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Impact of a Technology Based Intervention Package on the Inappropriate Behavior of a Child  
with Severe Disability

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A thesis  
presented to  
the faculty of the Department of Special Education  
East Tennessee State University

In partial fulfillment  
of the requirements for the degree  
Master of Education in Special Education

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by  
Amani Ali Alshehri  
December 2017

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Dr. Pamela Mims, Chair

Dr. James Fox

Dr. Tina Hudson

Keywords: Challenge Behavior, Assistive Technology, Simultaneous Prompting, Social Stories,  
Comprehension

## ABSTRACT

Impact of Using Social Stories and Assistive Technology on Inappropriate Behavior for Children  
with Severe Disabilities

by

Amani Ali Alshehri

One useful strategy to support students with intellectual and developmental disability (IDD) to promote appropriate behaviors across environments and gain the social skills is using social stories. In addition, experts have recognized iPads and apps were associated with less challenging behavior and more academic engagement over traditional materials (Lee, Lang, Davenport, Moore, Rispoli, Meer, & Chung, 2013). The focus of this study was to examine the effectiveness of an intervention package featuring social stories delivered via an iPad and simultaneous prompting on frequency of targeted challenging behavior and comprehension of the social story of a student with IDD. A single-subject multiple probe across behaviors (Kennedy, 2005) design was used to investigate the effectiveness of this intervention on the student's ability to correctly match pictures to steps in social stories as well as the targeted challenging behaviors. The results, future research, and the limitations of the study are discussed.

## DEDICATION

It is with utmost gratefulness and warmest regard that we dedicate this work to my husband, Mohammed Alsahri, and a great mother, Fatima Alshehri, without their support; this would not have been possible. We also dedicate this work to the memory of my father, Ali, who left fingerprints of grace on our lives and always believed in my ability to succeed in the academic arena. You are gone, but your belief in me has made this journey possible. Also, I would like to dedicate this achievement to the hard work of professionals in the special education sector in my country, Saudi Arabia, with the particular mention of Dr. Sharefa Alzubaery. Finally, I would thank all those whose names may have escaped my attention here but have in one way or the other contributed to my thesis. Your small acts of kindness and commitment to my academic interests were invaluable to me. I can never thank you enough.

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## CHAPTER 1

### INTRODUCTION

Inappropriate behavior in children is considered to be actions that cause interference with the child's learning, development, the aspect of play and causes harm to either the child or his peers (Oliver, Petty, Ruddick, & Bacarese-Hamilton, 2012). At some point, the challenging behavior can cause damage to the environment, equipment and any other materials that are within the child's reach (Oliver et al., 2012). Often we see challenging behavior exhibited largely in children that have severe disabilities (Oliver et al., 2012). Severe disabilities in children are classified as those with moderate to profound intellectual disabilities, autism, schizophrenia, and/or sensory impairments as well as problematic orthopedic behaviors (Oliver et al., 2012). Children with severe disabilities that display inappropriate behavior can demonstrate the following: act aggressively by hitting, kicking spitting as well as punching others. Additionally, these children exhibit antisocial behavior, cause self-injury, fail to attend and relate to others, lack self-care skills and poor verbal skills (Oliver et al., 2012).

#### **Types of Challenging Behaviors**

Challenging behavior in children with intellectual disabilities, can also include such behaviors as both out seat and off task actions. Out of seat behaviors are often seen in school as traditionally, school requires students to be in seat for a large portion of the day. On the other hand, off task behavior in children with severe disabilities can be characterized by actions such as humming, mumbling, make drawings while instruction is occurring, playing with objects on their desks, and day dreaming. In some cases, these children can become anti-social as they stay aloof and do not engage in play with others. An attempt by their friends to join them in play might result in aggressiveness such as kicking, punching and biting the other children (Oliver et al., 2012)

## **Reasons for Exhibiting Inappropriate Behavior**

There is a need to understand the reason children with disabilities exhibit these behaviors. Parents, guardians, and teachers need to understand that these children with severe disabilities can also have concomitant disabilities such as behavior disorders. The child with intellectual disabilities (ID) and behavior disorder (EBD) can have difficulty controlling his behavior fully either at home or in class (Ageranioti-Bélanger, Brunet, D'Anjou, Tellier, Boivin, & Gauthier, 2012). Students with autism spectrum disorders (ASD) also often exhibit inappropriate problem behavior (Wing, 2007). In many cases, the disorder results in aggressive and withdrawn behaviors (Kerr & Nelson, 2006). Also, children with autism are likely to display poor social skills (White, Keonig & Scahill, 2006). Many students with ASD struggle with communication and exhibit a range of vocal verbal skills from highly verbal to nonverbal. Evidence indicates that students across this spectrum have shown difficulty with verbalizing their feelings and as a result, can react aggressively when upset. Furthermore, these children can lack emotional balance (Emerson, McGill & Mansell, 2013). Therefore, while in class, out of class, and at home, many students with IDD or ASD struggle to successfully handle their interactions with others.

## **Strategies that Educators Use to Manage Challenging Behavior**

Several highly researched strategies have been shown to decrease inappropriate behaviors for those children with IDD and challenging behaviors. Below, a summary of some of these strategies will be highlighted that benefit teachers and families to handle with challenging behaviors successfully, such as: self-modeling, visual supports, embedding choices, assistive technology, and social stories.

**Visual supports.** Teachers who use visual information to promote learning for students with IDD could enrich students' lives more effectively than using auditory information along

(e.g., verbal directions). Visual supports give students with IDD clear expectations, a predictable schedule of events, promote independent transitions, and help them to cope with the changes that may occur throughout a day (Fittipaldi-Wert & Mowling, 2009).

**Embedding choices.** Ruef, Higgins, Glaeser, and Patnode recommend giving students with IDD and challenging behavior opportunities to make choices. This can be an effective strategy to teach them that will allow them to have more control without having to resort to challenging behavior. Also, whenever possible allowing to students make choices improves their productivity and independence (Ruef et al., 1998).

**Video Self-modeling.** Video self-modeling (VSM) is a useful strategy with a particularly strong research base when applied with students with autism spectrum disorder (ASD).

