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Technology-Enriched Social Story Intervention: Engaging Children with Autism Spectrum Disorders in Social Communication

Abstract

The purpose of this study was to investigate the impact of a technology-enriched Social Story intervention on the social engagement of children with Autism Spectrum Disorders (ASD). A single-subject, multiple baseline design was used to investigate the effects of the intervention on the acquisition of gratitude skills by seven elementary students with ASD in a Kuwaiti self-contained Special Education school. Results demonstrated that participants accelerated their gratitude skills (expressing gratitude words use) after reading the Social Story delivered via iPads. Students increased the number of "thank you" words uttered by them in multiple contexts both in and out- school settings. Implications along with recommendations for future research and practice are provided.

Keywords: Social Story, technology, iPad, Autism Spectrum Disorders

Introduction

Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder characterized by deficits in reciprocally social communication, and/or interaction across multiple contexts (American Psychiatric Association [APA], 2013). Impairments in socialization and interaction, language, and stereotyped behaviors with early onset in the child's development are defining characteristics of individuals with ASD (Karal, & Wolfe, 2018). Ranging from mild to severe, children with ASD might manifest deficits in initiating and maintaining reciprocal social interaction, communication difficulties, and characteristically idiosyncratic language and repetitive motor mannerism (Min & Wah, 2011). Other characteristics demonstrated by children with ASD are basically related to their limited repertoires of social skills that generally affect their abilities to establish and maintain friendships (Locke, Ishijima, Kasari, & London, 2010). These deficits may impede a child's social and emotional development, increasing the risk of social withdrawal and isolation (Matson, Dempsey, & LoVullo, 2009). Social isolation might result in rejection from peers (Kagohara et al., 2012), lack of interest in learning with others would eventually and adversely impact the child's overall educational performance (Delano & Snell, 2006). It is therefore critical to provide structured support for children with ASD to help them develop their social skills and improve their overall social and academic outlook. International educational laws such as the Individuals with Disabilities Education Act [IDEA] emphasize the notion of social skills development in educational goals, especially for children with

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ASD (Karal & Wolfe, 2018). What Works Clearinghouse (WWC) (2013) identifies social skills training as an intervention that has positive effects on social-emotional development and behavior for children with disabilities in early education settings. Developing social skills and understanding the needs of children with ASD are huge challenges encountered by parents, adults and educators. As the number of children with ASD continues to rise, there is an increased need for Evidence-based strategies to help individuals with ASD and their parents cope with challenges in social skills.

Social Stories: Characteristics

According to Gray (1994), Social Stories offer the needed help and assistance in the development of social skills of children with ASD. In essence, Social Stories' content is designed to meet the individuals needs of a child with ASD. Social Stories are identified as an effective practice for children with ASD (Gray, 2010), and they can be used with individuals of a variety of ages. Gray (2020) defined Social Stories as:

> *Social learning tool that supports the safe and meaningful exchange of information between parents, professionals, and people with autism of all ages. The people who develop Social Stories are referred to as authors, and they work on behalf of a child, adolescent, or adult with autism, the audience. (p. 1).*

Smith (2001) also defined Social Stories as interventions that use a short story (20-150 words) to teach the child about a social situation and/or context. Social Story interventions present natural approaches as perceived by adults (parents, teachers). The advantage of the Social Story's naturalness is reassuring adults that when they have a relevant skill they want to teach a child; this intervention can enhance the child's social understanding and behavior on this skill.

As any evidence and research-based intervention, Social Stories involve prominent characteristics. Gray (2000), Gray and Garand (1993) stated that Social Stories have visual and auditory means for presenting environmental information in a certain format that could easily be understood and comprehended by individuals with ASD. Social Stories also focus on relevant, idiosyncratic and immediate social challenges encountered by individuals with ASD. Thus, they explain social concepts, situations, describe essential components, and suggest adequate, expected responses (Ivey, Heflin, & Alberto, 2004). A third characteristic is that Social Stories personalize and extend the instruction of social skills beyond meeting and greeting activities that can commonly be seen in social skill programs. Therefore, they concentrate on real-life social situations, highlighting the notion of how to help a child acquire the social skill from the Social Story, and apply/generalize it in different situations (Smith, 2001).

Writing Social Stories

Gray (2000, 2002) points out that Social Stories are individually written to address the needs of a particular student. According to Ivey et al. (2004), Social Stories are generally written in first person language with present or future tense verbs, so they do not cause any confusion or misconception for the reader with ASD. Including illustrations and pictures are recommended. Yet, teachers and/or adults should consider that drawings might be restrictive for a few children with ASD, and these pictures/drawings might limit the application of the social skill to only restricted situation(s) as depicted in that story. This could happen because children with ASD tend to be rigid to their expectations of events. Any Social Story should be generalizable to other similar situations for the targeted skills or behaviors (Ivey et al., 2004). Thus, adults/teachers should pay attention to the use of certain words. Using terms like "usually" will permit some sort of flexibility in the interpretation of the story. Other words, like "always" or "every" might be very rigid, causing unanticipated change in the use of the skill in certain situation(s). Gray (1994) added that the author of a Social Story should not make assumptions regarding the preferences or opinions of the child. Yet, the author can make statements regarding the reactions and feelings of other people involved in the story. The Social Story should be written at the child's comprehension level (Gray, 2002).

Preparation of Social Stories

In order to prepare Social Stories, authors should consider two aspects: story types and sentences types along with the target skill and/or behavior to be taught. There are several different types of social stories. Selecting the specific skill will help determine the type of Social Story along with the sentences and/or entire context to be used.

Social Stories types

Smith (2001) pointed out that there are multiple types of social stories including:

- Visual stories: presented in a written format, involving developmentally appropriate images, charts, drawings and/or diagrams.
- Stories: written in simple language, reflecting the child's language levels and current vocabulary (e.g., writing the story in colloquial instead of standard Arabic).
- Permanent stories: allow the individual to revisit the same story over and over again when needed.
- Stories that are based on child's assessment: this type is prepared and written depending on certain observations of the child's behaviors/skills, and discussions with the child.
- Stories that are focused on an area of core need (e.g., greeting, interaction).
- Factual stories: offer information about who, is doing what, and why.
- Unusual stories: focus on what people think and/or feel and how that (perspective) relates to their behavior (enhancing the Theory of Mind of the child).
- Situation specific stories: related to certain situations/contexts.
- Predictable stories: written in a predictable style.

Sentence types and ratios

Rowe (1999) identified various types of sentences that compose the development of an effective Social Story and suggests using a ratio of the number of time each type of sentence should be used in a story. Table 1 demonstrates types of sentences and ratios.

Social Stories and Children with Autism Spectrum Disorders

Multiple skills can be taught to increase the social interaction of students with ASD including: addressing or responding to others (these addresses/responses could be verbal, physical and/or gestural), retaining conversations, offering help, giving needed information, and engaging in games (Bellini, Peters, Benner, & Hopf, 2007). These skills would help students with ASD learn better from their peers and adults around them and promote positive interaction in social contexts. Several approaches are typically used in social skills training including: role-playing, and specific instruction. The use of Social Stories has also been associated with social training interventions. A meta-analysis examining Social Story interventions for individuals with ASD indicates mixed results as to effectiveness when used to increase social communication skills (Qi, Barton, Collier, Lin, & Montoya, 2015). According to Barnard-Brak, Ivey-Hatz, Ward & Wei (2014), adults (e.g., teachers, parents) and peers can effectively promote and increase the social engagement of children with ASD using evidence-based strategies. The National Autism Center [NAC] (2015) endorses a number of strategies that can be used to benefit individuals with ASD including behavioral interventions, modeling, peer training/tutoring, pivotal response treatment and scripting. One strategy often recommended in the literature and frequently used to improve and rectify social involvement of students with ASD is Social Story intervention (NAC, 2015).

