

**IPAD APPS: A VEHICLE TO DEVELOP SOCIAL SKILLS IN  
CHILDREN WITH AUTISM**

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### **Abstract**

The iPad has become an important tool to assist children with autism in the classroom. This case study research was conducted to determine if three moderately priced iPad apps could be used to assist children with their social skill development. The apps in the study include: ‘Social Skill Builder’, ‘Mission Rescue Kloog: Social Skills for Autism’, and ‘Quick Cues.’ Five participants from Grades 6-12 were selected for this study (three boys and two girls). The researcher met with each of the five participants three times for approximately one hour each time over a one-month period. Each participant was given a demonstration using each of the three apps and then the participants were asked to independently demonstrate how to use the apps. The researcher observed each participant using the apps and then asked questions relating to their experiences with them. The researcher also had many conversations using the themes of the apps to determine whether the participant comprehended the social situations that were presented within each of the apps. The results of each of the five case studies varied based on the cognitive abilities of each of the participants. Each participant did have success with at least one of the apps. Each participant also indicated that they would continue using the apps in the future to help them with social situations. There is minimal research in the area of the development of social skills for children with autism through the use of the iPad. More research is needed in this area to determine the true potential of the iPad as a tool for children with autism to develop their social skills.

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## **CHAPTER I**

### **Introduction and Background**

#### **Context of Study**

Prime Minister Justin Trudeau (2014) said, “It’s time to put autism on the national agenda.” Organizations like Autism Awareness Centres are now holding national conferences each year in Canada and around the world to discuss new research in autism. Technology is one area that is being discussed as a means to assist people with autism. Having government acknowledge that autism research is important will hopefully lead to more funding availability in the education system to help these students. Technology is one area that shows great potential in the development of social skills in students with autism.

In my school division there has been a steady increase in the amount of iPads that are being purchased for use in our schools. This started about five years ago when iPads were being discussed in our staff meetings and how they could be used in the school. At first, many teachers were given these iPads to create lessons and allow the child to use them at appropriate times. More recently, iPads have been purchased for our students with special needs. These children would have access to them full time during the day and parents would be invited to the school to learn how to use the device so that they could work with their child at home. The apps (iPad programs) range from typing software to voice recognition. Teachers have also been installing apps on these iPads based on the needs of the individual students.

Apps range from being free to costing hundreds of dollars. The Apple iStore contains many reviews on these apps. There is no filter on what is said in these reviews,

so it is impossible to know whether they are credible or not. This study was conducted because there was minimal research done on specific apps and how beneficial they were for children with autism.

## **My Story**

I have been a teacher in a Manitoba school division for nine years and have taught Grade 8 for all but one of those years. When I first started at the school, I worked closely with many of the seasoned teachers, including our school resource teacher. She has been in that position for more than thirty years. As a result, I became connected to student supports. It was about six years ago when the first student with autism was placed in my classroom. At first, I felt nervous and highly unqualified to work with this child. It was with the help and assistance of our resource teacher that I learned the mannerisms of this non-verbal child. The year ended and I felt that although I could still improve my skills and awareness, I had learned from this experience.

The following year, I received another student with autism. This child was able to talk and complete regular work. This child was more on the spectrum as a behavioural issue. Again, with the help of resource, and with some training, I was able to work with this child, and become more confident in my own practice.

Four years ago was the only year that I taught Grade 7. My administrators asked me to try looping which is a concept where I would teach Grade 7 one year and Grade 8 the next with the same group of students. I embarked on a two-year journey with this group of students. What made this group unique was the number of students with special needs I was given to work with. I had three students on the autism spectrum. Two had



mostly behavioural difficulties and the third was considered a high functioning student with Asperger's. It is this student (pseudonym Charlie) who made me want to learn about autism.

For the purpose of this introduction, I will use the name Charlie as a pseudonym. Charlie had the highest mental math functions in the class. I could put any sequential problem in front of him and he could solve it within seconds. Anything requiring a concrete answer was simple for him but he struggled immensely demonstrating any form of written literacies. It was at this time when I started my master's degree. My first course was appropriately titled 'Language and Literacy' and it is where I first began to ponder what this thesis could be about. I wanted to work with Charlie and see if I could incorporate technology in his life to enhance his writing ability.

Charlie was able to read the graphic novel by Shawn Tan, "The Arrival" and discuss his perceptions of the story with his peers and me. Charlie later demonstrated his understanding of the story by making his own story using the pictures he took with the PowerPoint program. I closely monitored him as he took his own pictures and transferred them from a digital camera to the computer followed by importing them to the PowerPoint program. At the end, he was able to share his own story with the class by showing everyone his PowerPoint picture story. I used this mini study in my Language and Literacy course to show how a child with autism could interpret a picture book and utilize a computer to demonstrate this knowledge. It was from this point when I knew that I wanted to do my research on the topic of utilizing technology to enhance the social skills in children with autism.

**Purpose of Study**

From personal experience, I have learned that there is a dire need for educators to contemporize and provide our students with the tools that they need to be successful. The research I have done while working on my masters has shown that technology is what students with autism need. McIlroy (2012) states, “The access to technology can be life-changing” (p.1). Based on my personal experiences with students who have autism, I can see how this statement is true. They are engaged, and the technology has given non-verbal students with autism a voice that they have never been able to use.

Many children with autism have some difficulty developing social skills. Many characteristics of autism focus on how the child has difficulty developing and maintaining friendships or following directions from their teacher. iPad technology is allowing children with autism to enhance their social skills and gain independence in their daily lives. Apps like ‘Proloquo2Go’ have provided non-verbal children a voice to communicate with others. This app is very expensive but has yielded many positive reviews.

I did this study so that I could further my own understanding of how children with autism think and learn. I am hopeful that one day I can be that leader in my school just like the one that has mentored me over the last nine years. With her guidance, my research, and practical experiences, I believe that I, too, can make a difference both in my school and in the research world. My hypothesis is that current apps can successfully support children with autism in order to develop their social skills.

## **Hypothesis**

The hypothesis for this study was that free and moderately priced apps could positively influence the development of social skills in children with autism.

## **Research Questions**

The research questions that were used in this study pertain to how well the selected iPad apps enhance the social skills of children with autism.

The main question of this study is: How does the use of Apple iPad apps assist/not assist children with autism demonstrate their understanding of socially accepted behaviours and mannerisms? These commonly accepted behaviours and mannerisms are included in Appendix 1 (p. 165) but some of the most notable include eye contact, following instructions, and recognizing facial features and emotions.

The following are sub-questions that assisted in data collection and analysis:

- (a) In what ways does the child (participant) respond to the selected apps?
- (b) How quickly does the child adapt to the apps?
- (c) How does the child demonstrate independence using the apps?
- (d) What attitudes does the child exhibit when using the apps?

These research questions guided the researcher throughout the process of collecting data for this study.

## **Significance of the Study**

The iPad was introduced in 2010. There are thousands of web pages written by parents and app designers who endorsed the use of apps without scientific research.

After looking at the reviews from the Apple iStore, they showed what apps were beneficial and which ones were not.

The issue, after conducting a thorough search of research studies on iPad app use, was that there were minimal studies conducted on specific iPad apps related to autism that did not include an endorsement from the makers. Studies like Neely (2013) and Lorah (2013) discussed the importance of technology and how iPad apps were an important tool for students to use. The issue was that there were minimal studies showing what specific iPad apps were useful for students with autism.

It is important that children with autism have a voice. Oftentimes, many children do not have that voice. Apps such as 'Proloquo2Go' provide children with that voice and independence to communicate with their families and peers, (A Voice 2016). Apps are giving children a voice that they did not have before.

Parents also benefit from research being done in this area. Having successful communicative apps will allow parents, teachers, and peers to help assist children with autism and help them enhance their social skills. Depending on where their child is at on the autism spectrum, apps could help a parent communicate with their child.

Due to the fact that there was very little research available on specific, new, trending apps, this thesis was geared towards other researchers who can use the data for themselves. They could use it to compare these results with other age groups of students to see if there are similar or differing results. Researchers could use this to compile a list of apps that are worth the investment to families versus ones that are not.

Further, as more research on apps for autism is gathered, it will be important to have documentation where the idea of apps for children started in 2014 versus where the

quality would be in 2024. This is very similar to the way research said that the computer and the Internet would become an integral part of our everyday life.

### **Scope of the Study**

This study was designed to be a valuable resource for parents, teachers, peers and students with autism. The study was meant to be a focussed case study. Therefore, the scope of the study is limited to what was beneficial or not to the group of children that were participants. It was meant to test both free and moderately priced apps and to see whether they helped children with autism with their social communicative skills.

One of the limitations of this study was that it was not being conducted with a large number of participants. The true value of the study is for the participants and their families. Nonetheless, this limitation was important for the study since students with autism are unique and the case study approach allowed the researcher to open up the view of autism spectrum related to each app for each individual's uniqueness. Without the case study approach, the nature of autism would be negated in the results.