According to Schaefer, Hamilton and Johnson (2016) "VSM is a strengths-based intervention technique utilized to modify the frequency, quality, and duration of a desired behavior" (p.18).

The studies have divulged the effectiveness of VSM across many skills such as, academic skills, *task engagement, language production, and vocational skills.*

**Social Stories.** Caring, guiding and teaching children with IDD especially when discouraging challenging behaviors is not an easy task. In most cases, educators and guardians are advised to consider the use of evidence based practices such as assistive technology and social stories or both. Carol Gray introduced social stories in 1991 as a strategy to encourage positive behavior in children with IDD Gray, 2010). Social stories are defined as short stories in the form of images and text or both, depicting a social situation that children with severe disabilities might encounter (Vanderborgh et al., 2012). Given that students with IDD may engage in the inappropriate behavior when they encounter a new or situation or routine, the social story acts as a guide to overcoming the challenging behavior. In most cases, educators use

individualized short stories that are precise and provide sequential information. The sequential information indicates the possible confusing and difficult events that the student may encounter and provides a scenario regarding the manner in which the child is expected to behave. Gebbie et al. (2012) highlight many areas can be expressed through social stories, such as self-care, for children with inappropriate behaviors. For instance, if children with IDD fail to brush their teeth and ask for help when in need, it is advisable for parents to access an appropriate social story that provides the targeted procedures and reminders for the processes and people to seek help from in order to prevent future concerns and breakdowns in the teeth brushing process.

The effectiveness of social stories as a tool for managing inappropriate behaviors, in children with IDD, manifests in independent choice-making as well as appropriate behaviors related to play. Additionally, social stories are written in the first person or the point of view of the child (Aron & Loprest, 2012). Gray insists that the present tense is the most suitable tense to use. If reading is a problem for the child, it is advisable to use pictures in a sequence in telling the story. A routine observation of the pictures and reading of the story helps the child to behave appropriately and encourages them to seek for help whenever necessary. Therefore, they learn to share, ask, play and avoid acting aggressively towards others and objects.

**Assistive Technology.** Assistive Technology (AT) In conjunction with the social stories, AT is another way of managing challenging behavior in children with IDD. AT entails any piece of equipment, device, or material whose purpose is to increase, improve as well as maintain the functional abilities of children that have disabilities (Ploog et al., 2013). The advantage with the use of AT to encourage positive behavior in children is that the technology ranges from low tech to high tech devices. Educators use behavior charts, vision boards and incentive sheets as the low-tech supports that require minimal skills to use and are cheap.

In the case of behavior charts, students can track their behavior changes using a visual format. This format allows them to see successes which helps motivate future appropriate behavior. On vision boards that are available at strategic points within the school and classrooms, they serve as visual reminders to students about their goals and the essence for positive behavior (Ploog et al., 2013). On the other hand, incentive sheets allow students to keep track of the evident positive reinforcements. Social stories can be mounted on the vision boards so that children with disabilities can have time allocated for reading and viewing them. In this way, it is possible and advisable to use both techniques in managing the inappropriate behavior portrayed by children with disabilities.

Mobile technology, such as iPads, have recently provided a format for several instructional strategies designed to reduce problem behaviors. There is currently a plethora of apps that focus on strategies such as behavior tracking, behavior charts, social stories, and visual schedules. One such app is *Goworksheet*. The *Goworksheet* allows the teacher to upload a document or take a picture of a document. The researcher can add text to speech, images, and answer choices. Moreover, the student can answer questions by several ways such as dragging answer choices, typing on a keyboard, circling, or drawing connecting lines. Essentially, the document becomes interactive and more accessible to students who would otherwise have limited access to typical documents. In conclusion, for effective learning processes for children with IDD, the experts determine various efficient strategies to manage challenging behaviors. Educators should adopt strategies such as, self-modeling, visual supports, embedding choices, assistive technology, and social stories. Thus, the experts recognize the iPad was associated with less challenging behavior and more academic engagement than traditional materials (Lee et al., 2013). There are few studies conducted on apps used to decrease behavior, but they have shown

effectiveness in reducing problem behaviors. As indicated above, apps such as 1 on 1: Communicate Easy, AAC Autism Talk Now and ABA Timer have been shown to be effective in reducing problem behavior (Autism-apps ,2012). But few studies have investigated the effects of an app based social story intervention used to reduce targeted problem behaviors for students with IDD as well as to investigate the comprehension of the targeted social story lines. Therefore, the focus of this study was to examine the effectiveness of an intervention package featuring social stories delivered via an iPad and simultaneous prompting on the student's challenging behavior and comprehension. A single-subject multiple baseline across behaviors design was used to extend the research on the impact of an *app based intervention* for a student with IDD.

### **Research Questions**

The following research questions guided this investigation:

1. Will the intervention package including an iPad based social story and simultaneous prompting decrease the student's challenging behavior?
2. Does the intervention package improve student's comprehension the social stories?

## CHAPTER 2

### LITERATURE REVIEW

This section covers the review of related writing and studies that the researcher has used shed light into the point under study. It gives an overview of the research topics, summarizing every detail in each section of the research study: Assistive Technology, Social Stories, Simultaneous Prompting and Comprehension

#### **Assistive Technology**

According to Westling and Fox (2000) IDEA 2004 defines assistive technology (AT) services as "any service that directly assists a child with a disability in the selection, acquisition, or use of an assistive technology device" (p, 481). The range of AT devices is considerable and includes such things as audio books and publications, calculators, instructional software, and computer applications.

The application of AT may bolster learning, allowing students with disabilities to gain academic skills and life skills (Etscheidt, 2016). In particular, studies that have evaluated the implementation of AT interventions have shown that students with Autism Spectrum Disorder (ASD) show improvements in several areas, such as social behaviors, communication skills, facial recognition, functional skills, and safety skills (Yakubova & Zeleke, 2016) using various specific technologies.