Table 1.
Sentence Types of Social Stories

Types of Sentence	**Description of Sentence**	**Sentence Ratio: 10**
Descriptive	- describes what happens, where and why the situation occurred. - should be as accurate as possible. - should involve terms like "usually" or "sometimes" instead of "always" to avoid literal interpretations, helping them cope with any change.	2-5
Perspective	- describes reactions and responses other people in the target context, reasons for such responses, and feelings of the respondents.	2-5
Affirmative	- describes the relations of the target skill with a particular situation. (e.g., I wash my hand before eating).	2-5
Cooperative	- describes the roles of others within a situation (e.g., my mother helps me with my homework).	2-5
Directive	- describes desired responses to social situations, positively telling the child what he/she should do or say in the target context (e.g., I will try to..).	1
Control	- provides a strategy for calling and using information in the Social Story.	0-1

Hudock, Kashima-Ellingson, and Bellini (2011) defined Social Story intervention as a story that consists of "a set of sentences that describe a social situation in terms of relevant social cues and appropriate social responses" (p. 104). Karal and Wolfe (2018) added a Social Story intervention are designed to increase the quality and/or quantity of the social interaction manifested by individuals with ASD in social contexts with others by teaching specific concepts. A Social Story intervention is developed to provide individuals with ASD the needed description and explanation to navigate social situations and contexts in terms of appropriate cues and responses (Del Valle, McEachern, & Chamber, 2001; Karal & Wolfe, 2018; Kuoch & Mirenda, 2003; Sansosti, Powell-Smith & Kincaid, 2004). Gray (1998) indicated the main purpose of a Social Story is to share and deliver relevant information to the place and time of a given situation, the persons involved, what is occurring and why it is happening. The effectiveness of the Social Stories in absorbing appropriate social skills and behaviors is basically pertained to the notion of Theory of Mind (ToM) (Gray, 1995; Hobson, 1993; Trevarthen, Aitken, Papudi, & Roberts, 1996).

Weakness in Theory of Mind can impede the social success of individuals with ASD. Theory of Mind is the ability to understand others' perspectives, anticipate their reactions and assume their perspectives (Beaumont & Sofronoff, 2008). Ghanouni et al. (2019) stated that core impairments in socio-emotional reciprocity and interpersonal communication of individuals with ASD might be due to the lack of theory of mind, meaning perspective-taking, or one's ability to understand others' mental states including: emotions, beliefs, and intentions (Baron-Cohen, 2000). Limited ability of children with ASD to understand the relationship between people's cognitive states and their actions lead them to involve in few activities and have few social networks and communication with their peers (Kreider et al., 2016).

Southall and Campbell (2015) stated:

> *The term theory of mind (ToM) was introduced by Premack and Woodruff as the ability to infer mental states of others. Many researchers believe that social deficits seen in children with autism spectrum disorders (ASD) are directly linked to deficits in ToM or the inability to realize that others' perspectives are different from their own, decreasing social understanding. (p. 194)*

While typically developing children develop ToM by the late preschool stage, many children with ASD demonstrate delays in developing higher-order mental operations of understanding others' opinions (Baron-Cohen, Leslie & Firth, 1985). These delays may include negative effects on communicative and social outcomes of students with ASD (Hutchins & Prelock, 2008). Garfield, Peterson and Perry (2001) described ToM as a term used to denote the knowledge that guides prepositional attitude attribution, the explanation and prediction of behavior by means of inner states and processes. According to Karal

and Wolfe (2018), individuals with ASD might encounter difficulties and problems in interpreting social information because of their deficits in recognizing other people's thoughts.

Another cognitive challenge impacting social communication of students with ASD is in the area of central coherence. Many students with ASD exhibit weak central coherence, meaning they tend to focus on minor details rather than larger concepts or global image(s) of a topic (Hillock, 2011). Additionally, O'Connor (2009) demonstrated that weak central coherence means that an individual with ASD does not have the ability to generalize skills to new contexts. Weak central coherence pertains to the notion that children with ASD encounter challenges in understanding the meaning of a cue, social context/situation and therefore cannot apply it to new environment. This would lead to the child's use of language and his/her understanding of pictures, stories, events and objects (Williams & Wright, 2004). Such difficulty would hinder a child's ability to initiate a social behavior or function/respond to a social prompt (Hanley-Hochdorfer, Bray, Kehle, & Elinoff, 2010).

Social Stories and Communication

Many researchers have found that Social Story interventions can positively impact the communication and reciprocally social engagement of students with ASD (Acar, Tekin-Iftar & Yikmis, 2017; Crozier & Tincani, 2005; 2007; Hanley-Hochdorfer, Bray, Kehle, & Elinoff, 2010; Hudock, Kashima-Ellingson & Bellini, 2011; Leaf, et al., 2012; Lorimer, Simpson, Myles & Ganz, 2002; Min & Wah, 2011; O'Connor, 2009; Ozdemir, 2008; Pane, Sidener, Vladescu & Nirgudkar, 2015; Quirmbach, Lincoln, Feinberg-Gizzon, Ingersoll, & Andrews, 2009; Sani-Bozkurt, Vuran, & Akbulut, 2017; Scattone, Tingstrom, & Wilczynski, 2006). The use of Social Story intervention has increased among special educators and professionals to address multiple skills including: academic, social and behavioral (Test, Ritcher, Knight, & Spooner, 2011). According to Dodd, Hupp, Jewell and Krohn (2007), Social Story intervention is easy to implement and widely used with children with ASD. Schneider and Goldstein (2009) indicated that Social Stories are a non-invasive method that does not conflict with the systematic and routine behaviors of children with ASD. They could effectively decrease challenging behaviors and increase the positive ones (Schneider & Goldstein). Social Stories involve many benefits, they are cost-efficient, time-effective, and appropriately convenient to address target behaviors (Benish & Bramlett, 2011).

Key diagnostic characteristic of children with ASD is manifested in their deficit in communication development (Min & Wah, 2011). This involves: lack of interest to communicate with others and lack of abilities to initiate, maintain and conclude a reciprocal interaction. All of these characteristics may hinder children's abilities in language and speech acquisition development since it requires grounding within the context of communication (Tomasello, 2008). Therefore, many children with ASD encounter delays in their speech and language development (Sigman & McGovern, 2005).

Reviewing prior literature in the field of Social Stories, researchers indicate such interventions can increase the target behavior levels of children with ASD and decrease the negative ones (Acar et al., 2017; Hudock et al., 2011; Lomier et al., 2002; Ozdemir, 2008; Pane et al., 2015; Sacttone et al., 2006; Sani-Bozkurt et al., 2017). Social Stories help children with ASD accelerate social engagement and the initiation of the verbal communication with their peers without ASD (Hanley-Hochdorfer et al., 2010; Min & Wah, 2011). Crozier and Tincani (2007) added Social Stories increase motivation to demonstrate appropriate behaviors. Scattone et al. (2006) indicated interventions show immediate acceleration of the target behavior and the participants demonstrated social interaction during free time, and of those participants generalized the conversation topics during lunch time.