## **CHAPTER II**

### **Literature Review**

#### **Introduction**

The term autism has evolved over the past century. This chapter will discuss the evolution of autism, explain what it is, and connect it to how educators are able to utilize 21<sup>st</sup> century technology to assist these students with their social skills. A discussion of the history of computer technology will occur. This lead to the potential the iPad has shown with children who have autism in education. Finally, a review on the importance of new iPad apps that are being designed to help children with autism concludes the chapter.

#### **Historical Overview**

The term ‘autism’ is a Greek word that comes from the term ‘autos’ meaning ‘self.’ The term was first used in 1911, by a Swiss psychiatrist named Eugen Bleuler. Although the term was first used by Bleuler, it was not until 1938 when Hans Asperger, an Austrian pediatrician began using the term within his practice. Uta (1994) translated Asperger’s first definition (written in German) of Asperger’s syndrome calling it “autistic psychopathy.” This term came from autistic meaning “self” and psychopathy meaning “personality.”

Autism generally causes an individual to have some difficulty in social situations. Asperger 1944 and translated by Uta (1994) conducted research with four boys and concluded that they showed, “A lack of empathy, little ability to form friendships, one-sided conversation, intense absorption in a special interest and clumsy movements.” Interestingly, it was noted that Asperger himself was known to show the same symptoms

that he was diagnosing others with. There were other doctors who followed in the footsteps of Asperger when it came to autism research.

Leo Kanner a doctor from John's Hopkins Hospital was the first to use the term autism in its modern sense in 1943. Kanner conducted research with 11 children who all showed similar results. According to Kanner (1943) all participants showed signs of "autistic aloneness" and "insistence on sameness." From this point, autism has become an area of major significance and research.

### **Types of Autism**

There were four major types of sub groups of autism. The first was known as Autistic Disorder. This was also known as 'Autism', 'Childhood Autism', 'Early Infantile Autism', 'Kanner's Syndrome' or 'Infantile Psychosis.' 'Autistic Disorder' was used until 2013 when The fifth edition of the Diagnostic and Statistical Manual of Mental Disorders began using the term Autism Spectrum Disorder (ASD).

Asperger Syndrome was another type of autism. According to Autism Research (2014) "It differs from autism primarily in the fact that there is no general delay or retardation in language or in cognitive development. This disorder is often associated with marked clumsiness. There is a strong tendency for the abnormalities to persist into adolescence and adult life. Psychotic episodes occasionally occur in early adult life." This is widely considered to be a mild form of autism where the individual is often considered high functioning.

Childhood Disintegrative Disorder is a rare form of autism that generally does not show symptoms until the age of two or three. A child develops normally until this age

before showing signs of the disorder. At this age, children often digress and begin losing some of the skills that they developed including walking and talking. Research Autism (2014) state, “Children develop a general loss of interest in the environment, by stereotyped, repetitive motor mannerisms, and by autistic-like abnormalities in social interaction and communication. In some cases the disorder can be shown to be due to some associated encephalopathy but the diagnosis should be made on the behavioral features.” This form of autism was described as being quite rare.

The World Health Organization (WHO) (2010) state that childhood autism is:

“A type of pervasive developmental disorder that is defined by: (a) the presence of abnormal or impaired development that is manifest before the age of three years, and (b) the characteristic type of abnormal functioning in all the three areas of psychopathology: reciprocal social interaction, communication, and restricted, stereotyped, repetitive behavior. In addition to these specific diagnostic features, a range of other nonspecific problems are common, such as phobias, sleeping and eating disturbances, temper tantrums, and (self-directed) aggression.”

This description and the characteristics of autism that were given by (WHO) are similar to what is used now.

In 2016, autism is diagnosed, as Autism Spectrum Disorder (ASD) rather than being separate like the categories mentioned above. Autism Speaks (2016) describes ASD as:

“Varying degrees, by difficulties in social interaction, verbal and nonverbal communication and repetitive behaviours. Autism Yukon (2016) state the “Spectrum



refers to a continuum of severity or developmental impairment. Children and adults with ASD usually have particular characteristics in common, but the conditions cover a wide spectrum, with individual differences in number and particular kinds of symptoms, severity: mild to severe, age of onset, levels of functioning, challenges with social interactions."

ASD essentially broadens the definition of autism to include many more characteristics. This eliminated the need to have different types of autism.

### **Current Issues**

In May of 2013, the American Psychiatric Association released the most recent manual for the diagnosis of autism. It is called The Diagnostic and Statistical Manual of Mental Disorders 5<sup>th</sup> Edition. This is the first edition that classifies all autism as Autism Spectrum Disorder.

According to the latest estimates (March 2014) from The Centers for Disease Control and Prevention (CDC) "1 in 68, 8-year old children in the United States has been identified with Autism Spectrum Disorder (ASD) compared to 1-2000 in the 1970s and 1980s." The numbers of children diagnosed with autism have increased. This is likely because of the broadened definition of autism as ASD.

There is debate on the reason why more people are getting diagnosed with ASD. Part of the reason is that all of the other types of autism mentioned above are now under the ASD umbrella and it covers a wider spectrum. With this wider spectrum, it is easier for a doctor to use the autism label.

Because of the increase in autism diagnosis, people are searching for reasons why. Some people believe that early childhood vaccinations have played a role in the increase

of autism diagnosis. Hamilton (2005) found that “Children who received vaccines containing a preservative called thimerosal, which is almost 50 percent mercury, were more than twice as likely to develop autism as children who did not. Although mercury has been removed from regular childhood vaccines due to growing safety worries, it is still present in other vaccines children might get.” (p. 145) Not everyone believes that vaccines cause autism.

Allegations that vaccines have caused autism are unfounded according to many medical experts including an organization called Autism Speaks (2014) who quoted a study by saying, “A meta-analysis of ten studies involving more than 1.2 million children reaffirms that vaccines don’t cause autism. If anything, immunization was associated with decreased risk that children would develop autism, a possibility that’s strongest with the measles-mumps-rubella vaccine.” There are definitely more people that believe that vaccines do not cause autism than people that do.

With the increase in autism diagnoses comes the demand to find ways to assist these students. Technology is an area that has evolved greatly over the past thirty years. The next section will explore the history of technology and connect it to the current technology that is available to assist in the development of social skill in children with autism.

### **History of Technology**

Technology has evolved so much over the last several decades that it is necessary to look at its history in order to discuss how it is being used now. The context for this will

come by showing how learning tools such as the Apple iPad can be utilized to help children with autism with daily tasks, both academically and socially.

Before looking at the research on how technology can be used to help children with autism, it is necessary to look at how technology has evolved over the past half century. The military began using technology during the late 1950's under the President Eisenhower. As discussed on their official website (2014):

DARPA was created in 1958 as the Advanced Research Projects Agency (ARPA). The political and defense communities recognized the need for a high-level defense organization to formulate and execute R&D (Research and Development) projects that would expand the frontiers of technology beyond the immediate and specific requirements of the Military Services and their laboratories” (p. 1).

In 1981, IBM released the first personal computer for home use. Wealthy people were among the first to get a PC. It was a full decade later when a man by the name of Tim Berners-Lee was credited with inventing the World Wide Web (WWW) in 1991. Lee was an avid programmer who was proficient with computers. The creation of WWW expanded the possibilities for people when it came to communication and obtaining knowledge. This was the beginning of the Internet, as most people know it.

Berners-Lee (2010) discussed how the web has so many different functions. “It also allows links between data from any form of life, academic, commercial, private or government. It can't censor: it must allow scribbled ideas and learned journals, and leave it to others to distinguish these. It has to be independent of language and of culture. It has to provide as good an access as it can for people with disabilities” (p.1). Berners-Lee believes that the Internet is for everyone regardless of cognitive ability. Children with

disabilities are now able to use the Internet for various tasks like communication, academics and gaming.

The WWW became such a large universally known domain during the late 1990s and early 2000s that companies were looking at ways to maximize profits and have accessible internet readily available to people in their homes. Many companies were releasing computers and laptops. Schools were beginning to purchase computers for the library and students would start doing research on computers rather than going to the library card catalogue.

In 2001, Wikipedia launched their version of an encyclopedia. People have been adding to it over the past fifteen years and it has become one of the top ten most commonly visited WWW sites in the world (Top 15). It has become the default search engine for students doing research papers and obtaining desired knowledge.

As computer technology became more popular, there was a demand for manufactures to develop portable computers that could be taken anywhere. In 2010, the Apple iPad became available. Examples of the benefits of the iPad came out in a major study conducted within a number of schools in Queensland, New Zealand (2012). For example, “The touch interface of the iPad allowed students to directly interact with objects and text on the screen, rather than via a mouse on the desk that moved an on-screen pointer” (p. 13). For the first time, students were able to touch a screen rather than only type words.

According to Hutchison (2012) “Devices such as the iPad promote anytime, anywhere learning in schools where the student does not have to be sitting in front of a computer in a laboratory setting (p.3). The child is able to take their work with them

wherever they go. This has immense benefits to a child with autism who could use the iPad to hold important information such as directions on how to get somewhere or reminders for a task that must be completed.