**Video-Self Modeling.** One particular instance of AT is that involving video-self modeling or VSM (Buggey, 1995). Whereas modeling typically involves the student's observation of another person such as a peer engaging in a desired target behavior, VSM consists of the student observing a video or other depiction of him/herself engaging in the targeted behavior. Schatz, Peterson, and Bellini (2016) used a multiple baseline across participants design to test the effects



of using Video Self-Modeling strategy with three white elementary school male students with ASD exhibited off-task behaviors and disengagement from independent work activities. Teachers presented each participant a video in which each student was successfully engaged in on-task classroom behavior. All 3 students exhibited increases in their task engagement once VSM was applied to them. Also, their teachers reported that the students' grades in math increased during VSM (Bellini & McConnell, 2010).

Portable technology, another aspect of technology is its portability. With the advent of tablet computers and smartphones, the delivery of interventions such as VSM has been enhanced. Rather than having to observe videos of appropriate behavior in one place with stationary video equipment, students observe VSM examples directly in those settings which the target behavior is relevant. For example, a study by Spooner, Kemp-Inman, Ahlgrim-Delzell, Wood and Davis (2015) examined using portable technology to encourage the acquisition of literacy skills for students with severe disabilities. The study used a multiple baseline design across participants with probe measurement. The intervention involved the use of adapted shared stories formatted on an iPad2®. The results indicated that once the AT intervention was applied literacy skills and their responses were improved.

Flower (2014) studied the impact of using an iPad on time on-task during independent practice for three students with Emotional/Behavioral Disorders (EBD). An alternating treatments design was used to evaluate the effects of typical classroom practices versus the iPad during an independent work math and reading activities. In typical practices, the teacher requested participants to finish worksheets at their tables independently. In the iPad condition, the participants worked with at least one reading application and one math application. Results showed that the iPad was accompanied by increased time-on-task for all the students. Also,

Flower (2014) reported that the teachers and students perceived the iPad as acceptable and useful.

Hill and Flores (2014) studied three preschool and two elementary students, with autism comparing their use of an iPad-based Picture Exchange Communication or PECS (Bondy & Frost, 1994) with traditional PECS picture cards to make independent requests (e.g. requests for food). Three out of the five participants engaged in more independent communication when utilizing the iPad-based PECS versus the traditional picture cards (Hill & Flores, 2014).

Lee et al. (2013) found that iPad use was associated with less challenging behavior and more academic engagement than various picture cards. The study used an ABAB design to measure the influence of permitting the participant to pick between photo cards and an iPad. All students picked the iPad when given a choice and more time-on-task and less inappropriate behavior.

### **Social Stories**

Gray (2010), who developed and has written about social stories, defined social stories as briefly written narratives that, through the action of the principal character, describe and explain the stimuli or cues for particular behaviors in particular situations. Teachers may use social stories to decrease inappropriate behaviors or to train a new social behavior or new academic skills (Flores et al., 2014). According to Sansosti and Powell-Smith (2006) social stories are especially beneficial for students with autism "because they are visual; permanent; written in simple, positive language; individualized, and focus on a core area of need." Research by Spencer, Simpson, and Lynch, (2008) encourages teachers' use of social stories to teach children with Autism Spectrum Disorders positive social behaviors such as, decreasing tantrum behaviors

and disruptive classroom behaviors, enhancing positive social interactions, increasing social communication behaviors, appropriate play, sharing toys.

A variety of different behaviors have been addressed using social stories. Gray identified four types of sentences that are essential so that educators use social stories effectively in curbing inappropriate behavior in children (Aron & Loprest, 2012). In order to communicate information, Gray advised the use of *descriptive sentences*. The second category was the perspective sentences, which communicate the thoughts as well as feelings of others regarding the activity and behavior of the child. In order to behave appropriately, precise directive sentences will be listed in the social story to outline the right thing to do in such kind of situations. Further, the use of affirmative sentences reassures the child that the positive behavior outlined will be welcomed by others. Gray further lists cooperative sentences like those that would direct the child to the right individuals that would offer help in the specified situation. For example, Sansosti and Powell-Smith, (2006) tested the outcomes of individualized social story interventions on the social behaviors of three children with Asperger Syndrome. These students had an average age of 10 years and five months. Increased social engagement for two of the three children was observed following the initiation of the social story intervention.

Schneider and Goldstein (2009) examined the relationship between a Social Story intervention and on-task behavior. Visual social stories were used with three students with autism in grades kindergarten to fifth who demonstrated off-task problem behaviors and few communication skills. Social Stories described and explained the replacement behaviors (e.g., listening to the classroom teacher, sitting in circle). Once the social story intervention was implemented, increased on-task behaviors were noted for the three target children with autism. (Schneider & Goldstein, 2009).

Social Stories may be illustrated and communicated in various ways. For example, Graetz, Mastropieri, and Scruggs (2009) used color images in their stories and found they were useful and had immediate effects. Social Stories can be delivered through various means including traditional printed stories and on computers. Mancil, Haydon, and Whitby (2009) used pictures and text in a PowerPoint format as well as in a more traditional paper format for three elementary students with autism. They targeted pushing, grabbing, touching, and shoving other students. The computer-assisted delivery of social stories was reported to be more effective in decreasing the targeted inappropriate social behaviors than paper-format social stories.

Kim, Blair, and Lim (2014) used a combination of methods to deliver social stories to three children with severe intellectual disabilities who exhibited disruptive behavior. The target behavior defined as out seat classroom without permission, turning head away from the teacher. PREZI (2009) was used to create social stories and the children accessed the PREZI –based stories via Quick Response (QR) codes using a Galaxy Tap smart tablet. The results showed all three children decreased targeted behavior and increased academic engagement.

A recent study by Halle, Ninness, Ninness and Lawson (2016) examined teaching peer-interactive greeting behaviors to four middle school students with autism by using Social Stories videos. The study was conducted within the general education setting. Halle et al (2016) found that once the video-based social stories were implemented, the target students’ greetings to peers increased.

In summary, the social story is visual, written in simple, individualized and make to a particular need. A social story is efficient when using to challenging behavior in children with autism. Social Stories can be presented through multiple means including traditional printed stories and or by using technology. To date, the number of teachers applying the iPad as an

instructional tool increased to teach several skills to students with disabilities (Zhen Chai, 2017). Overall findings emphasize the effectiveness of using social stories and assistive technology on inappropriate behavior for children with severe disabilities. Even though the number of technology programs available is limited, they have been effective in reducing challenging behaviors. Given the effectiveness of video-self modeling, social stories, and the use of portable technologies such as tablet computers and smart phones in affecting both social and academically related behaviors, it seems appropriate to wed these approaches in so far as intervening with students' disabilities. In particular, it will be the purpose of this study to investigate the use stories delivered via iPads on the inappropriate classroom behaviors (e.g., off task and disruptive behaviors) of students with moderate to severe intellectual disabilities.