Features of Social Stories

As discussed earlier, "Social story is a cognitive intervention that describes social cues and appropriate responses involved in a particular social situation that are geared toward the visual strengths of individuals with disabilities" (Flores, Hill, Faciane, Edwards, Tapley, & Dowling, 2014). Research indicates Social Stories are useful interventions for students with ASD

(Grandin, 2011; Gray, 1994). According to Flores et al., Social Stories are mainly used to help individuals with ASD adjust to the environmental changes and successfully encounter social challenges that are pervasive across the lifespan. One of the prominent features of Social Stories is that they are written from the perspective of the child (Karal & Wolfe, 2018). Social Stories are used to describe and/or clarify the social cues in a certain situation, appropriate responses and designed to decrease inappropriate behaviors such as aggression, fear, obsessions. They could be used to introduce new routine, new academic and/or behavioral skills (Flores et al., 2014). Gray and Garand (1993) developed Social Stories that involved sentences with images. Each page of their Social Stories involved one-line sentence, accompanied with visual representations so students with ASD would not be overwhelmed with many ideas at once.

Social Story intervention requires a specific construction. Gray (2010) indicated a Social Story must be individualized, and consist of types of sentences: descriptive, perspective, directive and affirmative. Flores et al. (2014) demonstrated that descriptive sentences should contain answer to important "wh" questions, and provide relevant information about social: setting, people and activities. Perspective sentences, on the other hand, describe internal state or physical condition of people involved in a situation. They usually refer to emotions and feelings, and people other than the readers with ASD. Directive sentences are telling students what to do in a situation in a gentle way. Affirmative sentences enhance the meaning of surrounding statements and stress important, rule or law (Flores et al.). Quirmbach et al. (2009) added that Social Stories are valuable interventions because they can be written about any situation or behavior in which a child has difficulty. In addition, they are portable, easy to implement with inexpensive materials, and tend to have short learning intervals with immediate effects (Quirmbach et al.).

Third key feature of Social Stories is pertained to the availability of visuals. Keogel, Matos-Fredeen, Lang and Koegel (2012) indicated that students with ASD could absorb more information when presented in a visualized form. This is due to the diagnostic characteristics of those individuals who require specialized, discrete and visually supported type of learning materials and instruction to prompt their learning (Keogel et al., 2012). Chezan and Drasgow (2010) stated that many individuals with ASD need tangible and concrete types of reinforcement (e.g., token) to motivate them to learn and participate in class room activities. Quirmbach et al. (2009) discussed the notion of visuals, stating that children with autism learn more with visuals and they need the social information to be described explicitly to act accordingly and more appropriately in any given context, this effectively happens with the help of visuals in Social Stories. Kunda and Goel (2011) indicate many children with autism rely more on visual features of the situations, utilizing visual cues to facilitate the process of their learning and accelerate their motivation and learning engagement levels.

Potential Role of Technology

Technological tools and supports have been adopted in the field of teaching and educating students with disabilities (Sani-Bozkurt et al., 2017). Technology, specifically the portable/mobile digital tools can be used to create a reformed, motivating, engaging and effective learning experiences in the educational field. Mowling, Menear, Dennen, and Fittipaldi-Wert (2018) highlight the importance of technology to enhance the learning of students with disabilities. Using technology leads to an increase in learning and retention of skills in affective, and cognitive domains (Gies & Porretta, 2015). Roth (2013) added, technology facilitates communication endeavors because it provides structured and direct, visual contact/instructions which many individuals with disabilities, including those with ASD need to gain knowledge. "Technology-based interventions use technology to deliver, change and/or develop skills for individuals with autism spectrum disorder (ASD)" (Mowling et al., 2018, p. 31). Deficits in social and communication skills, repetitive/restrictive behaviors and sensory difficulties are the common characteristics associated with individuals ASD (APA, 2013). Knight, McKissick, and Saunders (2013) stated that technology promotes social skills and accelerates the social, attention, and

responsiveness of behaviors. Simmons (2014) indicated that touch screen technologies such as tablets present an easy, "on-the-go" (Mowling et al., 2018, p. 6) way of communication, that attracts children with ASD. Tablets provide the tactile experience, ease of navigation and personal interaction with the user. For all of these advantages, tablets have been proven as affective tools to increase motivation and target behaviors (Goldsmith & LeBlanc, 2004).

With the use of technology, Social Stories can be unique interventions that could be designed for a child with ASD, and involve videos, photos/pictures, words and sentences with the purpose of providing information about certain situations (Gray, 2010). These digital Social Stories could also provide vivid images and solutions on how to respond and communicate thoughts and ideas with others (Mowling et al., 2018). According to Flores et al. (2014), Social Stories with their technologically visual supports capitalize the learning of students with ASD. Successful Social Story intervention leads to successful personal learning and effective socialization practices with peers and adults. Mowling et al. (2018) discussed the notion of personal learning: "it occurs as the student with ASD is consistently exposed to personal story and is provided with the opportunity to practice mimicking the desired behavior in a social setting" (p. 6). Giving children with ASD the opportunity to access social interaction through a story with all the technological supports involved, can accelerate the student's comprehension when and where to use certain social cues and responses when applicable and needed. Social Stories should be scripted from the child's perspective to maximizing the connection between the child and the social situation (Flores et al., 2014). The use of new technological applications such as (iBook) delivered through iPads helps in creating more personalized stories (Mowling et al., 2018).

Literature Implications and Current Study

The results of the literature review provide a rationale for the current study and offer a conceptualization of the need to improve and develop social skills in students with ASD. Hudock et al. (2011) recommended that future research should focus on how to increase the verbal communications and interactions (e.g., showing gratitude) in social contexts, investigating the effectiveness of Social Story interventions. Few of the reviewed studies focused on aspect of social communication (greetings/conversations) (Hudock et al., 2011; Leaf et al., 2012; Sani-Bozkurt et al., 2017). Other reviewed studies investigated the effects of Social Stories in decreasing inappropriate behaviors (e.g., verbal interrupting/disruptive behaviors) (Lorimer et al., 2002; Ozdemir, 2008; Pane et al., 2015). Prior literature revealed a need to investigate the ability of Social Story to generalize social skills in more natural settings (e.g., classroom, home) (Min & Wah, 2011; Quirmbach et al., 2009). None of the reviewed articles investigated the effects of Social Stories on the acquisition/practicing gratitude skill which is needed in our daily communications and interactions with others. Few studies (e.g., Acar et al., 2017) investigated the impact of video Social Story on the target behaviors. Flores et al. (2014) investigated the impact of delivering Social Story via tablets (iPads). Yet, none of the reviewed articles used other technologies such as iBook Author to create the Social Story and deliver it through iPads.