It is important that teachers and caregivers are active participants in their children's learning: Melhuish and Falloon (2010) state:

“It would be dangerous to ring-fence new technologies, effectively sidelining them and ignoring any potential they may have for supporting learning. Indeed, to do so would reinforce the perception already held by many younger people that their education is becoming increasingly detached and irrelevant, by failing to utilise the capabilities of technology to help them learn using other sources of information and from each other at any time, rather than simply between the hours of nine and three, while at school (p.10).”

One common trend that comes up while reviewing pertinent literature is that technology needs to be embraced by all teachers. There seems to be a general concern that some teachers would rather ignore the benefits of the iPad rather than learn how to use and implement it within their practice. This is dangerous to do because children are growing up in a technological age and if they are not allowed to express themselves through what they know, there is a concern that they could become lost in their education.

As the iPad becomes more commonplace in homes and schools, developers are focussing their energy on creating apps that meet the needs of all learners. It is important that developers continue to do their own research to keep up with the needs of children with autism.

Research has shown that there is potential for the iPad for children with special needs. All of the factors listed above contribute to the value of the iPad, but developers are creating apps now that tailor to the needs of children with specific special needs. Queensland (2012) concludes by saying, “The benefits of the iPad as an assistive device for students with multiple impairments were overwhelmingly positive, with great feedback from trial teachers, students and parents” (p.11). With an increase in student engagement, introducing the iPad is a step forward for technologies used in special education.

iPad technology is starting to shape how educators are working with students with autism in terms of what they need. Apps are available that teach social skills, routines, writing, numbers and many others. As Kagohara (2012) states, “Although iPads are widely used, there is limited research to support their learning benefits, with only anecdotal evidence on the iPad’s effects on challenging behavior for individuals with ASD” (p.307). It is important to obtain scientific data regarding the apps that are available. This will give parents an unbiased review of what could be valuable for their child. Over years, this list could be made available in simple form where there could be a website that parents could go to for a review of the app before they choose to purchase it.

### **Developing Social Skills in Children with Autism**

Many organizations like Autism Speaks (2012) state, “If you know one child with autism, you know one child with autism” (p. 1). This may be true however; there are a number of important features that are present in many children with autism. These characteristics are being taken from (Appendix # 1). A few of these features include

children having a lack of eye contact, having difficulty in group situations, difficulty obtaining or keeping friends, unhealthy habits and repetition. Children with autism often lack social and communicative skills with the people around them.

As MacKenzie (2014) states, “Children with autism are like emotional sponges, they absorb emotions and feelings of others around them. They may not interpret what the feelings are or why they are experiencing them. They likely just feel on edge and agitated” (p. 282). This agitation comes from a variety of factors that needs to be explored.

Many children with autism have difficulty with regular movement. Many children have a problem with their fine motor skills. MacKenzie (2014) states, “More than half have low muscle tone and about 9% have large muscle delays where the child looks clumsy” (p.46). This in part is why so many children spend time working on movement and circulation during their day at school.

Another important element of autism present at school is the ability of the child to learn. Research has shown that sleep is a major area of concern. MacKenzie (2014) says, “Two thirds of children with ASC have atypical sleep patterns” (p.49). This is a substantial number that certainly has a role in the academic output of these children in the classroom. Many children have difficulty with sleep at night due to a number of factors, but many children with autism sleep far less.

These factors make it very important that a child with autism receives a calm and quiet place to function; otherwise the child will have a very difficult time obtaining traction and success at school. If one is to expect a child with autism to become

comfortable, everyone in their immediate surrounding must be comfortable as well. A quiet environment is often enough for a child with autism to have success.

Many children with autism function best when an established routine has been set. When this occurs, the child is able to function within their surroundings and concentrate on the tasks being asked of them. Having a solid routine along with supports at school will better equip the child to have success.

When conducting a research study on autism, it is very important to note that every child is different, and conducting a literature review may prove to be quite difficult. MacKenzie (2014) argues that, “It is often difficult to compare study results due to differences in age of the subjects in functioning levels and co-morbid conditions like ADHD as well as diversity in the types of tasks and responses required” (p. 25). Although it is difficult to compare results, this study will look for patterns in the results from the children that are being used. Because there is minimal research showing the value of the iPad, the current study was a starting point for future research on the subject area.

The relevance of this study comes from the general theme that all children with autism have their own unique gifts and differences that make it quite difficult to compare with other studies. The review of the literature has shown that if the child does not come to school rested and alert, and if teachers do not provide an environment that is quiet and conducive for the child, then it is quite difficult for learning to occur.



## **Roles of Caregivers and Schools**

Many studies including Cunningham & Stanovich (2003) have shown that, “Early success at reading acquisitions is one of the keys that unlock a lifetime of reading habits” (p.671). It is important that parents read to their child from a very early age. Reading habits do not necessarily need to mean books and papers, but can mean anything involving digital technology. Working with a child with autism utilizing technology can help them have long term success that can help them in school and in life.

It is important that schools provide the necessary tools that will allow their students to succeed. Long (2009) states, “From very early on, reading was not simply a social activity but was suffused with the emotional engagement of competition and its implications for identity and self-esteem” (p. 190). Having the ability to read gives children an advantage. It allows them to find what is engaging and interesting to them, which could provide for lifelong learning. There are benefits to reading to children with autism. Although a child may be non-verbal, many can still hear. A child that hears a story about a red truck may become engaged long term to learn about red trucks. It should not matter whether the child has autism or not. The school needs to provide avenues wherein the child can succeed and incorporating technology is showing that a child with autism gains independence and becomes more engaged when it is available. According to Squire (1991), it is important that teachers meet the needs of their students by exploring “how they learn” (p. 8). When teachers know how their students learn they are better equipped to meet their personal and academic needs

Having the technology is important, but it is equally important that adults know how to use it and implement it properly before introducing it to their students. Coolican

(2010) states, “Proper parent training is pivotal and has been shown to enhance the communication skills of children with autism.” (p. 25) If adults are not comfortable with the technology then it will be very difficult to teach students. It is very important that the professional goals of teachers involve learning the new technologies that are available. As Ralph Tyler states (1949), “It is very necessary to have some conception of the goals that are being aimed at” (p.3). Teachers, EA’s and parents who know how to use the technology will be more able to teach their children how to use it. The more adults know technology, the more comfortable they will be in sharing it with their students.

Technology has changed the world in so many ways and can allow students to demonstrate their knowledge in newer, non-traditional ways. Teachers need to embrace this. Feeley and Strickland (2003) state, “The belief systems we develop play a large part in determining the decisions we make about what we teach, how it will be taught, and how we view the effectiveness of our instruction” (p. 339). If teachers, especially older ones, do not allow themselves to evolve, then students with autism will have a more difficult time succeeding than the child where technology has been made available. Smith and Stock (2003) say, “The constructed child is indeed made in our image” (p. 119). The teacher needs to continuously evolve these values to meet the needs of the 21<sup>st</sup> century child.

Teachers need to evolve. Noddings (2013) states that sameness is not efficient and can only lead to more issues in the school system. “Giving all of our children the same education, especially when the ‘sameness’ is defined in a model of intellectual excellence, cannot equalize the quality of education” (p. 190). Every child is different, especially those with autism. Families and teachers need to meet the needs of these

children by determining what they need. Everyone involved with the child must embrace this strategy or there is concern that the child will not be able to maximize his or her potential both in and out of school. Eisner (2013) states, “Teachers need to provide opportunities for youngsters and adolescents to engage in challenging kinds of conversation, and we need to help them learn how to do so” (p. 281). In order to make better schools, Eisner agrees, “We need to ask better questions” (p.285). These questions need to come from solid leadership in the school that will filter down to the educators that work with the students.

Teachers and students are always learning. Garton and Pratt (2009) state, “Learning transforms into actual learning through interaction with others” (p. 501). This is particularly important with children with autism. It is important that they are given the opportunities to work with their peers. This can enhance their social skills, allowing them to become more active participants in their learning.

Children with autism, regardless of their cognitive level have potential. It is up to the caregivers to determine how best they can serve their child. MacKenzie (2014) notes, “A lack of learning should first be interpreted as a result of the inappropriate or insufficient use of teaching strategy rather than an inability on the part of the learner” (p. 212). This is why it is so important that teachers are willing to evolve their practice to meet the needs of their learners. Technology is a relatively new option available that has so far been very good at helping children with autism in school.

There is certainly a discontent around the world when it comes to technology. There are many countries that do not have access to technology and, in countries where it is available, not all families can afford it. Cunningham and Stanovich (2003) state that,

“It is becoming increasingly evident that rich get richer and poor get poorer mechanisms are embedded in the social and cognitive contexts of schooling” (p. 666). In Western culture, there should be no excuse why a child would be unable to utilize technology. Regardless of whether families can afford it, the public school sector needs to make technology available to the children that need it.

As Wagner (2009) states, “A countries ICT investment can directly enhance the capabilities of its citizens” (p. 550). Both schools and government need to allow more funds to be dispersed to people with autism. New technology and apps such as the ones found on the Apple iPad are allowing children and adults to function independently.