### **Simultaneous Prompting**

Head, Collins, Schuster, and Ault (2011) clarified simultaneous prompting as the effective strategy is given great outcome and request lower power and time than other strategies. Also, using simultaneous prompting that helps students to generalize knowledge across setting and materials (Rao & Kane, 2009). The researchers had demonstrated that diverse prompting procedures are the best strategies to teach and train academic skills to students with mild, moderate, and severe disabilities (Head et al., 2011)

Simultaneous prompting (SP) is the effective response prompting method for educating students with intellectual/ cognitive impairment disabilities (Rao & Kane, 2009) and with age groups ranging from pre-school to adults in one-to-one and small-group settings (Hudson, Hinkson-Lee, & Collins, 2013). SP includes two characters of sessions: (a) instructional session and (b) probe session (Swain, Lane, & Gast, 2015). On SP instructional session, the teacher displays a target stimulus and followed immediately by a controlling prompt (i.e., 0-s delay).

However, on probe session teacher presents a target stimulus and provides the student an opportunity for a correct response (e.g., 4-s delay), but does not give the controlling prompt (Swain et al., 2015).

SP has been used to teach students a variety of academic task (Akmanoglu & Batu, 2004) including Math skills and literacy skills (Waugh, Alberto, & Fredrick, 2011) such as sight words (Swain et al., 2015), Moreover, daily writing assignments in the classroom of students with emotional or behavioral disorders who learned writing a paragraph by using the simultaneous prompting procedure are development in both proficiency and fluency (Hudson et al., 2013). Other studies emphasized to employ SP to teach communication skills, (Coleman et al., 2015): (Waugh et al., 2011), daily living, leisure, and vocational skills (Coleman, Cherry, Moore, Park, & Cihak, 2015).

### **Comprehension**

"Literacy is one of the most important educational goals for all students because of the opportunities it provides to gain strategies for further learning and access to information about the world" (Mims, Browder, Baker, Lee, & Spooner, 2009, p.409)

As known, the aim of reading is comprehension. The reading requires more than educated words successfully. It is necessary to understand meanings of words (Liebfreund & Conradi, 2016).

Liebfreund and Conradi (2016) mentioned multiple elements affect reading comprehension. Furthermore, they are different vary by text type. Absolutely, previous knowledge influences on reading comprehension so, a reader with great levels of prior knowledge understands texts better than the reader with little prior knowledge.

In 1999, specialists are recommending four reading comprehension strategies: "previewing and predicting (Preview), monitoring for understanding and vocabulary knowledge (Click and Clunk), main idea (Get the Gist), and self-questioning and passage understanding (Wrap-Up)" (Vaughn & Klingner, 1999, p.284).

Shared stories also known as read aloud are used to promote early literacy in young children (Coyne, Simmons, Kame'enui, & Stoolmiller, 2004; van Kleeck, 2006). According to Justice & Kaderavek (2002), shared stories could be used to improve literacy concepts including the following; phonological awareness as well as print awareness. For students with severe disabilities, shared stories have been proved to effectively increase their communication and literacies

One of the common reading issues is that students with severe disabilities often have difficulty with phonemic awareness and phonics (Browder, Lee, & Mims, 2011). Chai, Ayres, and Vail (2016) and Jozwik and Douglas (2017) indicated that using the iPad for young children with disabilities enhancing early literacy skills.

In overall, using iPads in classrooms have several benefits to both the teachers and the students to teach several skills with a different level of students.

## CHAPTER 3

### METHOD

The objective of the study was examining the effectiveness of an intervention package featuring social stories delivered via an iPad and simultaneous prompting on frequency of targeted challenging behavior and comprehension of the social story of a student with IDD.

#### **Participant**

The student inclusion criteria included the following: (a) an IQ in the range of a moderate to severe intellectual disability; (b) exhibited several problem behaviors; (c) had few reading skills; (d) available for the study up to three times a week; (e) in grade 1-6; (f) with signed informed parental consent; and (g) physically capable of using the iPad device.

The participant in this study was a Caucasian, female student. She was in a 1st grade special education, self-contained classroom. She was six years and nine months at the time of the study. She was diagnosed with developmental delay. A Developmental Profile (DP) was used to test her (Alpern, 2007) in five areas development child: physical, adaptive behavior, social-emotional, cognitive and communication by using an interview parents or caregivers or using a checklist. All her scores on five key areas of DP were below 50. Sara exhibited three problem behaviors; the first behavior was off task behaviors, including talking to other students, to avoid completing work. She also talked about off topic subjects to avoid doing work. The second behavior was refusal of directions when asked Sara to complete an activity or follow a verbal direction. She often hit, kicked, or screamed when asked to follow verbal directions or complete an activity. This target behavior often would be directed at an adult or an object such as a table or chair. It was observed and recorded, as well as anecdotally reported by the teacher to occur more in the morning than afternoon. The last behavior was yelling out during group instruction. Sarah yelled out during whole group instruction, specifically when the teacher was presenting



information. At the time of the study, Sara could name a few letters, and was completely familiar with using iPad device, and had regular attendance at school.

### **Setting**

The study took place in an elementary school in the student's assigned classroom and school environments in which the targeted behaviors typically occur. The school was located in a rural location in the United States with around 200 students. The ethnicity breakdown of the students in the school was around 88% White, 11% Hispanic, and .5% were other. The percent of students with a disability was 25% and 61.7% of the students were eligible for free and reduced lunch. The classroom served 11 kids with severe disabilities in grades K-5 (age range 5-11 years old). The teacher held a Masters degree in special education. Two assistants also were assigned to the classroom. Daily activities took at least 30 minutes and included welcoming, breakfast time, Math class, Free Time, ELA class, gym time, Lunch, Outside, Circle Time, Language Activity, Free Time, and Dismissal. The researcher implemented the intervention sessions in an open area in the school, where students eat lunch.