Addressing the shortages in the literature of any field gives the rationale for a study (Bloomberg & Volpe, 2012; Egbert & Sanden, 2015). By addressing these gaps, researchers can justify the research investigations (Randolph, 2009). In short, the primary gaps found in the literature include: (a) limited research on teaching gratitude skills for: English language learners and native speakers of English, and Arabic with ASD, (b) the investigation of Social Stories on maintaining over time, and generalizing the learned skills in other contexts (e.g., home, school cafeteria) rather than only classroom, (c) and the use of technology component to enhance and support Social Story. It is highly essential to explore the use of a variety of newer, motivating, technological applications (e.g., iBook Author and iBook on iPads) to engage students with ASD in social communication. Accordingly, the current study was an attempt to address some of the gaps found in the literature regrading Social Stories paired with a technology enhancing component to improve the gratitude skills of elementary school students with ASD.

Research Questions and Purpose

The purpose of this study was to explore the impact of a technologically enhanced Social Story intervention on the acquisition of gratitude skill of students with ASD by answering the following research questions:

1. What is the impact of the technologically enhanced Social Story intervention on the number of gratitude words said by participants with ASD?
2. To what degree did the effects of the technologically enhanced Social Story intervention maintain over time?
3. How did students with ASD and their teacher(s) perceive the tablet-based reading supports associated with Social Story intervention?

Method

Participants and Setting

The study took place in a public Special Education school which exclusively enrolls boys who are identified with ASD. The school is part of a complex of center Special Education schools located in Hawalli, Kuwait. The complex houses 9 schools for boys, 8 for girls, and 1 Kindergarten, with each school exclusively serving a specific category of disability. The school serves boys aged 6-18 with moderate to severe ASD.

Seven elementary school-aged boys attending the above-mentioned school participated in the study. Upon obtaining the required institutional approvals for the research study from the Administration of Special Education Schools, the participants were recruited through the office of the assistant principal using students' school records and teachers' recommendations. This was a sample of convenience, and the criteria for participation included: (a) 3rd grade enrolment (age 7-8), (b) primary diagnosis of moderate to severe ASD according to the Childhood Autism Rating Scale (CARS), (c) native speaker of Arabic, (d) needing social skills training as per the social goals of the student's Individualized Education Plan (IEP), (f) classroom teacher(s) recommendation for needing assistance to improve social engagement skills. All 7 participants were verbal. Full scale Intelligence Quotient (IQ) test scores of the participants were not available. This is due to the school's policy of not testing students with a primary diagnosis of moderate to severe ASD for IQ. The researchers obtained assent from participants' parents/legal guardians. All participants were assigned pseudonyms to ensure anonymity. The participants demographic data are shown in Table 1.

Additionally, participants were selected according to their prerequisite skills that were needed for their participation in the study. These prerequisite skills involved: (a) their ability in reading words and sentences adequately, and correctly in Arabic so they could read the Social Story presented, (b) they knew how to use tablets (e.g., press the home button, select the iBook app, select the Social Story), and (c) their ability to focus on pictures, define them when describing a situation.

Experimental Design and Procedures

A single-subject, multiple baseline-across participants design was used to investigate the effects of the technology-enhanced Social Story intervention on the acquisition of gratitude skills by elementary children with ASD. In multiple baseline design, the "effects are demonstrated by introducing the intervention to different participants at different points in time" (Kazdin, 2011, p. 144).

Table 1
Participants' Demographic Data

Participant	Age	Gender	Ethnicity	Disability Classification	Severity Level
Hashim	7	Male	Caucasian	ASD	Moderate
Ahmed	8	Male	Caucasian	ASD	Moderate
Ali	8	Male	Caucasian	ASD	Moderate
Fahad	7	Male	Caucasian	ASD	Severe
Esam	8	Male	Caucasian	ASD	Moderate
Salem	7	Male	Caucasian	ASD	Severe
Fayez	8	Male	Caucasian	ASD	Moderate

Measures

The dependent variable was the number of gratitude words (Thank You) said by the participants with ASD during the school day in different locations within the school: classroom, cafeteria, gym, Speech and Occupational Therapy offices. Data were collected using event recording measurement (Kazdin, 2011). Event recording involves the procedure of recording the frequency of a behavior and/or responses during an observation (Kazdin, 2011). Response rate (frequency/time) was also counted. One of the unique features of event recording is: it provides information about certain and essential dimension of the behavior, meaning the frequency of its occurrence. It also provides direct measure of the target behavior (Kodak, et al., 2015). It can be only used when the behavior has clear beginning and ending so to possibly and accurately count it.

Reliability

Huck (2012) defined reliability as the consistency of the measuring instrument. An approach to reliability, used in the current study was inter-rater reliability. Inter-rater reliability is the agreement between two raters on the data collected on the target behavior (in the case of this study was: number of gratitude words said by participants). Two raters (the first researcher and the Special Education teacher) independently observed the participants and collected data on the dependent variable. The second rater was a Special Education teacher with master's degree in Special Education, and 13 years of experience teaching students with ASD.

Before collecting data, the first researcher provided a definition of the target behavior (operational definition) for the second rater. She also trained the rater on how to count the occurrence of the behavior using event-recoding sheet (created by the second researcher). All raters observed and counted samples of the target behaviors until 100% agreement was obtained. A point-by point agreement ratio was used during the training period as well as when calculating the actual inert-rater reliability of this study to obtain the agreement estimation (Kazdin, 2011). Point-by-point agreement depended on calculating agreements of the raters on number of gratitude words said by the participants during the school day. If raters disagreed on the occurrence of the target behavior, this disagreement would not be counted because counting disagreements of the two raters would inflate the estimate of agreement (Kazdin). The formula for estimating the point-by-point agreement used was: (agreement/agreement + disagreement) x 100. A minimum of 80% agreement was required for the inter-rater reliability to represent high reliability coefficient (Huck, 2012; Pierangelo & Giuliani, 2012).

Inter-reliability coefficient for the number of gratitude words (Thank You) per school day was calculated. Inter-rater reliability agreement (94.5%) was calculated between the first (first researcher) and second (Special Education) raters. This score fell above the standard reliability suggesting the score represents high reliability coefficient (Huck, 2012; Pierangelo & Giuliani, 2012). Consequently, results were stable and consistent over time.

Intervention 'Social Story' Preparation

The independent variable (Social Story) was technology-enhanced with the use of iBook app delivered via iPads to improve the social, communicational (gratitude) performance of the participants. The first researcher delivered the intervention (Social Story). The Social Story was adapted from a Social Story called "Thank You" by Nabeeha Mohaidli. The first researcher provided it for the participants via iPads through iBook app. She provided the iPads for the participants. The first researcher took sentences from the original "Thank You" story, modified them so they would be appropriate for teaching the target skill. In addition, she simplified the language of the sentences, shortened them so that they could be more concrete, direct as recommended by Gray (1994). The Social Story was short, containing types of sentences used frequently in Social Stories as discussed previously by Gray (2000). The first researcher included in the first two pages of the Social Story descriptive sentences to answer the "wh-" questions: what is the word (e.g., Thank You), why do we use it, and when do we use it? (situation occurrence). The next two pages of the Social Story involved perspective sentences showcasing the reaction and feelings of others when the student thanks them (showing gratitude). In the last two

pages, affirmative sentences were provided to describe the common association(s) of the gratitude skill (e.g., saying Thank You) with certain situations (e.g., when waiter brings food in a restaurant, when a classroom teacher helps the student in the task). According to Gray and Garand (1993), affirmative sentences highlight the notions of rules and laws, providing assurance, and emphasizing the need of the target skill (i.e., in this research: showing gratitude).