### **IPad Studies**

Much of what is written focuses on the value of videos on the iPad and how they assist in developing routines and social skills. Video modelling is a strategy often used with people who have autism like studies completed by Buggey (2013), Cardon (2012) and Burton (2013). Essentially, a person shows the child a behaviour that they are asking them to replicate. Many iPad developers have created videos of routines that children can use to follow. These may include taking a shower, making a bed, being polite, brushing teeth and essentially any other routine that could be desired. Huang and Wheeler (2006) state that, “Research has found that the use of video modeling (including self-modeling and peer modeling) can have a great positive impact in the areas of social communication, daily functioning skills, and academic performance on children with various disabilities” (p. 170).

Early research like that of Delano (2007) has shown how video modelling can be very useful for children with ASD:

“Video modelling has been shown to be an effective strategy for teaching children with ASD...Video modelling has some potential advantages over other instructional strategies, including the lower cost and time commitment, the increased control over procedural integrity due to the pre-recorded instruction, and the constant accessibility to instruction because the video can be permanently available” (p. 36).

Not only does iPad video modelling help children perform desired tasks but it is economical as well. Tablet computers are useful for students with autism because some of the apps available for them easily and cheaply replace bulky, expensive older forms of assistive technology. New apps are allowing the user to create videos using the child in them.

Studies completed like Burton (2012) show that, “An immediate and abrupt change in student performance was observed each time the video model was introduced. The data demonstrates the efficacy of using visual stimuli to enhance skill acquisition when working with students with autism and limited cognitive ability.” (p. 3) This study shows how children with autism can use the iPad to demonstrate their understandings about important concepts and follow tasks. The valuable research here is that videos that are made with the child and/or his or her family members are more impactful than videos where the actors are unknown.

More (2008) discusses social stories and their value to help establish routines for children with autism:

“Digital technology provides a multidimensional forum for the creation and implementation of social stories. Creating the digital files of student pictures, backgrounds, scripts, and voice recordings allows the digital stories to be easily edited by cutting and pasting. Digital media can increase learning by gaining children’s attention through the use of technology and digital stories” (p.170).

Utilizing new apps like the ones on the Apple iPad have the potential to be more beneficial as the iPad is portable and the user can insert their own pictures and videos. This technology has far more potential than the traditional way of presenting social stories by copying stories onto a Word document and printing them with Clipart.

### **Potential Uses for the iPad**

Marturana states (2012) that, “The increasingly popular Apple iPad can be particularly appealing for young learners, as it is not only motivating but also provides opportunities for self-initiation. Further, the iPad includes many features that are potentially useful, including the capability to run a wide variety of software applications” (p.195)

Apps that are coming out are better than ever. Shuler (2012) states, “When looking at the App Store, one would see that much of the world’s bestselling apps have to do with young people and students. Fifty-eight percent of the 25 top-selling educational apps target toddlers/preschool children.” (p.25). There is a desire by app developers to focus on education because there are families that are willing to pay money on apps that could help their child.

There appears to be no limit to the possibilities of the iPad. Stockall (2014) says, “Apps have the potential to target a wide array of functional skills necessary for effective communication including joint attention, turn-taking, vocabulary development, increases in length and complexity of language, and pre-literacy skills” (p. 210). The demands of parents will have a role in what app designers are going to create in the future.

Since every child with autism is different. Stockall (2014) says the iPad can trigger the interests of the child and “provide varied opportunities to teach and/or support specific skill sets across naturally occurring routines and activities.” (p.197)

There are many apps available in the App Store that it is difficult to pick the most beneficial ones for the child in need. Stockall (2014) concludes that:

“Teachers may want to keep the following in mind: (a) child interest and skill level, (b) the type of feedback provided by the app in terms of visual and/ or auditory reinforcement, (c) ease with which the child can access and use the app, and (d) utility of the app across various contexts and/or routines (e.g., classroom, playground, lunch room). Teachers may also want to consider apps that focus on a skill or set of skills that a child may be lacking or needs additional motivation to acquire” (p. 213).

As more research is conducted with apps, more information will become available which will help designers create the next new revolutionary app.

There are more students being diagnosed with autism. There are many studies available like Picciotto and Delwiche (2009) where they state, “The rise in autism incidence has occurred during a time of diagnostic and legislative changes affecting the definition of autism and the availability of services for developmental disabilities (p.10). The medical testing and procedures available to professionals has become more advanced

in recent years. This has allowed doctors to diagnose autism at an earlier age than would have been available twenty years ago. There has been a move to put all autism under the umbrella Autism Spectrum Disorder (ASD)

It is important that educators know how to work with children with autism. In the area of math, children need to develop life skills involving money so that they can manage themselves in society. Burton (2013) claims, "Youth with disabilities are in need of instruction incorporating a blend of academic and functional math objectives" (p. 10).

According to Melhuish and Falloon (2010), "Education has a well-established history of taking devices not originally intended for educational purposes, and attempting to appropriate them for educational gain." (p. 12). An example of this is the iPad.

MacKenzie (2014) states, "When you find something, you tend to remember it. That's exactly what will happen: When the kids find it as opposed to being told it, everything changes" (p.8). When a child is able to explore, deeper learning occurs and when this happens they become engaged in what they are doing.

This is important research because as Nel Noddings (2013) states, "Every teacher has the obligation to provide an equal quality of education for all of our children" (p. 190). Through the use of the iPad, students with autism are now obtaining a voice that they may never have had otherwise.

Research has shown that the iPad is a revolutionary tool that will transcend the academic world for all learners. It is important to note that many articles have also shown that the iPad is capable of helping students with autism. The research talked about building independence, helping establish routines and succeeding academically. Further,



research shows that video self-modeling is helping children with routines and social skills.

## **Conclusion**

The world of technology has evolved over the last decade in order to support children with autism. There has been considerable research done on the value of computers and technology in school for students but there is minimal research that has been conducted on the value of specific iPad apps to assist in social skill development for children with autism. In part, this is due to the more recent use of apps and how they are now seen as valuable tools.

Autism comes in many forms from high functioning to non-verbal. This spectrum is vast and every child is very different. Some children are able to communicate with others and show minimal signs of disability whereas others require a full time educational assistant. These students may have difficulty with tasks like writing a story or lacking social skills that lead to disruptive or violent behaviour.

Technology has evolved in recent years and app developers are claiming that they have the solution to help children obtain independence and enhance their social skills by using their apps. This study aimed to evaluate the use of an iPad for children with autism. Specifically, it is necessary to look at how the child uses the iPad apps to assist in their development of social skills.

Most information found regarding iPad apps comes from the iStore reviews written. There is no filter on who writes the reviews, which calls into question the overall credibility of the reviews that are available. This study provided an unbiased evaluation

of the use of three free and moderately priced apps. The results will hopefully be used to provide feedback to future research that will take place. Chapter III discuss the research study, the participants and the procedures that occurred.

## **CHAPTER III**

### **Methodology**

#### **Introduction**

The focus of this research was to examine the interaction of students with autism as they used iPad apps that were purported to support development of their social skills. The methodology was based on a blended combination of case study and single-subject research in order to arrive at results that would show the uniqueness of individual subjects but at the same time apply comparison/contrasting between subjects in the study. The hypothesis of this study was that apps chosen for the purpose of the research successfully support the participating students with autism in their social learning associated with education. Data from an autism inventory, student interviews, and field notes were used to prepare 5 case studies about student interaction with 3 apps selected as assistive technology (AT) for students with autism. Case study data was compared and contrasted in the analysis to determine the usefulness of the assistive technology (AT).

#### **Considerations**

There were a number of factors that needed to be considered before embarking on this study. As discussed by Marshall and Rossman (2003), the following criteria must be addressed.

The first criterion was the “Do-Ability” of the study. This refers to whether this study could be conducted in the time frame that was available. It was also important that people could commit to the study. Also, it was necessary that the resources required for the participants were available during the study.

The second factor was the “Should-Do-Ability.” It was important to decide whether this study should be done. It was necessary to determine who would benefit from this study.

The final factor was “Want to-Do-Ability.” A research study takes a lot of effort and time. It was very important that the researcher was engaged in the topic. It was important for the researcher to convince others that what they wanted to study had merit and contributed to the research world.

All three of these factors were met. This helped the researcher reaffirm that this study was one that should be conducted.

## **Overview**

This study was based on a qualitative approach in line with Denzin and Lincoln’s (2007) statement that, “Qualitative research is a field of inquiry in its own right. It crosscuts disciplines, fields, and subject matters. A complex, interconnected family of terms, concepts, and assumptions surround the term qualitative research.” (p. 2). Robert Bogdan and Siri Biklen are leaders in qualitative research, and the methods that were used in this study followed much of their beliefs on what makes an impactful study. This methodology was chosen in order to achieve meaningful data regarding the apps. The researcher worked closely with the participants conducting interviews and observing them using the apps. This enabled the researcher to analyze the qualitative data and to make connections between the apps and the children using them.

Interviews are an important element of collecting qualitative research data. Cresswell (2012) defines qualitative interviews as “when researchers ask one or more participants general, open ended questions and record their answers” (p.217). This

method was adopted for this study because it was through ongoing dialogue that the researcher analyzed the value of the app that the child was using. Interviews provided the data that demonstrated whether the child was successfully able to accomplish what the app developers said the app was meant to do.