### **Experimenter**

The researcher for the study was seeking a master's degree in special education program at the local University. The researcher collected all data across each phase of the study. A graduate student in the masters' program in special education collected interobserver agreement (IOA) and procedural fidelity for the majority of sessions. She was trained in IOA and PF before attending the school to collect data for the study.

## **Materials**

Three social stories were designed to address the above identified target behaviors for the participant (see Appendix 1,2,3). These social stories followed the guidelines suggested by Gray (2010) and the pictures of three social stories were used from Mayer-Johnson.com. In addition, they were validated by the teacher and several members of the University faculty of special education. Also, the study used the iPad device and downloaded, *Goworksheet* app designed by Attainment Company, it enables to take a photo of the printed worksheet or open an image or PDF file in the app. Then customize the digital worksheet to student's needs. Create text fields, word banks, and drag-and-drop text or image answers. Also, there are options supportive auditor can add text or image answer choices.

## **Research Design**

The researcher used a single-subject multiple probe across behaviors (Kennedy, 2005) to compare participants' scores in the performance of the social stories by matching pictures to steps in social stories as well as the targeted challenging behaviors. The study included two phases: baseline and intervention. During each phase a measure of frequency of target behaviors were collected. Once at least five baseline data sessions were conducted on each targeted behavior, the behavior with the highest level of frequency was brought into intervention first. The other two targeted behaviors remained in baseline with a probe that occurred once the first targeted behavior showed a change in trend and/or level. At this time, the other two behaviors were probed to ensure they were still at a similar baseline level. Then the next targeted behavior was identified to start intervention. This continued until all three targeted behaviors were in the intervention phase.

## Measures

**Dependent variables.** The dependent variables were the daily frequency of the target behaviors, the target problem behaviors included: 1) off task behavior; 2) refusal the direction; and 3) yelling out. The baseline and intervention phases used interval recording to assess the occurrence of these behaviors during typical classroom activities as described in the “Setting” section. Direct observation of the target behaviors used between 10 and 20 minutes each session depending on the typical length of the particular activity. The observations summarized to determine the percent of total intervals during which the target behavior occurred.

**Off Task behavior.** To measure Off Task behavior, the researcher used interval recording. It was observed activities for 20 minutes. Divide that 20 minutes into 2 minutes' intervals. During the first 60 seconds, observed whether or not the Sarah engaged in Off Task during that interval. Also, during the last 60 seconds record whether or not she engaged in Off Task during the preceding 60 seconds. Continued that until the end of the 20 minutes' observation.

**Refusal the direction behavior.** Each trial of instruction was collected when Sarah refused or complied within 3 seconds of instruction. Next, the number of refusal instruction divided by the total of instruction to measure the percentage of daily frequency of refusal the direction behavior.

**Yelling out behavior.** For the last behavior the researcher collected the counts frequency of Yelling out behavior during various activities, such as Math class, reading class, etc. and the length observation was 20 minutes.

In addition, during the intervention, each step in a social story correctly performed by Sarah was recorded for a total number of correct steps.

**Comprehension.** By using an iPad program, the researcher collected data on the number of correct matches the student exhibited. Also, the researcher did not provide any reinforcement for correct responses or error correction for incorrect responses during the probe sessions.

**Interobserver agreement.** A graduate assistant collected checks for agreement. Interobserver agreement data were collected for 25% of baseline and 29% of intervention of On Task Behavior. IOA data were collected 20% of baseline and 50% of intervention for Refusal Behavior. Finally, IOA data were collected for 14% baseline sessions and 25% intervention sessions for Yelling Out Behavior. IOA was calculated by taking the agreements and dividing it by agreements + disagreements and multiplying by 100 for a percentage. IOA for On Task Behavior in baseline was 88% and for intervention was 85%. IOA for Refusal Behavior in baseline was 100% and for intervention was 100%. IOA for Yelling Out Behavior in baseline was 100% and for intervention was 100%. Across all targeted behaviors, IOA was collected across 75% of all baseline and intervention and was met with 94% (Range = 88% – 100%) agreement.

**Social validity.** The researcher checked SV of the end of the study. For the teacher classroom the researcher did the social validity questionnaire that was created by the researcher. It contained three parts, 12 questions with five responses for each question, including strongly agree 5, agree 4, neutral 3... etc. The study also, measured the social validity for the student, the study utilized two pictures "thumb up and thumb down" to give the student an opportunity to value each social story.

## **Independent variable**

The independent variable in this study was an instructional package including an iPad based social story and simultaneous prompting, which was used to teach Sara to implement the social story program.

Simultaneous prompting was the response prompting teaching strategy used to promote the transfer of stimulus control from the investigator showing and directing the student's use of the social story application to the student's independent use of the social story. When implementing SP, an attention getter was provided to gain Sarah's attention and the probe session was started. During the probe session, the investigator read the first sentence and asked Sarah to match picture to the first sentence in story and waited 5 seconds for her to make a selection. The investigator did not provide any reinforcement for correct responses or error correction for incorrect responses during the probe sessions, recorded the data, and moved on to the next sentence in story. In the instructional sessions, the interventionist provided an immediate controlling prompt to indicate the matching step in a social story and Sarah was to repeat the match.

**Procedural fidelity.** The procedural fidelity (PF) data were collected 40% of baseline and intervention sessions. A graduate assistant was trained in the intervention and collected checks for fidelity. PF was found to be at 100%.

## **Procedures**

**Baseline** During baseline, observations of the student's targeted challenging behaviors, off task behavior, refusal the direction and yelling out, were conducted during typical classroom activities in which the teacher had reported their occurrence. During baseline, only observation procedures were conducted.