The first researcher used a free software, *iBook Author* to create an electronic version of the "Thank You" story. Additionally, a free website, *Bookry,* that provides free interactive widget downloads, was used to develop a Social Story iBook designed specifically to enhance and improve the social skill (of showing gratitude) to others and when/where to use the word "Thank You." A widget is a tool that can be built in an iBook through Apple's iBook Author application. Widgets are usually represented by a button, and they can be placed anywhere on an iBook page(s). When the user clicks the button, the widget will open in an independent pop-up (appears/rises suddenly on the screen) window on the screen. Appendix 1 demonstrates pages of the iBook including widgets and pop-up cues. The Social Story iBook involved technology-based scaffolds such as videos about gratitude and why to use it, picture illustrations, pop-up cue cards to help participants memorize the word and understand why, when and where to show gratitude. That would assist them to accurately use the gratitude word "Thank You" in different situations appropriately.

Procedures

This study was conducted in three phases: baseline, intervention and maintenance. For collecting data in the three phases, the students were observed by the first researcher and second rater in different school locations as discussed earlier.

Baseline

Participants were observed during the school day, in classroom, special classes: arts, music, gym/physical education, speech and occupational therapy offices and the cafeteria. These observations were conducted daily. For the first group, baseline data were collected in three days to document stability in the performing the gratitude responses of the participants and to predict the future gratitude skill performance when no intervention was used (Horner et al., 2005). The number of baseline days for group 2 and 3 increased during the progression of the study's phases.

Social Story

For the delivery of the Social Story, with the teacher's collaboration, the first researcher grouped students into three groups, two students in the first and second groups and three in the third group. Students were grouped according to scheduling considerations. After stable baseline was established for participants, the delivery of the Social Story "Thank You" was initiated for the first group. Before reading the Social Story, the first researcher presented the iPads to the participants, giving them opportunities to explore the app (iBook) and how to open the assigned story. She also explained to participants that they would experience reading an electronic book that involves videos about gratitude, pictures and pop-up cues about the words of gratitude. The first researcher delivered the Social Story in three phases of explicit instruction (I do, We do, You do) introduced by Archer and Hughes (2011) in three lessons. Certain situations (6-8) prompts were written and prepared by the second researcher to be used after each lesson, to check the participants understanding and whether they had a grasp of the Social Story's value (to show gratitude). These prompts were assigned randomly by the first researcher (deliverer of Social Story) after each lesson.

In the first lesson, first researcher read the story for the participants showing them all the technology-based scaffolds. The students would answer certain question on the story and in what situations they should say gratitude words: (e.g., Thank you, I'm grateful). The second lesson, (We do) phase, with the help of the first researcher, the participants read the Social Story, went through the technology-based scaffolds on the iBook. Participants had to answer comprehension questions about the story. Additionally, providing them with situations, they were asked what to say. By

prompting them, they should utter gratitude words/phrases. For the third lesson, the (You do) phase, participants should go through the Social Story solely, then they would say appropriate gratitude words/phrases for the assigned situations. Participants were provided with help/assistance in answering with the appropriate word for the situation prompt, when needed. Data were not collected in this phase since it was devoted for the instruction of the gratitude skill. Each lesson was carried out in the allocated time for the school class (30 minutes).

Application of Social Story Steps

Social Story application during the instruction phase took several steps. These steps were as the following:

1. Students take the iPad, and by the first researcher prompt, they press the home button, slide over and select the iBook app.
2. In the iBook app, they choose "Thank You" Social Story.
3. For the second lesson, participants read the Social Story with the first researcher, doing the required activities on the iBook (e.g., listening to the Thank You" song, reading instructions for the next activity in the widgets).
4. For the third lesson, participants were prompted to read the Social Story. They performed all previous steps. When a student missed a step, the first researcher gave him feedback, prompted/gave him a hint for the correct step.
5. After reading the Social Story, participants were prompted by the first researcher to respond to certain situations, for the purpose of checking their understanding and acquisition of the learned/target skill (showing gratitude).

Treatment fidelity

To ensure the treatment implementation integrity, the first researcher conducted three fidelity checks for each of the Social Story lessons, using a fidelity checklist. The fidelity checklists were used to examine the extent to which Social Story was implemented as intended during the lesson. The teaching assistant in the class observed the first researcher (while delivering Social Story, asking questions about it, and giving the situation prompts) in each lesson, and completed the fidelity checklists. The teaching assistant had bachelor's degree in Special Education and five years of experience in assisting teachers in classes of students with moderate and severe ASD. Each fidelity checklist involved ten-items to measure the performance of the first researcher in: getting students' attention (warm up), reading the story, using the technology scaffolds, asking the questions about the story, receiving the participants' answers, prompting them to utter the word "Thank You" every time it appears in the Social Story, and asking them to respond to social situations provided after each lesson. Fidelity across all lessons was 100%, indicating that the first researcher implemented all procedural steps as intended. The total percentage of the three fidelity checks were summed and divided by the number of checklists (n=3), to derive the percentage of the fidelity of delivering the intervention.

Intervention

When the students mastered the use of gratitude words they proceeded to the intervention phase. The first researcher and a Special Education teacher (second rater) collected intervention data for five days during this phase at school's locations, as indicated earlier.

Maintenance

Four weeks after the conclusion of the intervention phase, the first researcher observed the participants in two school days to collect maintenance data.

Results

This study examined the effects of the intervention consisting technologically enhanced Social Story on the social skill, including showing gratitude of third grade students with ASD. Multiple baseline across seven participants was used to evaluate the extent to which the intervention impacted students' gratitude skill performance. Measures of central tendency

including mean and median as well as percentage of increase for the mean scores were all calculated. Data analyses were presented in alignment with research questions.

What is the impact of the technologically enhanced social story intervention on the number of gratitude words said by the participants with ASD?

Table 2 presents information about participants' mean scores. As depicted in this table, all students increased the number of "Thank You" words per school day from baseline to intervention. Group 1 (Hashim and Ahmed) demonstrated gains following intervention. During baseline, Hashim uttered and average of 2.6 "Thank You" per school day in different classes and locations including: classes, gym, Occupational and Speech Therapy offices, recess and cafeteria. This average increased to 29 during intervention, with percentage of increase up to 1015.3. While it was noted that Hashim leveled off during maintenance, reaching 22.5, his average score of the Thank You word uttered never returned to baseline. Ahmed also increased the average of Thank You word uttered per school day from baseline (2.3) to 24.5 during intervention. This number slightly decreased to 23.5 during maintenance. Overall, Ahmed achieved approximately 965.2% of increase from baseline to intervention for the mean score of number of Thank You word uttered per school day. Collectively, both Hashim and Ahmed increased their median scores from 3 and 2 during baseline up to 30 and 25 respectively during intervention, and 22.5 and 23.5 during maintenance.

Group 2 (Ali and Fahad) demonstrated similar average score increases in Thank You word uttered per school day. Ali uttered an average of .87 during baseline, 24.6 during intervention and 20.5 Thank You word during maintenance. Fahad showed accelerated performance during intervention and maintenance phases in comparison to baseline. His mean baseline score was 1.125 words per school day, which increased to 21.8 during intervention with a slight decrease to 21.5 during maintenance. Median scores also increased for this group. Ali improved his median score for the same variable from 1 during baseline up to 24 during intervention and 20.5 during maintenance while Fahad increased his median scores from 1 during baseline to 23 during intervention, and 21.5 during maintenance. Percentage of increase in phases for Group 2 are detailed in Table 2.