Direct observation of students using the apps was also implemented as a form of data collection for this study. Cresswell (2012) defines observation as, “The process of gathering open-ended, firsthand information by observing people and places at a research site. Advantages include the opportunity to record information as it occurs in a setting, to study actual behaviour, and to study individuals who have difficulty verbalizing their ideas” (214). Observations were appropriate for this study because it allowed the researcher to see the physical mannerisms that the participant exhibited while using the apps.

Children with autism generally have difficulty with social situations. (Appendix #1) contains the general characteristics of children with autism. This study was grounded by this questionnaire to evaluate how many of these characteristics the child exhibited. The questionnaire outlined which characteristics the apps could help improve the social skills of the child. At the end of the study, the researcher compared the questionnaire with the results of the interviews and observations to see if the app had any impact on the participants.

The main questions that this study addressed were: (1) How does the use of Apple iPad apps assist/not assist children with autism demonstrate their understanding of socially accepted behaviours and mannerisms? The following were sub-questions that assisted in data collection and analysis. (A) How does the child respond to the

application? (B) How quickly does the child use the app? (C) How does the child demonstrate independence using the app? (D) What attitudes does the child exhibit when using the app?

### **The Study**

Three iPad apps intended to support students with autism were selected for this research: (1) Social Skill Builder, (2) Quick Cues, and (3) Mission Rescue Kloog: Social Skills for Autism. These apps were carefully selected for this research based on their purported usefulness in supporting social skills for students with autism. To choose the apps, a Google search of recommendations of iPad apps for children with autism was conducted and then compared to parent and teaching blogs that advised the use of these particular apps. The 3 apps selected were repeatedly the top contenders for benefits.

The research involved five case studies with students using these apps who had access to a personal iPad. Students had 3 sessions with the researcher including: (1<sup>st</sup> session, Appendix 3) introduction to study and signing of assent forms, demonstration of apps following the guides provided by the app developers, (2<sup>nd</sup> session, Appendix 4) showing the researcher independent use of the 3 apps selected for the study and then the researcher interviewed the student about their use of the apps, and (3<sup>rd</sup> session, Appendix 5) final observation of student working with the apps and exit interview. Each session took approximately one hour over three weeks, one session per week. This developmental case-study approach enabled the researcher to observe the process of app use for the purpose of the study.

## **Participants**

The researcher approached the superintendents of school districts in the province of Manitoba asking for permission to conduct research with students from their school division.

Once permission had been obtained, the researcher contacted the divisional special needs coordinator, asked this person to identify 15 potential participants, and asked the coordinator to send an Invitation Letter (on behalf of the researcher) to potential families with a return envelope being sent directly to the researcher. Because there is a significant range in autism from non-verbal to exceptionally high functioning, the special needs coordinator was asked to identify students who fit the following criteria:

- Grades 6-12
- Students who are verbal and have conversations
- Students who have some difficulty with abstract text discussing social behaviours
- Own their own, or have access to an iPad

Once the primary caregiver had contacted the researcher, the researcher set up times to have the consent form signed and began the study at a convenient time and location for all parties. At that time, the researcher asked the participants to sign an assent form.

There was a preference to work with five students because this number gave a data rich sampling of the value of the apps that was being studied. Conducting research with five participants was also a small enough number that the researcher could spend an ample amount of time with each participant in order to obtain valuable case study data about the apps.

Every case of autism is different, and this qualitative study was conducted as five single subject case studies where each participant and their use of the apps was being evaluated separately. Each participant used the apps and the researcher evaluated how useful the apps were for the child in each particular case in comparison to what the app developers said their product was advertised to do. Each participant was given an equal amount of time with the researcher. Participants were not selected from the school that the researcher works in. This eliminated any power vis-a vis that could have potentially arisen.

### **How Data was Collected**

#### **Location of Study:**

This study was conducted at the participant's home or a mutually agreed upon location away from and after school to maintain confidentiality in as much as was possible. All precautions to maintain participant confidentiality were carried out including using pseudonyms instead of their real name.

#### **Number of sessions and length:**

Each participant had 3 sessions lasting no more than 60 minutes. The total time commitment for this study did not exceed 3 hours. All sessions were tape recorded (audio only) for the duration of each session. No video was ever taken during the study. Every effort was made to stick to the time guidelines without compromising the data that was gathered.



**How information was collected:**

- a. Sessions were recorded using a tape-recorder (audio only, no video)
- b. Transcriptions of all sessions were made for later discourse analysis.
- c. Discourse analysis (Gee, 2011) was used to analyze rising themes from the recorded sessions.
- d. The researcher wrote reflection field notes at the end of each session. The notes included: (a) impressions of how the session went, (2) a narrative about impressions of how the participant had been interacting with the apps from the researcher's observational point of view using the Rocky Point Academy characteristics list as a guide.

**Method and timetable of the interviews:**

The following process was implemented after receiving approval from the University of Manitoba Ethics Board.

There were 3 sessions that included: (1) assent, initial questions, introduction to apps, (2) student demonstration of independent use of apps and researcher interview, and (3) follow-up demonstration of independent use and final exit interview. All sessions were tape recorded (audio only) for the duration of each session. No video was taken during the study. Every effort was made to stick to the time guidelines for the data that was gathered.

**Session #1** Introduction and Initial Use Protocol (Appendix # 2)

**Session #2** Independent Use Observation and Interview Protocol (Appendix # 3)

**Session #3** Final Use Observation and Interview Protocol (Appendix # 4)

\*\*\*The following was the process for each of the three sessions.\*\*\*

**Session 1: Introduction, signing of student assent form, and orientations to 3 apps  
(maximum 60 minutes.)**

The following questions were asked of each of the participants:

- a. What is your name?
- b. How old are you?
- c. What grade are you in?
- d. What is your favourite subject in school? Please describe this.
- e. Do you like using technology? Please describe this.
- f. What are your favourite types of apps? Please describe this.
- g. What are some other things you like to do with technology in your spare time?
- h. What would you like to be when you grow up?
- i. Do you own/have an iPad? (Student will explain their access to the iPad: sole user, borrowed from school, shared with another, etc.)
- j. How often do you use the iPad?
- k. What do you use the iPad for?
- l. Have you ever tried any apps to assist your autism?
- m. The researcher completed Characteristics of Autism survey (Appendix #1)

**Demonstration of the Apps in the Study (maximum 15 minutes for each)**

The researcher explained the purpose of each the apps and demonstrated how to use each of them following the online instructions provided by the developers. This

information and the accompanying scripts that were followed are located within (Appendix #2). This is intended to prevent researcher bias in as much as is possible.

### **Between Sessions 1 and 2**

Participants were asked to practice using the 3 apps between sessions and report to the researcher how much they practiced and their overall experiences using the apps. The questions that were asked are located at the beginning of (Appendix #3).

### **Session #2: Initial use of the 3 apps (maximum 60 minutes)**

At the beginning of the session, participants were asked questions relating to their app use between sessions. These questions are located under the app protocol labeled within (Appendix #3)

The researcher then invited the student to open each of the apps, one at a time, and asked the participant to navigate them, in a demonstration of their use for the researcher. In as much as was possible, the researcher did not interfere with the students demonstration of their use of each of the apps and the researcher acted as observer of use, later to take reflection notes on this.

At the end of the session, the researcher asked the questions located under the app protocol (Appendices #4). The researcher also completed the 'Characteristics of Autism Checklist' (Appendix #1)

### **Between Sessions 2 and 3**

Participants were asked to independently practice using the 3 apps between sessions and report to the researcher how much they practiced and what their overall experiences

using the apps was. The questions that were asked are located at the beginning of (Appendix #4).

**Session #3: Observation and interview of student working with the apps and exit interview (60 minutes)**

Following independent use of the apps the researcher again met with the participant and asked how much time they spent on each app and how they felt about using each one of the apps. These questions are located under the app protocol labeled within (Appendix #4)

Next, the student independently used the apps as the researcher observed. The researcher completed (Appendix #4).

At the end of the session, the researcher asked the interview questions (Appendix #4). The researcher also completed the Characteristics of Autism survey (Appendix #1).

**Final session exit interview questions.**

At the end of the session, the researcher asked the exit interview questions (Appendix #4):

### **The Apps Included in the Research Study**

The principle purpose of this study was to assess how beneficial the iPad apps ‘Social Skill Builder’, ‘Mission Rescue Kloog: Social Skill for Autism’, and “Quick Cues” were in assisting the development of social skills for children with autism. One of the most prevalent features of autism is that the person has difficulty with social skills. There are certainly other forms, but for the purpose of this study, social skill development was the primary purpose. Children with autism often have difficulty communicating their desires or feelings. Some children are non-verbal and others get angry easily and become violent. This study used the iPad to determine whether there were beneficial apps that could be used to enhance the social skills of children.