**Intervention** Once baseline data was collected on all targeted behaviors, the researcher identified the first behavior to begin intervention on the use of the relevant social story on the iPad device. The researcher applied the simultaneous prompting procedure. The researcher worked with the student at a specific time of the day 5 or 10 minutes before the targeted instructional activity to conduct a probe session (the first step of SP). During the probe session, the researcher asked student match pictures to the steps in social stories by using an iPad program and collected data on the number of correct matches the student demonstrated. No reinforcement for correct responses or error correction for incorrect responses were provided during the probe sessions. The student only received reinforcement for appropriate attending behaviors during the probe session (e.g., Sarah, I like how you are looking at me when I am asking you questions.). Once the probe session was finished, the interventionist started the instructional sessions where Sarah was shown each step in a social story and asked to repeat at a zero delay. Following each training session, direct observations of the student's challenging behaviors were conducted as described during baseline above. Once there was a change in trend and/or level, the interventionist would identify a second behavior to start in the intervention. The intervention was applied in the same manner for each target behavior when the (see Design). This continued until all targeted behaviors were receiving the intervention.

## CHAPTER 4

### RESULTS

The study utilized visual analysis of the graphed observation data as the primary means of evaluating change in from baseline to intervention for each behavior. Also, the following descriptive statistics were calculated for the participant: 1) the average level of target behaviors for baseline and the social stories (SS) intervention; 2) the change in level of the target behaviors from the last day of baseline to the first day of SS; 3) the percentage of non-overlapping data points (PNDs) for target behaviors during SS and baseline; and, 4) any change in trend in target behaviors during SS as compared to baseline trend. In addition, the number of correct answers when using the social story-iPad device was analyzed.

#### **Off Task Behavior**

Figure 1 shows the daily percentages of Off Task behaviors during baseline and intervention, once social stories were implemented. During the four baseline observations, Off Task was variable and ranged from 30 – 67% with a mean level of 45%, with an overall increasing trend. Once SS were implemented there was an immediate decrease in Off Task from the last day of baseline (42%) to the first day of SS (30%). Over the total SS phase, Off Task behavior exhibited a consistent decreasing trend. The overall mean level of Off Task behavior decreased to 21%, and the range or variability decreased (10 – 30%). In terms of percent of non-overlapping data (PNDs), the student displayed 66% PNDs. Moreover, when comparing the number of correcting matching of the pictures with sentences of the social story, the first day of intervention, Sarah correctly matched 2 out of 5 pictures to sentences and 5 of 5 at the last two days of intervention.

## **Refusal of Directions Behavior**

During the concurrent baseline, Refusal of Directions Behavior was quite variable (ranging from 25 to 71%) with a mean level of 43%. Across the baseline Refusal of Directions showed a decreasing trend. Once SS stories were introduced, there was an immediate decrease in Refusal from the last day of baseline (25%) to the first day of intervention (10%), a decrease of 15%. During SS the mean level of Refusal decreased to 5%. The researcher determined there were several factor that may have had an impact to the Refusal of Directions Behavior. For more details, see CH5. Figure 1 displayed during bassline that the behavior was unstable in the first three data points because the setting which collected data were varied in each session. In the last three data points, the behavior was more stable when the researcher controlled the setting events in which the targeted behavior typically occurred. Sara displayed 100% PNDs. Finally, she correctly matched 4 out of 4 pictures to sentences in all days of interventions.

## **Yelling Out Behavior**

Finally, figure 1 also shows the daily frequency of the third target behavior, Yelling Out. During baseline, yelling out was variable, ranging from 1 to 6 occurrences with an average level of 3.42 occurrences. Overall, there was a decreasing trend in Yelling Out during baseline. Once the SS intervention was implemented, there was a slight decrease in the mean level (2.25) in Yelling Out with a slight decrease in variability (0 to 5). It is important to note, in the yelling out behavior, for the sharp decreases shown on session 5 and 11, on these dates Sara was not feeling well and had previously been sick or soon after was sick. There was 18% PND in the SS Refusal occurrence with that of baseline. Further, Sarah perfectly matched 4 out of 4 pictures to sentences in all days of interventions.

Table 1 displayed the summary of the results of the Study.



Table 1.

*Summary of the Results of the Study*

	Mean level		Range		PNDs
	Baseline	SS	Baseline	SS	
On Task	45%	20%	30-67%	10-30%	66%
Refusal	43%	5%	25-71%	0-10%	100%
Yelling out	3.42	2.25	1 - 6'	0-5	18%