Group 3 (Esam, Salem and Fayez) showed performance differences from baseline to intervention. During baseline, Esam uttered and average of 1.30 for the Thank You word per school day. This mean increased to 16.2 during intervention, and up to 18.5 during maintenance. Overall, Esam achieved 1146.1% of increase from baseline to intervention, and 14.19% from intervention to maintenance. Salem also improved his mean scores for number of Thank You words uttered per school day from 1.30 during baseline to 12.4 during intervention with percentage of increase 853.8, and 18 during maintenance. Fayez demonstrated improvement in his mean scores of Thank You words uttered per school day from 1.23 during baseline to 12.4 during intervention with percentage of increase 908.1, and followed by an average of 15.5 words uttered during maintenance. Results are all presented in the same table (Table 2.).

Table 2.
Participants' Mean Scores on Number of Thank You Words per School Day, across Phases

Participant	Baseline	Intervention	% of Increase	Maintenance	% of Increase
Hashim	2.6	29	1015.3%	22.5	-22.4%
Ahmed	2.3	24.5	965.2%	23.5	-4.08%
Ali	.87	24.6	2727.5%	20.5	-16.6%
Fahad	1.125	21.8	1837.7%	21.5	-1.37%
Esam	1.30	16.2	1146.1%	18.5	14.19%
Salem	1.30	12.4	853.8%	18	45.16%
Fayez	1.23	12.4	908.1%	15.5	25%

Figure 1 provides graphic display of outcomes, per each student and peer group for the dependent variable (number of Thank You words) per school day. As depicted, all participants increased the number of gratitude words (Thank You) per school day. Performance changes were immediate and after the delivery of the Social Story (intervention).

Effect Size

Effect size was calculated to further examine the strength of effects measured (Scruggs, Mastropieri, & Casto, 1987). The effect size was calculated using the percentage of non-overlapping data (PND). A minimum effect size not less than 90% is used to document intervention effectiveness and establish functional relationships (Scruggs & Mastropieri, 1998). The PND was calculated for the dependent variable: number of gratitude words (Thank You) uttered by the participants per school day. Percentage of nonoverlapping data (PND) was 100% for all the seven participants across baseline versus intervention and maintenance conditions. This indicates the effectiveness and a strong impact of the intervention on the social skill (showing gratitude) performance of the participants across the variable (number of gratitude words uttered); thus, there was a functional relationship between intervention and performance and the improvements in social skill were most likely due to the intervention.

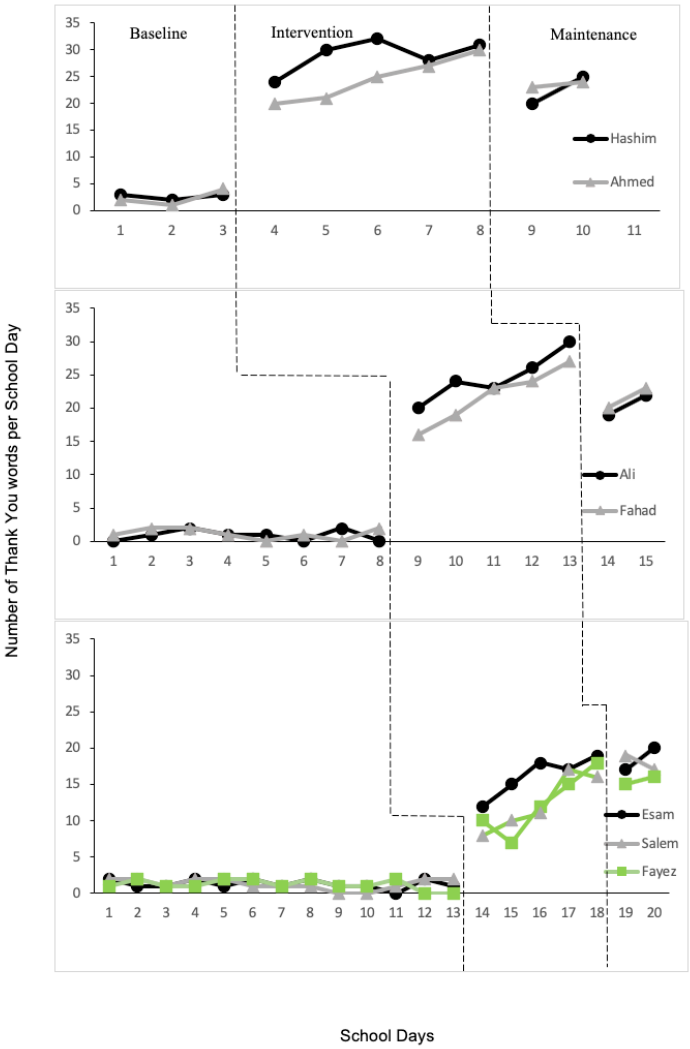

Figure 1.
Total Number of Thank You Words per School Day

To what degree did the effects of technologically enhanced social story intervention maintain over time?

Participants engaged in social communication that involved showing gratitude to certain situations in all phases including maintenance. Four weeks after the intervention phase, students were still able to utter gratitude words (i. g., Thank You, I Thank You, Thanks). Results indicated that participants could improve their average along with median scores for the dependent variable during maintenance phase in comparison to baseline. It was clear that participants could use the gratitude skill learned in the social story delivery phase and employ that skill in the last phase of the research (maintenance). Students could show gratitude in daily situations (i. g., when getting their lunch in the school cafeteria, receiving an incentive for correct answers, helping the students with school work). It was notable that participants could use the gratitude words when and where appropriate and show the learned social skill with adults and peers. Their ability to maintain the skill over time could be attributed to the effectiveness of the intervention along with their willingness and potential for learning and acquiring social skills when the resource (Social Story, the instruction of the skill) was available. It was apparent that students needed increased opportunities to gain the learned skill (via iPads, encouraging and engaging tool to read the story and learn from it).

How did students with ASD and their teacher(s) perceive the tablet-based reading supports associated with social story intervention?

The third research question is associated with social validity. According to Horner et al. (2005), social validity is enriched when the independent variable changes the outcome and this change is highly essential. Horner at al. added implementing a practical intervention would enhance the research's social validity. An interview with the participants was conducted to determine social validity, and to derive those students' perspective of reading tablet-based Social Story and learning gratitude skills. The interview involved three open-ended questions in which the participants' perspective, impressions and experiences regarding the intervention were explored.

Social validity interview data collection, and analysis

As aforementioned, social validity data were collected using two interviews: one with the participants and the other was with classroom teacher(s). The interviews were designed to answer the questions of how the participants with ASD perceived the Social Story delivered via iPads. Classroom teacher(s) perspectives were also gathered to strengthen and enhance social validity data. Along with participants' assent forms, teachers' consent forms were obtained for the purpose of social validity interviews. Neither teachers nor participants real identities were revealed. They were anonymized and confidential. The interview questions were prepared. The interview lasting 10-15 minutes was conducted with the participants. After finishing the interview with the participants, their classroom teacher(s) were interviewed with the second interview. As highly recommended by Seidman (2013), the interviews questions did not involve any leading questions so that direction of the interview, participants, and their teachers' responses would not be influenced and/or biased.