The original plan for the study was to only use free apps. It became apparent rather quickly that many of the free apps offered in- app purchases that lacked the necessary substance to conduct a thorough research study. The free apps did not contain enough breadth of material to use in order to conduct and obtain enough research data to analyze. These apps were more of a work in progress where the developer is constantly adding material one element at a time, which gave the owner an option to purchase the upgrades periodically. Some of the apps reviewed prior to selection lacked enough tangible elements to assess for a study of this nature. For example, one free app had absolutely nothing that a child could work on without purchasing a \$3 upgrade.

The apps selected for this study were chosen from several criteria related to the common characteristics that are present in children with autism. The apps chosen range from \$0 -\$19.99 (USD) and are available in the Apple iStore.

**Social Skill Builder**

The first app that was used during the study was called “Social Skill Builder”, created by Social Skill Builder Inc. This app cost \$11.99 (USD). The app developer Social Skill Builder states (2016) this app is supposed to, “Help children and young adults demonstrate common social interactions with their peers and other adults” (p.1.)

Social Skill Builder was used to assess whether the child obtains better scores with each session. There were many video modules that could be used within this app. The videos selected were chosen based on the needs of the child. The themes within the video modules from the app include “My School Day’ with videos relating to transition time, walking in the hall, the playground, playing games, lunch time, school rules, assignments and playing with friends. Other themes involved going to restaurants, ordering food, and paying for your bill. There are also videos geared specifically to young elementary school children.

The child received a demonstration on how to use the app from the researcher during the first session, watched the video module, and answered the 10 multiple-choice questions. The participant was then given the opportunity to use the app with researcher assistance during the first session. After the first session, the participant was asked to use the app independently before the second session. At the beginning of the second session, the researcher asked questions relating to the students experiences using the app. During the second session, the participant demonstrated independent use of the app following the initial instructions that were provided in the script below, within this appendix. The same procedure was followed during the third session. Upon completion of the video modules

and the multiple choice questions, the researcher asked questions to the participant regarding their learning and understanding of the videos.

### **Mission Rescue Kloog: Social Skills For Autism**

This app was free from the iStore. The app developer, Shrine Centre for Autism (2015) states, “The Social Skills for Autism app is designed to teach children, adolescents, teenagers and young people with autism the social skills they need to operate effectively and comfortably in social situations” (p.1.)

During the study this app was used to gauge the students understanding of the text that was being presented. Participants read a series of short text based stories. At the end of each story they were asked to complete ten multiple-choice questions. If the participant answered 9 or more questions correctly, they passed in accordance of the rules within the app. If the user received less than 9, they were asked to redo the quiz. The number of stories read per session was limited to twenty minutes. After using the app, the research asked the participants their thoughts about the app based on (Appendix 2). Participants were also asked to practice using this app between sessions.

### **Quick Cues**

The third app was called “Quick Cues ”It is created by Fraser. The app is available in the Apple iStore for 5.29 (USD) per module. There are 6 modules.

These modules include communication, socialization, life skills, and coping. This app was completely based on written text focussing on communication and socialization, coping, and on the job. The app presented itself as a social story app. Fraser (2015)

claims that their app is supposed to, “Help teens and young adults on the autism spectrum handle new situations and learn new skills” (p. 1.) This app had the potential to be used to assess the participants understanding of words, vocabulary and idiomatic expressions. There were no pictures with this app, and the vocabulary within the social stories would suggest that the appropriate age group would be thirteen and up. Based on the needs of the participant, the researcher selected appropriate stories to review. The participant read and discussed the story with the researcher

## **Materials**

The Apple iPad was the primary tool used for this research study and each participant had access to one during the study. The apps that the participants used were installed on their personal device.

The researcher utilized the “Voice Record” app to record each of the three sessions. The researcher also observed and wrote notes.

## **‘Characteristics of Autism Checklist’ Analysis**

Rocky Point Academy (2016) is an organization that specializes in “learning and developmental struggles” They assist people with autism. They granted permission for their 86-question “Characteristics of Autism” checklist to be used for this study. The Rocky Point Academy developed a checklist of items that described the spectrum of issues faced by persons with autism. This checklist is not a tool for diagnosis, but rather a general set of criteria that may be present in people with autism. The researcher utilized the checklist to gauge whether progress occurred through the use of the apps.



The developers of the apps ‘Social Skill Builder’, ‘Mission rescue Kloog: Social Skills for Autism’, and ‘Quick Cues’ claimed that their individual app was useful in some way for social skill development in people with autism. This autism checklist was used to determine whether there was merit to the claims made by the developers. This study specifically focussed on the social skill development in students with autism.

These characteristics from the ‘Rocky Point Academy Checklist’ lead to a discussion during the analysis of data as to whether the apps were useful to the participant. Each case study was unique to the individual and therefore the profile of each student was unique according to his or her match between the app and Academy categories.

To analyze the data, a survey style questionnaire (Characteristics 2009) along with direct observations was used. From the onset, the researcher kept field notes of the first impressions of the participants and their demeanour. These notes were kept and coded throughout the process in order to see common trends that occurred throughout the study. It was important to look for common vocabulary, phrases or mannerisms and to place them into common groups for analysis. Other areas that were coded according to Lofgren (2013) were “actions, activities, concepts, differences, opinions, processes or whatever you think is important.” (Video 39 seconds.) Important facts came from a constant or repetitive response.

Data was also analysed through a comparison of the actions of the participant before the study and the way they behaved and interacted with others after the study. These results were determined through the questionnaires provided. The video

mentioned above showed how qualitative research data could be interpreted and coded in a variety of ways unlike quantitative research focussing on the analysis of statistics.

This study could be valuable to the research field because technology is always changing and it is important to have practical research being done so that others can know what to try or not try in their own situations.

Bogdan and Biklen (2003) state, “Analysis involves working with the data, organizing them, breaking them into manageable units, coding them, synthesizing them, and searching for patterns. Interpretation involves explaining and framing your ideas in relation to theory, other scholarship, and action, as well as showing why your findings are important and making them understandable.” (p. 147)

The questions asked in this study were used at three different intervals: before, during, and after. The interview questions were analyzed through coding and looking for responses that are similar or use the same language.

As Bogdan and Biklen (2003) state, “As you read through your data, certain words, phrases, patterns of behaviour, subjects, ways of thinking, and events repeat and stand out. (p. 161). These are patterns that the researcher looked for when analyzing the data.

Direct observation was also involved in the data collection process. Field notes were used to analyze the data. After each observation, it was necessary to record the findings. This included descriptions of the participants, their use of the apps, and their interactions and dialogue with the researcher.

## **Context**

This study focussed on the use of iPad apps to enhance the social skills of children with autism. The primary goal was to evaluate the value of each of the apps in terms of:

1. Usability, which is defined as, “The extent to which a product can be used by specified users to achieve specific goals with effectiveness, efficiency, and satisfaction in a specified context of use.” (European Union, 2006) Could the participant complete the task that they were working on? How much effort did the user need to put into using the app?

2. The speed in which participants used the apps. The apps in this study had an element of repetition and it was beneficial to see the participant’s speed using the app.

3. This lead to seeing whether the participant showed independence using the apps. The child was shown how to use the apps by the researcher and then as they used it during the second session, the gradual release of responsibility was passed to the participant where they had ownership over their participation in the study. Sessions were no longer than one hour in duration. The participants had autism and it was necessary to keep sessions at a length that would not be overwhelming. Sensory breaks were provided when necessary. Within this context, the success of the apps was measured and evaluated.

## **Potential Benefits**

There were a number of groups that could benefit from this study including:

### **1. Children with autism**

These students were provided with an opportunity to utilize technology to assist with their social skill development. It could provide for more meaningful learning and allow the child to become more independent.

### **2. Parent/Care Givers**

This study could provide an opportunity for families to communicate with their child in a way they were previously unable. This include being able to demonstrate an understanding of socially accepted mannerisms or having a discussion about facial features.

### **3. School Boards**

This research could provide valuable information regarding specific iPad apps that could be beneficial to use in school. This could result in more children with autism obtaining access and funding for the apps used in this study

### **4. Researchers**

Researchers could take this data and replicate it on a larger scale or with other age groups to evaluate the value of the apps. Researchers could go a step further by conducting research on other apps that could assist in the students learning.

## **Ethical Considerations**

It is necessary that everyone was reassured that participation in this study was completely voluntary and that they could withdraw at anytime. As Flick (2004) states:

“Persons, who are observed, questioned or who are involved in some other way in

investigations, for example in connection with the analysis of personal documents, shall not be subject to any disadvantages or dangers as a result of the research. All risks that exceed what is normal in everyday life must be explained to the parties concerned. The anonymity of interviewees or informants must be protected.” (p. 337).

There were minimal risks to participants in this study. Research was conducted at the home of the participant or a mutually agreed upon location to maintain participant confidentiality. The child had their guardian at the home or an agreed upon location when the research was conducted. This alleviated some of the stress for the child participating in the study. The parent was invited to stay close but about 10 feet away from the researcher/student exchange so that the participant’s attention was not deviated.