\*See results and discussion for further analysis

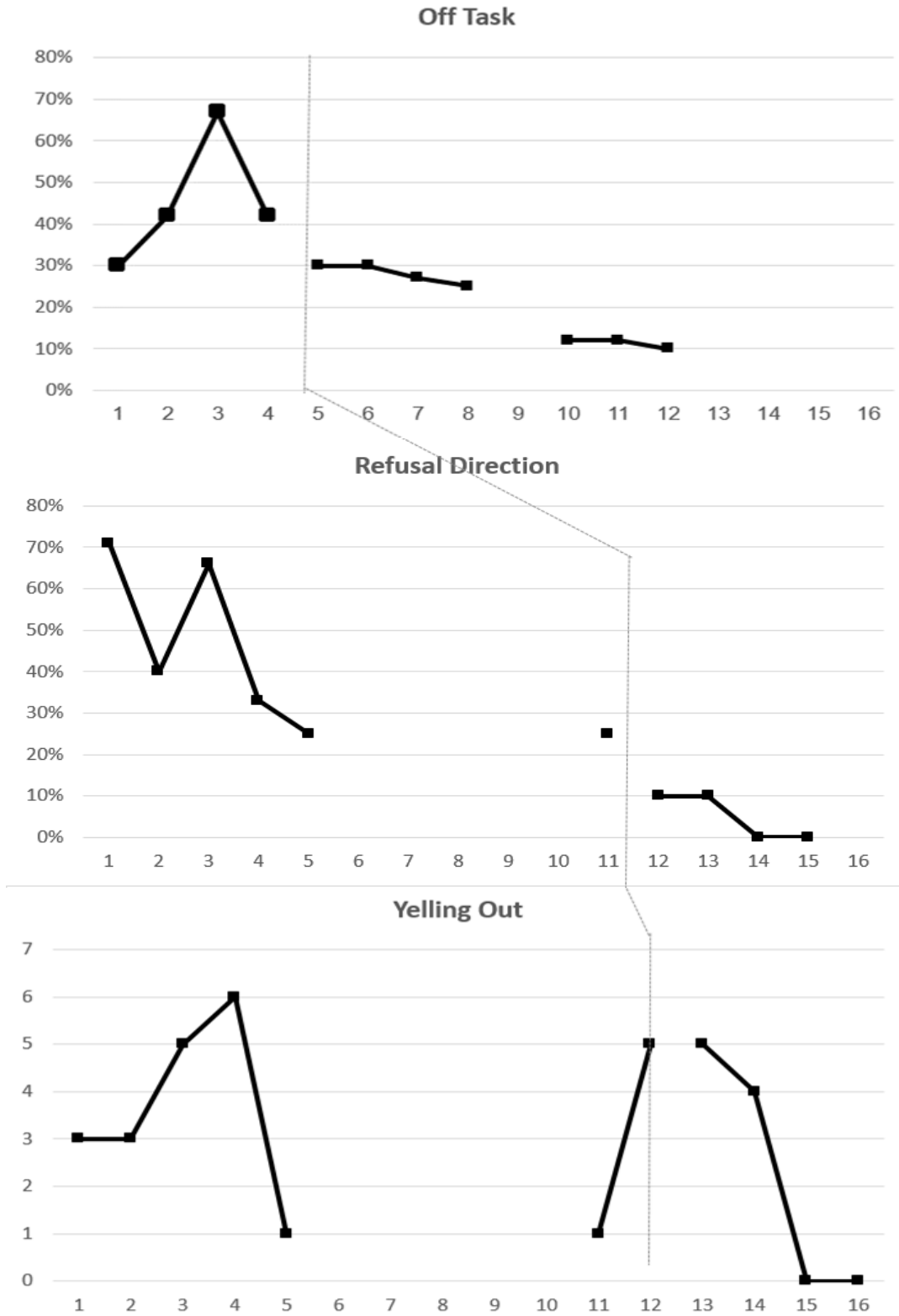


Figure 1. The daily frequency of the target behaviors

## The Social Validity

The study measured the social validity, Table 2 shows the result of the social validity questionnaire for the teacher classroom. In regard to the SV results for Sarah, she pointed to thumbs up picture for all stories presented.

Table 2.

*Result of the Social Validity Questionnaire*

	Total score	The average	The average of total score
Student effects	12/25	2.5	
Intervention procedure	19/25	3.8	
Future plan	7/10	3.5	

3

## CHAPTER 5

### DISCUSSION

This study used a single-subject multiple baseline across behaviors designed to evaluate the effects of social stories delivered via an iPad application on the correct performance of the steps in those social stories of a student with severe disabilities. Effects on the student's challenging behaviors during typical classroom instructional and social activities were also evaluated. The results indicated a functional relation between that an intervention package: social stories delivered via an iPad, Simultaneous Prompting procedure and the occurrence of targeted behaviors. In addition, the student was able to independently match more steps of the social story to corresponding pictures to demonstrate understanding. These results emphasize the effectiveness of social stories delivered via an iPad to decrease challenging behaviors.

Prior research has shown that implementing social stories to teach children with ASD can increase targeted positive social behaviors (e.g., Smith, 2006; Spencer et al., 2008) as well as on-task behaviors (Schneider & Goldstein, 2009). In the present study, we found that the benefits of using social stories could also extend to a student with developmental delay so as to decrease challenging behaviors such as off task behavior, yelling out and refusal to follow directions during instruction.

Rao and Kane (2009) found simultaneous prompting is the effective response prompting method for educating students with intellectual/ cognitive disabilities, such as literacy skills (Waugh et al., 2011). In the current study, simultaneous prompting was a critical part of an intervention package that was used to teach social stories to a young student with developmental delay. While SP was one feature of the package, it was the direct method used for teaching the matching of targeted social story lines with corresponding pictures. Overall this strategy was found to be effective in teaching the target student to match the

pictures with sentences of each social story as a measure of comprehension of the social stories delivered via an iPad. Each story used in the study included 4 to 5 steps. The participant's response to matching the pictures with sentences of each social story was improving when comparing between the first day and the last day of the intervention sessions and resulted in 100% percent correct matches across stories.

Worth mentioning, this study was successful in the short period to reduce inappropriate behavior, more time-on-task with considerable participant's engagement. Also, combining the studies that emphasize to use an iPad as a tool instruction and other confirms the benefits of the social story.

### **Limitations and Future Research**

There were several limitations to the present study. The first is that the study was conducted with one participant. The multiple baseline across behaviors design is one that has high internal validity in so far as showing the intervention produced behavior changes for this subject. However, it is unclear to what extent these results might be reproduced with other similar participants and their challenging and on-task behaviors. Thus, there is a need for systematic replication of the current intervention with additional students with developmental delay or intellectual disabilities to evaluate the generalizability of the intervention and its effects.

A second limitation was that the time of conducting the study. The study was applied in winter and spring seasons during the school year. Weather conditions and student illnesses lead to more missed days in school and extend the length of study. And the consistency with which the intervention could be implemented, this could have impacted the data. The third behavior in the multiple baseline, Yelling Out, was quite variable in intervention on this behavior occurred late in the school semester. This may have affected the variability of the behavior and it would have been advisable to have had more data points with which to

evaluate the variability in that behavior and better evaluate the possible intervention effects. However, given the approach of the end of the school year, it was decided to implement the intervention for that behavior and thereby reduce its frequency and its variability.

Unfortunately, the effects of the intervention package on this behavior were less clear than on the first two behaviors.

The third, related limitation was the location of the intervention. Given the requirements of the student's class schedule, the intervention sessions were conducted in an open area in the school, where students ate lunch and during which there was a lot of noise. Many times the researcher had to cut intervention off until the noise was reduced. These setting conditions may have contributed the variability exhibited in all of the targeted behaviors that in turn made it difficult to have clear effects on the target behaviors, particularly Yelling Out. On the other hand, it was also a strength of the study that the intervention package could have effects on Off Task and Refusal to Follow Instructions despite these conditions. Although, the results did not seem to be adversely affected, future replications should identify a more appropriate instructional setting in which to conduct and analyze the intervention package.