To collect the social validity data from participants and teacher(s), the first researcher used Notability app on her iPad to record the interviewees' responses and help in the process of transcribing the audio recordings. The first researcher took 25-30 hours of verbatim transcription. The data analysis process began afterwards. The technique of analyzing data was coding the most frequently repeated themes, ideas and concepts expressed by the interviewees. In essence, analysis begins with organizing the main ideas derived from the collected data, and then combining the similar information (Rubin & Rubin, 1994). The most frequently repeated concepts related to Social Story by participants (the students with ASD) and their teachers were how Social Story taught student: what, when and where to show gratitude (using the word thank you).

Overall, participants (students) indicated strong support for the tablet-based Social Story, and how it improved their acquisition of gratitude skill. Hashim stated, for instance, that Thank You story helped him know when to use gratitude words in different situations, with people he never

thanked like his teachers and parents. In his words:

> *I know new word "thank you", and when to use it with my teachers, friends at school and mother, father and sister at home. Thank You story on iPad taught me the word "thank you" with pictures that move and have sounds!*

Participants brought up the notion of Social Story intervention narrates their reality and teaching them how to react in real life situations. Fahad said:

> *Thank You story has pictures of people say "Thank You" to each other in different places. I saw and read about people say "thank you" when they are given food, when their parents take them to the sea or gardens.*

Participants discussed the notion of technology and how the Social Story was engaging and motivational, increasing their knowledge of uses of the gratitude skills. They discussed the Social Story intervention's pop-up cues, and widgets were interactive supports to gain the gratitude skills. Esam pointed out:

> *We read stories with our teacher. This time is different. Thank You story had pictures that spoke to us and moved. That was good!*

Teachers responses also indicated that the intervention (Social Story) was highly effective in acquiring the target skill, when, where and why to use it in different locations at school (e.g., classroom, cafeteria), and in appropriate contexts (e.g., when a teacher helps, a classmate gives). They discussed the use of table-based Social Story, and the notion of engagement in the learning environment. They stated that usually their students talk about the use of iPads for leisure and playing games. Yet, this time was different. They used iPads for school stuff (learning the gratitude skill), engaging and motivating them for more learning endeavors, using the target skill in different locations and contexts and maintaining it over time.

To what extent did the participants perform the target skill in out-of-school contexts (e.g., home, supermarket, family gathering), from the parents' perspectives?

To derive data for this research question, researchers used semi-structured interview with the participants' parents. For the parents' data, a third (the semi-structured) interview was disseminated to parents. So, they could respond to the questions freely at home, any time at their convenience. Analysis process (coding most frequently repeated ideas and concepts) as recommended by Rubin and Rubin (1994) was conducted. Parents had multiple positive perceptions regarding the Social Story intervention. Hashim's parent for example, told the researchers that her son began using the word **"**Thank You**"** multiple times, showing gratitude to different people even those who were not of his acquaintances (e.g., registrar /cashier at the supermarket when handing the bag of groceries, waiters at restaurants). She added that her son did not need a reminder and/or prompt to show gratitude to people in comparison to prior the delivery of the Social Story when she used to motivate him to say thank you, and many times he did not respond.

According to the parents, the Social Story encouraged their children to engage in social interaction and short conversations without hesitations. Parents stated that showing gratitude gradually motivates their children to talk about multiple topics and socialize with others. In words of Ali's father:

> *Ali started talking to others without hesitation. Last week, we went to a restaurant for lunch. When the waiter brought our food, Ali thanked him. The waiter asked Ali to tell him what he thought of the food and place after lunch. Ali told the waiter the food and place were beautiful, and he thanked him for that! This was totally new to witness from Ali.*

The parents raised a salient notion regarding the use of tablets in classroom. Most of the parents indicated that their children (as many of their peers with and without disabilities), use iPads for leisure activities (e.g., gaming). Reading Social Stories in classrooms for learning and acquiring a highly essential social skill is not always noted within classroom contexts,

especially in segregated, self-contained Special Education classes in Kuwait.

Discussion

Students with ASD exhibit a variety of characteristics that might impact their ability to socialize and interact with their peers in both school-based and out-of -school contexts. One of the most salient characteristics is deficits in establishing and maintaining reciprocally, communicative social conversations with peers and adults. Such deficit might impede their abilities to appropriately react in certain social situations in and outside school. Students with ASD's difficulties in Theory of Mind (ToM) along with central coherence still remain challenges for those individuals to learn effectively from the classroom activities including the moralities, social cues and keys in social, communicative situations. Consequently, this study investigated the effectiveness of tablet-based Social Story intervention on the existing social performance, including showing gratitude of students with Autism Spectrum Disorders.

Results suggested that social story supported with the use of iPads, with technology supports and scaffolds highly accelerated participants' engagement in showing gratitude to peers and adults in different contexts and settings including school different departments and society places. More specifically, the intervention increased the number of "Thank You" (gratitude words) per school day and increased the participants' overt engagement in socialization and communication in more effective and efficient manner. Participants could comprehend the needs of the social situation and consequently respond properly to them. This result was consistent with prior research findings for providing students/individuals with ASD the required description and explanations to navigate any social situation and then helping them in producing the appropriate responses for it (Karal & Wolfe, 2018; Kuoch & Mirenda, 2003; Sansosti, Powell-Smith & Kincaid, 2004). This result also aligned with what Gray (1998) came up with that through Social Stories, participants could get relevant information about a social situation, who might be involved and what why it is happening.

In this investigation, technologically enhanced Social Story with the use of iPads, and delivering it via iBook with the technology supports provided may have increased the participants' opportunities to observe models of when, where, why and how to use gratitude words. It resulted in increasing the participants' knowledge of using the gratitude words. This led them to engage in other related conversations and accordingly decreasing their isolation and segregation in and out school. Prior research showcased multiple cons of social isolation including rejection from peers (Kagohara et al., 2012), lack of interest in learning with peers and how this negatively impacts the overall education students with ASD (Delano & Snell, 2006). Karal and Wolfe (2018) stress that the existence of social skills is highly important in the development of educational goals for all students including those on the autism spectrum.

As aforementioned, social engagement was notable. Technologically enhanced Social Story intervention increased the participants' use of gratitude words and encouraged them to engage in more elaborated social, communicative conversations. Those conversations were with peers and adults, from school and family, acquaintances and people in public places where they never talked and socialized. Increasing students' social interaction and communication is highly recommended for students with ASD (Griffin, Griffin, Fitch, Albera, & Gingras, 2006).

The technology component played a key role in fastening and strengthening the acquisition of communicative, gratitude skills. Reading a Social Story with the use of iPads was a new reading experience encountered by the participants. In comparison to paper-based Social Stories in which only reading texts and pictures might be provided, participants had more elaborations and detailed explanations on when and how to use gratitude words in different contexts in this technologically based social story. Digital supports represented in iBook widgets, and cues helped participants improve their social, gratitude skills. The iBook with digitized materials may have provided individualized, and more intense visual supports that were more portable and less stigmatizing (Shane, Laubscher, Schlosser, Flynn, &

Abramson, 2012). This result was also consistent with Howorth's (2015) findings in which students with ASD dramatically increased their learning accomplishments when they were explicitly taught how to use a social skill/cue/expression paired with digital tools. The notable aspect is many students with ASD at school do have the potential to engage in increasing their learning and social skills when the opportunity is provided through the use of technology (Asaro-Saddler, 2016).