Further, participant names were removed from all transcribed data and any writing including work samples. Instead, pseudonyms (fake names) were used in the data. Participation in this study was voluntary and participants could have withdrawn from the study at any time with no questions asked. The interviews and sessions were tape-recorded (audio only, no video). The recordings were then transcribed and the tape recordings destroyed. The transcription and observation notes were analyzed and kept in a secure, password-protected file on a computer at the home of the researcher. The researcher was the only person who knew the identity of the participants. Participants were be informed that the faculty committee member, Dr. Karen Smith would see the transcripts, but all identifying information was removed prior to sharing these transcripts with Dr. Smith.

There was a survey, (Appendix #1) 'Characteristics of Autism' that the researcher utilized during all three sessions. This survey had many general characteristics of autism that children exhibit. The researcher used this survey to determine whether there were any changes based on the use of these apps. Because these characteristics were general, and they could be linked to anyone regardless of whether they have autism, there was minimal risk that anyone could identify the student that actually participated in the study.

Strict confidentiality was maintained throughout this study. The researcher's faculty advisor, Dr. Karen Smith, had access to the transcripts, but the names of the students were protected with pseudonyms (fake names). The researcher was the only person knowing the true identity of the participants. The recruitment process and consent forms remained confidential and the name of the participants were not made public knowledge. Research was conducted after school hours at the homes or another agreed upon location. This helped maintain participant confidentiality.

### **Limitations and Potential Bias**

With most studies there are limitations. Going into the study, it was unknown exactly where on the autism spectrum the participants were. Since each child with autism exhibits different characteristics, comparing the results of each participant was challenging. Every effort to describe these complexities was made. One participant might have had great success with the app whereas another participant may not have been able to use it at all. Keeping this in mind, the primary goal of this study was to treat this as a single subject qualitative study having five participants.

The potential bias in the selection process was that it was the school division special needs coordinator who mailed invitations to 15 potential participants on the researchers behalf. By providing the power to the divisional special needs coordinator to identify candidates, it could have potentially provided opportunities to one child over another. This was alleviated, in part, by the fact that this was a single subject, qualitative research design, where the results for each child were different because there are no two children the same when it comes to autism.

## **Conclusion**

This study was conducted to assess the value of three iPad apps for assisting children with autism in improving their social skills and behaviour. Apps were carefully chosen based on the positive reviews that they had on the Apple iStore reviews webpage and the parenting.com website. These reviews could definitely have biases based on who posted the reviews. For example, developers may have posted these positive reviews in order to get sales for their product. An additional purpose of this research was to put aside those biases in as much as was possible and get at the truth about the apps as assistive technology for students with autism.

There has been minimal research that focussed on specific iPad apps for children to develop social skills. Hopefully this study provided some valuable data that could be used in other schools. If there is value in these apps, it would be beneficial to have school boards invest in them and perhaps provide more iPads to students that could use them within their education.

## CHAPTER IV

### Analysis of the Case Study Data

#### Introduction

This chapter describes the results of five case studies of five students with autism. These students were interviewed three separate times for approximately one hour each time over a three-week period. The students used three different iPad apps to determine whether they were beneficial in their social skill development. The researcher used the ‘Characteristics of Autism Checklist’ to evaluate whether progress was being made over the three sessions.

Each of these five case studies were analyzed separately as each student with autism has their own unique strengths and weaknesses. Analysis was conducted using the researcher’s reflective notes and transcriptions from each of the three sessions. Further analysis was made using the Rocky Point Academy’s checklist that contains traits associated with people with autism. This checklist was used to categorize any changes that occurred during the study. All participants were given pseudonyms (fake names) to maintain their anonymity.

#### Case Study Participants

**Ewan:** Ewan is 11 years old. He is a grade 6 student. He enjoys video games and spending time with his family. Ewan used all three apps during the study but had particular success with ‘Social Skill Builder.’ Interview questions focussed primarily on body language, facial expressions, and socially accepted behaviours.



**Cookie:** Cookie is 13 years old. She is a grade 8 student. Her interests include video games and hanging out with friends. Cookie used all three apps. Some apps proved to be more challenging than others. Her sessions focussed on how to act in social situations, voice control, and body language.

**Jason:** Jason is 15 years old. He is a grade 10 student. His interests include music, the performing arts and working out. Jason used each of the three apps during the study. He was able to navigate each of the apps and converse regarding them. His interviews focussed on social skills, talking to others, facial expressions, getting a job, and collaborating with others.

**Sara:** Sara is 15 years old. She is a grade 10 student. Her interests include listening to music and hanging out with friends. She utilized all three apps. Some apps were more difficult than others for Sara to use. There was a heavy reliance on the researcher to lead the sessions, as she talked very little. Her interviews focussed on topics relating to how ask for help, getting a job, and how to act in particular situations.

**Robert:** Robert is 17 years old. He is a grade 12 student. Robert describes himself as a sociable person who enjoys being around others. He specifically enjoys his high school internship placement. Robert was able to use all three apps. He enjoyed some apps more than others. His interviews focused on how to converse with others, dealing with conflicts, and getting a job.

## **Participant # 1 Ewan**

### **Session 1 Summary**

#### **Background Information:**

Ewan is an 11-year-old student in grade 6. He enjoys all subjects in school. Ewan really enjoys Phys-ed. He enjoys playing video games and spending time with his family. He also says that he likes to spend time reading in the school library.

When asking some introductory questions it became evident rather quickly that Ewan processed information rather quickly. The first question he was asked was what grade he was in to which his response was “I’m in grade 11.” Asked again if he was in grade 11 he corrected himself by saying, “wait, I’m in grade 6.” Further into these preliminary questions, Ewan was asked if he liked math and his response was “I like painting.” Again, he corrected himself by saying “wait, wait, wait, I mean, I like math.” One more question relating to his favourite sport was asked and he responded with “dodge ball” to which he immediately said, “wait, I mean I like basketball... and dodge ball too.” Ewan did not elaborate further on the questions that were asked.

Ewan processed information quite quickly, often saying “ummm” with lengthy pauses between words. It seemed that he was ready to respond to questions before they were asked. He was quick to correct himself and was very excited and anxious to begin using the apps. As the researcher explained what was going to happen, Ewan was already trying to open the first app.

**Social Skill Builder**

Ewan was given the iPad and asked to navigate from the home screen to find the app. He was able to locate it on his own and opened it immediately. The app asked him to enter his name. Ewan had difficulty spelling his name, so the researcher said the letters for him to type. When he finished typing his name he was very excited saying, “I win.” He gave the researcher a high five and said “woohoo.” Because this was the first session the researcher asked Ewan to open up the video modules geared towards elementary students aged 5-12. Ewan was asked to open the first video called ‘Classroom’ by tapping the start button. He yelled, “Fire.”

The first video was about classroom habits and behaviours on how one should behave in a classroom environment. Ewan listened attentively to all videos. When it came time to answer the multiple choice questions, Ewan had difficulty with the recall despite it being read aloud. The researcher read the question and answers again and Ewan was able to pick the first answer. He was excited to know he got the first answer correct softly saying, “Yes.” During subsequent questions, Ewan continued to yell “fire” before the question started and was excited for every correct answer that he got. Ewan liked to explain the video to the researcher before making his multiple choice selections. If Ewan was not sure of an answer he wanted to watch the video again. He did this two times during the session.

Ewan seemed excited and emotionally invested in this app. Ewan said the word “fire” 12 times while using the app. This was an obvious sign of excitement for Ewan. Ewan wanted to do well and said, “Sorry” four times whenever he got an incorrect answer or needed help.

While watching the videos, Ewan smiled during appropriate classroom behaviours and made a frown when students were not behaving properly. Ewan was particularly upset when a boy in the video threw his textbook on the floor.

Ewan got a score of 8/10 on the quiz. He was excited for this score. The researcher explained that he got 80% to which he said “80 questions?”

After finishing using the app, Ewan became quieter and calmer almost instantly. The researcher asked a few questions about the app and Ewan’s thoughts about it. Ewan was asked if he liked the app and he said, “I like painting.” A moment after that the researcher asked if he liked the app and Ewan said, “Yes.” He was also asked if he liked the videos, questions, and animations. He responded by saying, “I guess.” Ewan used this term twice while using this app. Ewan did not elaborate further about the app after these questions. Ewan was asked if he would practice between sessions and he said, “Maybe.”

### **Mission Rescue Kloog: Social Skills for Autism**

Ewan was asked to open this app. The introductory video started immediately and Ewan yelled, “Crash landing” when the ship hit the ground. This introductory video was short and when it ended, Ewan said, “That’s it?” He was excited to see what would happen next. There was a pause where the app said, “loading.” The app would not start. It was necessary to establish a Wi-Fi connection before continuing.

The researcher began to read the story explaining the premise of the app to Ewan. When the reading was done, Ewan was asked if he understood and he said, “Maybe.” The app required a substantial amount of reading. The story read was called ‘Facial

Expressions.’ The story focussed on the recognition of the different facial expressions like happy, sad, mad, bored, angry, worried and neutral. Ewan wanted the researcher to do the reading out loud. Ewan had difficulty with reading and the vocabulary in this app was difficult. Ewan was excited to tap the screen when it was time to change slides. Many times during the session, Ewan yelled “fire’ when it was time to change slides.

