUnit, BMAutism, CogImpair, Gender, ABACourse, MS, YrsTeach03
3. Predictors: (Constant), BehavProb, Bachelor, SABA.CV, SAge.CV, ABATrain, YrsTeach47, EdUnit, BMAutism, CogImpair, ABACourse, MS, YrsTeach03
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10. Predictors: (Constant), BehavProb, SABA.CV, SAge.CV, ABATrain, BMAutism
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12. Predictors: (Constant), BehavProb, ABATrain, BMAutism
Appendix D4

Model Summary for Linear Regression on Average of Barrier to Use ABA Strategies using Backward Elimination Approach

<table>
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<th>Std. Error of the Estimate</th>
<th>Change Statistics</th>
<th>Sig. F Change</th>
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3. Predictors: (Constant), BehavProb, Bachelor, SABA_CV, SAge_CV, ABATrain, YrsTeach47, EdUnit, YrsTeach811, BMAutism, CogImpair, MS, YrsTeach03
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9. Predictors: (Constant), Bachelor, SAge_CV, YrsTeach47, YrsTeach811, MS, YrsTeach03
10. Predictors: (Constant), SAge_CV, YrsTeach47, YrsTeach811, MS, YrsTeach03
Appendix D5

Model Summary for Linear Regression on Average of Desire to Training / Resources using Backward Elimination Approach

<table>
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<tr>
<th>Model</th>
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<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
<th>R Square Change</th>
<th>F Change</th>
<th>df1</th>
<th>df2</th>
<th>Sig. F Change</th>
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3. Predictors: (Constant), BehavProb, SABA_CV, SAge_CV, ABATrain, YrsTeach811, EdUnit, YrsTeach47, BMAutism, CogImpair, Gender, MS, YrsTeach03
4. Predictors: (Constant), BehavProb, SABA_CV, SAge_CV, ABATrain, EdUnit, YrsTeach47, BMAutism, CogImpair, Gender, MS, YrsTeach03
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