Reading Social Story via iBook on iPads provided participants to read the story in more "natural" reading atmosphere aligned with outside school experiences such as reading online or on video games, or social media (e.g., Instagram, FaceBook).This result aligns with Bromley's (2006) findings that technology can enhance the main aspects of effective learning, making the process more authentic, real, interesting and attractive. Using iBook supports, extra explanations, images and definitions in pop-cues and widgets may have given students multiple ways to access information. This result is consistent with one of the core principles of Universal Design for Learning (UDL) that promote the provision of multiple opportunities to access knowledge (CAST, 2020).

The results of the study correspond with prior research of (Hagiwara & Myles, 1999; Kuoch & Mirenda, 2003) that Social Story interventions markedly benefits children with ASD, improving and enhancing multiple social skills including gratitude. Results of this study extends the current knowledge and adds to the body of the prior research that Social Stories could increase students' with ASD gratitude skills, help them maintain such skills and generalize them in similar contexts and situations to classroom settings. Using a table-based Social Story (with the use of iPads), using multiple options: inserting images, videos, interactive activities made learning of the social skill engaging, motivating and novel to the participants with ASD. The functional relationship between table-based Social Story intervention and target skill was apparent. That was due to participants' exposure to new experience of reading Social Story via iPads. Although this was different from their daily routine (reading paper stories), participants were highly motivated. They could remember showing gratitude in multiple settings and contexts including school, home and/or community places. Social Stories help children with ASD enhance their reciprocally, social communication. "The use of the stories allows the children with ASD increased opportunity for participation, learning, enjoyment, and interactions" (Ivey et al., 2004, p. 173).

Implications

Social communication is an important skill that all students, including those with ASD should master. With more adequate instruction of social skills, students could be more engaged in socially, reciprocal communication. As such, the current study has important implications for those who work with students with ASD.

Recommendation 1

The use of technology gave participants multiple opportunities to access the thematic knowledge and concepts of the Social Story presented to them. They could acquire the skill was being taught and comprehend the purpose of it and justification of it. In other words, why to use "Thank You" and showing gratitude to others. Practitioners should consider the use of iPads to engage students with ASD in more reading endeavors.

Recommendation 2

Future research and practitioners should consider the incorporation of multimodality. This study explored the impact of technology based Social Story with the use of iPads. Using a tool such as the iPad to read a Social Story and acquire social, interactive skills connects this process to students' daily life contexts, in which iPads and/or smart device are saliently used by children and adults in the Kuwaiti society. As Bruce and colleagues (2013) state, "even in supportive academic environments, the literacy demands often represent a challenge to students with disabilities" (p. 25). According to Bruce el al., inclusion of multimodal options via technology could accelerate the quality of students' learning outcomes. Such consequence is a targeted aim for all students, especially those with ASD.

Limitations

While the study presents promising findings, there are limitations that may affect their utility at this time. The first limitation was that the sample size for this study was small, although this common in the use of single case research design. While internal validity is strong, one' ability to generalize findings to others (e.g., external validity) is limited (Kazdin, 2011). The second area of limitation was related to time. Time of the study was truncated due certain obligations that were outside of researchers and/or school staff control. The research study coincided with official holidays. This constrained the time to administer the generalization sessions/days. As such, the investigation should be replicated over longer times periods. More generalization sessions/days would help ensure the participants' ability to transfer the learned gratitude skill to other settings/with other people. Future research should consider investigating the impact of the intervention on generalization of skill to a range of areas.

A third limitation was this study was conducted in self-contained, Special Education classroom for students with autism. As such, the generalizability of the results to other student populations outside of this school (e.g., students with ASD in inclusive classes) should be considered by researchers. A fourth limitation was that all participants were male. While this is consistent with high prevalence representation reported by the Center for Disease Control and Prevention (CDCP, 2016), generalization to females with ASD should be made with caution. Future research should include female students with ASD whenever possible. Fifth, present findings are restricted to some extent to elementary school students with ASD, specifically at the third-grade level. Future research should replicate intervention effects for both younger and older students.

Conclusion

Through the context of this study, the impact of combining two research-based components (iPads, and Social Story) at once was explored. The positive effects of the intervention impacted participants' social behaviors represented in the number of "Thank You" words uttered per school day. Future research should attempt to avoid limitations of this study, consider ideas presented and investigate the use of evidence-based practices with technological tools to improve social performance of students with ASD. This study could be replicated with different ages, grade levels and target skills because it will be beneficial in understanding more about Social Story interventions and how to enhance them. Empirical research in future is highly needed to add to the body of research especially in Kuwaiti Special Education schools with Kuwaiti students with ASD.

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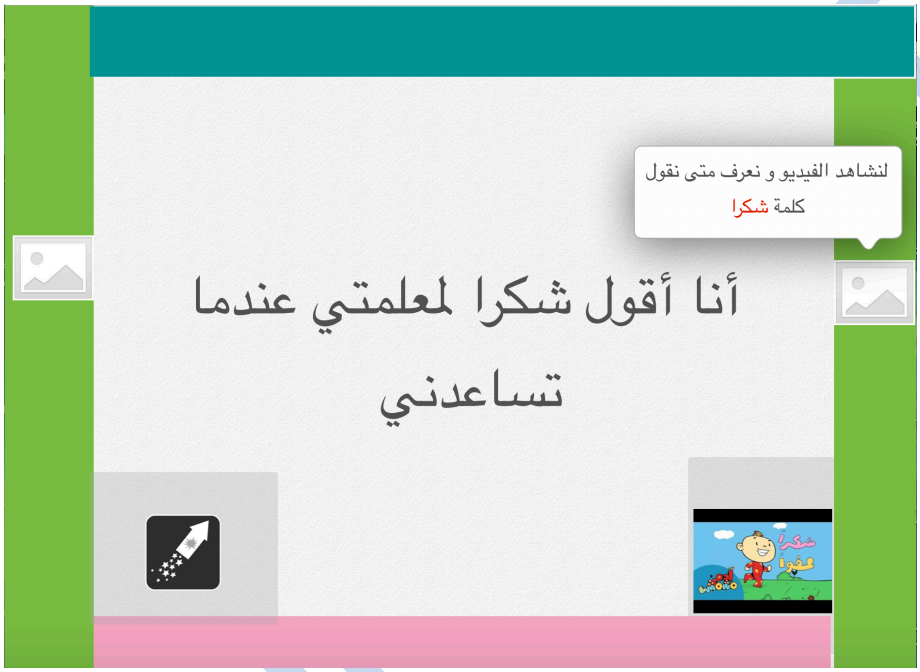
Appendix 1

This page of the Thank You Social Story iBook delivered via iPads showcases widgets and pop-up cues. The two small icons down the page are the interactive widgets to increase and engage students in the learning of the gratitude skill. The small white boxes on the columns are the pop-up cues that involved directions (in a speech bubble) for the child to use the widgets (e.g., listening to a Thank You song, do the exercise).



Other pages of "Thank You" Social Story iBook.