It is important to consider the factors that may have influenced the outcomes. For example, during the baseline session the daily percentages of Off Task behavior went from 30 to 67%. This variation may have been due to the kind of task the participant worked on. For example, the highest rate was in math class, and the lower portions were recorded in art class and a gym. In addition, it was noted during the refusal behavior, factors such as the sort of instructions, instructional presentation and instructor changes may have impacted the occurrence of refusals. Further, if the instruction had more than one step or if the participant was not familiar with something, it impacted her behavior. The inconsistencies across setting events and stimuli and antecedents may have also impacted the student's outcomes. Future

research should seek to control the setting events and stimuli presented in order to truly investigate the effects of the SS and iPad with SP on student behavior.

**Future research.** Future studies should seek to replicate the effects of this intervention package across additional subject students with similar and then different disabilities or levels of disability. Future research might also compare this iPad delivered social story intervention with more traditional paper social stories to determine which medium might have better effects on academic/skill learning and/or behavior challenges. In addition, Social validity is one of the components of quality indicators of research (Kennedy, 2005). An investigation of the social validity of the intervention in terms of teachers' and/or parents perceptions of the degree of behavior change, the acceptability and/or feasibility of using this specific intervention package in classrooms or homes should be examined. Also, future research should examine the impact of using *Goworksheet*, to teach academic functional skills. Given its effectiveness in the current study, this app warrants further investigation for other targeted areas.

A final area of future research would involve using and evaluating supplemental features such as the picture of students and their voices when creating the social stories. In the current study, pictures were added as a means to promote comprehension as the targeted student had limited comprehension skills. For students with limited reading and comprehension ability, future research on the use of pictures to promote comprehension would be warranted.

## Summary

In conclusion, the current study extends the research on the impact of an *app based intervention* to decrease challenging behaviors and improve communication skills of students with intellectual and/or developmental disability. Although more research is warranted, practitioners should consider technology when planning interventions to address challenging behavior for students with IDD. These options provide an avenue for increasing overall quality of life for this population.



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APPENDICES  
Appendix A: Social Story 1

**Staying on Task**

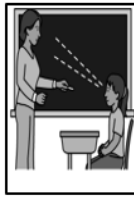
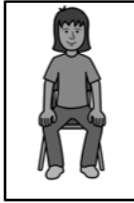
**I sit quietly**

**and I quiet my hands**

**my eyes on teacher**

**Now, I am ready to listen**

**Then, I complete my assignment.**



*Note* Created by Amani Alshehri Picture Communication Symbols in GoWorksheet using Mayer-Johnson picture symbols.



## Appendix B: Social Story 2

### Following the Directions

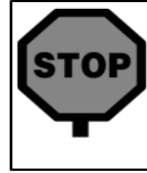
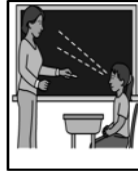
**When my teacher gives me directions**

**I will stop what I am doing**

**look at my teacher**

**and listen to what the teacher is saying**

**Then, I will follow the directions**



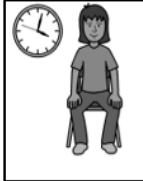
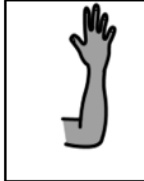


*Note* Created by Amani Alshehri Picture Communication Symbols in GoWorksheet using Mayer-Johnson picture symbols.

## Appendix C: Social Story

**Wait to Talk**

**When I need to say something**                      **I raise my hand**

**Wait my turn**                                      **Then I share what I want to say**



*Note* Created by Amani Alshehri Picture Communication Symbols in GoWorksheet using Mayer-Johnson picture symbols.

## APPENDIX D: Social Validity Questionnaire (Teacher Form)

Student: \_\_\_\_\_ Teacher: \_\_\_\_\_ Date: \_\_\_\_\_

This questionnaire consists of 12 items. For each item, you need to indicate the extent to which you agree or disagree with each statement. Please indicate your response to each item by circling one of the five responses to the right.

Questions	Responses				
1. Social Story Application was successful in engaging the student during academic tasks.	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
2. The social stories used in this study were appropriate for the student.	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
3. The instruction used to teach social stories with the student was helpful.	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
4. Picture icons with stories were helpful in the student's comprehension.	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
5. Assessing the student's ability to comprehend reading material is a valuable practice.	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
6. The social stories selected for intervention for the student are important and adequate.	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
7. There was a change in the student's response after implementation of the Social Story Application.	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
8. I noticed meaningful decrease in the student's inappropriate behaviors after the implementation of the intervention.	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
9. I noticed meaningful increases in the student's task engagement after the implementation of the intervention.	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
10. The intervention program is important and appropriate for my student.	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
11. I will use Social Story Application to manage inappropriate behavior in the future.	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
12. I am interested in continuing with the use of the Goworksheet application for my students.	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

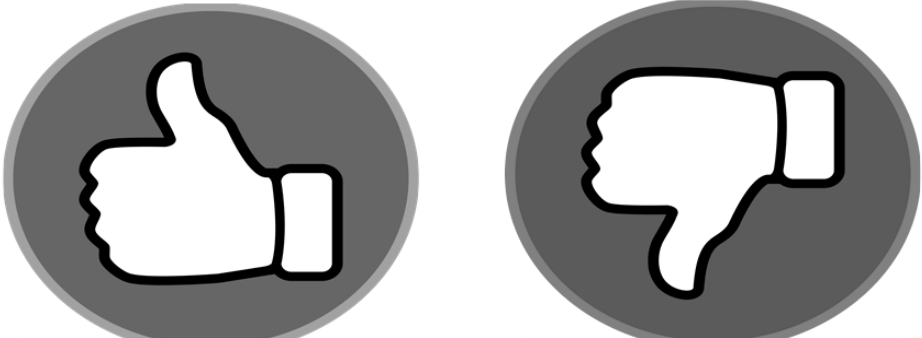
*Note Created by Amani Alshehri.*

## APPENDIX F: Social Validity Questionnaire (student Form)

Using Social Stories and Assistive Technology on Inappropriate Behavior Survey

*Social Validity Questionnaire (student Form)*

**I like the story.**

The image contains two circular icons side-by-side. The left icon is a thumbs-up gesture, and the right icon is a thumbs-down gesture. Both are white line-art symbols on a dark gray circular background.

*Note* Created by Amani Alshehri in GoWorksheet using Mayer-Johnson picture symbols.

## VITA

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