Ewan was asked to demonstrate different facial expressions to the researcher after the explanation was read from the app. Ewan demonstrated throughout the session that he understood facial expressions. The researcher asked, “What is his face saying?” Ewan’s answer was “It is saying that he is kind of feeling a little happy.” To explain the term ‘excited,’ Ewan jumped up and down and said, “Oh boy! Can’t wait,” When asked to demonstrate other faces like ‘sad’ or ‘upset,’ Ewan chose to make sounds to help explain what those faces would look like. Ewan chose to yell and bang the table to demonstrate anger. He enjoyed acting these faces out for the researcher.

Ewan had some difficulty explaining and making a face for ‘worried’ and ‘neutral.’ The researcher explained that ‘worried’ is similar to ‘scared.’ Ewan was able to demonstrate ‘scared.’ The word ‘neutral’ was new to Ewan. He had difficulty with this term. He continually said the word ‘natural’ instead of neutral. The researcher told Ewan that ‘neural’ was an expression that meant not too happy and not too sad. Ewan repeated “Not too happy and not too sad.” The researcher continued to ask Ewan for the duration of the session what the meaning of ‘neutral’ was. The second and third time he did not remember the term but the fourth time he was asked he was able to say, “Not too happy, not too sad.”

As the researcher read the app to Ewan, he would often look away and the researcher had to prompt Ewan. Three times the researcher asked Ewan, “Are you looking at the picture?” Ewan also made a lot of noises while the researcher was reading. Ewan seemed disengaged by the reading that came in the app. The only part he liked was the introductory video and making facial expressions for the researcher.

After completing the reading, Ewan was excited to do the quiz. The quiz showed 10 pictures of facial expressions and Ewan needed to say what type of face it was. He was able to get 8/10 questions correct however this was not enough to obtain a passing grade. The two faces Ewan got wrong were ‘worried’ and ‘neutral.’ Ewan immediately wanted to do the quiz again. He quickly did it without prompting and scored a 10/10. He jumped and said, “Yaa!! Winner!”

Ewan was asked what he learned from this app and he said, “Was about the guy that crash landed.” Asked again what this specific story was about Ewan said, “Faces and how they feel.”

Ewan said the app was “Pretty fun but a little bit hard.” Asked if he liked the app, Ewan said, “Ya, I guess.” He did not elaborate on why he liked the app. Ewan was getting tired and was ready to move on

### **Quick Cues**

Ewan seemed tired as he had been yawning for much of the session so very little time was spent on this app. Ewan was asked to open the app and tap on the story ‘Safety.’ Upon opening it, he yelled the word, “Fire.” The researcher asked Ewan to read this

story, as it was pretty short and the vocabulary was not too difficult. Ewan read very slowly with a pause between words. Ewan needed help with some of the words.

The story was about safety, and specifically focussed on calling 911, opening the door, and answering the telephone. Ewan had difficulty answering the questions that the researcher asked. An example of this was when the researcher asked, “What should you do before you open the door.” Ewan responded by saying, “Close the door.” Another question that was asked was, “If you call 911, who will come?” Ewan responded with “The hospital.”

Ewan had difficulty both reading and discussing the contents of this app. Ewan was able to answer ‘yes’ or ‘no’ questions but was unable to sustain a conversation when it came to safety in the house.

### **Concluding Remarks from Session 1**

The session took place at 10:30 on a Sunday morning. Throughout the session Ewan was yawning. He seemed tired throughout and had difficulty staying on task. Ewan was most engaged by the ‘Social Skill Builder’ app and least engaged by ‘Quick Cues.’ ‘Mission Rescue Kloog: Social Skills for Autism’ contained reading that was above Ewan’s capabilities at this time. He did however do very well with the facial expressions quiz.

Ewan repeated himself a lot. He yelled “fire” 18 total times during the session and said, “I guess” as his response to questions 8 times.

Ewan was asked which app he preferred most and he chose ‘Mission Rescue Kloog: Social Skills for Autism’ followed by ‘Social Skill Builder’ then ‘Quick Cues.’

## **Session 2**

### **Social Skill Builder**

At the beginning of the session, Ewan was keen to begin. Ewan quickly opened the app before the researcher was able to ask any questions relating to what he accomplished between sessions one and two. Ewan immediately went into the first series of videos relating to 'eating' and was completely engaged. This was a video that he did not practice between sessions. He wanted to listen to the videos and complete the questions. He ignored all questions that the researcher was trying to ask. Anytime the researcher tried to interject, Ewan got frustrated, not wanting the researcher to ask any questions. He showed his frustration by telling the researcher to "shhh."

Ewan got frustrated with one of the videos involving 'trading food.' In the video, the actors portrayed the importance of being able to share. The actors were then sharing the food that they were eating. Ewan said, "I don't think I should share my food." Asked why it is not okay to share food, Ewan did not answer.

During the videos, Ewan began to mimic the video saying, "Excuse me, can I sit here?" This is an example of how deeply engaged by the app Ewan was and that he wanted to focus and get the answers correct. Ewan got very excited when he got questions correct. He liked to give the researcher a high-five when he got questions correct. Ewan also had sudden movements that occurred frequently with his arms after most questions. Ewan did well with the videos about 'eating' and 'sharing.' He got a score of 9/10 on the quiz.

Ewan had success with the first set of videos and he immediately went back to the main page and was asking the researcher questions about the other topics that were



available. He asked the researcher what 'transition time' was and then opened many of the video categories only to go back to the main screen after saying that he had already completed the video module between sessions.

After about one minute, Ewan chose the video category 'Laughter.' Asked if he laughs a lot Ewan said "maybe." Ewan had difficulty at first identifying the actions occurring in the videos. He got the second question wrong. He hit the table then chose to shut down the app and reopen it, rather than simply continuing with the quiz.

Ewan discussed what he saw in relation to one child laughing at another. Ewan said that the person used, "Mean words" and "She is feeling sad." Ewan was able to identify both positive and negative reactions that people had in social situations regarding laughter.

The next video involved one child telling another a joke. Ewan said, "A joke is a funny story." The researcher asked Ewan if he could tell the researcher a funny joke and he did not. Instead, he told the researcher to "shhh" as he did not want to be asked any questions while he was watching the video. As Ewan was completing these questions, he was talking very quietly to himself by repeating the multiple choice options. Ewan scored 11/15 on the quiz from the 'Laughter' module.

The session went rather quickly but the researcher realized that Ewan was not engaged by reading. It was decided to conclude the session by having Ewan watch one more video module. Ewan chose 'My school day-Team Games #1.' Ewan watched the first video and when the multiple choice question came up Ewan yelled, "It's frozen again!" Asked if it froze before Ewan said, "Ya." The researcher rebooted the app and again the app froze on the very first multiple choice question. Ewan began to get agitated

and was screaming and was close to tears. He then yelled, “Why won’t it work?” The researcher rebooted the iPad a third time and the app worked. Ewan was happy and he said, “Perfect!” He was then able to watch the rest of the video module and complete the questions. Ewan got 7/10 on the quiz. He was then asked what his favourite module was and he said the ones about ‘eating.’

### **Mission Rescue Kloog: Social Skills for Autism**

Ewan was asked to open the app. When attempting to get to the main screen the app got stuck on the “loading” screen. The researcher had to pause and setup the Wi-Fi on the iPad. This took about one minute.

Once the connection was established, the researcher asked Ewan to select, ‘Eye Contact.’ This app and module was difficult for Ewan. He looked around and did not follow the reading with the researcher. Asked if he had difficulty looking at people in the eye, Ewan said, “I don’t know.” Asked in a different way if he looked at people in the eye when he talked to them, Ewan said, “I guess so.” Asked if he always looked at people in the eye he said, “Sometimes.”

The researcher read the entire story to Ewan, as he did not want to read. He was asked twice, “Are you looking?” in response to following the researcher as he was reading. Ewan remained very quiet during the reading and was not engaged. Ewan yawned once during the reading and it appeared that he was anxious to be done with this app.

After completing the story, Ewan asked the researcher to read the multiple choice questions. The questions were about conversation etiquette at a restaurant. It was too

difficult for him. The researcher needed to read each of the multiple choice questions twice as Ewan did not understand them. Ewan had so much difficulty with this app because the vocabulary throughout was too difficult. The reading level of this app was not conducive to his particular abilities. Because of the difficulty of the app, Ewan became disengaged quickly by looking away and not following the researcher.

Further, the length of the multiple choice questions and the options were too difficult. Ewan had difficulty reading, which made it difficult for him to follow all of the reading along with difficult multiple choice questions. A problem was that by the time the researcher read all four possible answers, Ewan had forgotten what the first two options were.

Ewan did not complete the quiz. He scored 1/5 and the researcher determined that completing the quiz was not necessary. When asked after stopping the quiz what he thought about the questions, Ewan said that they were, “A little bit too hard.”

### **Quick Cues**

Ewan was asked to open this app and select the ‘Communication’ category. From there Ewan was asked to open the story, ‘Asking the teacher for Help.’ Ewan said that he does ask the teacher for help. Ewan’s response to when he asks for help was, “That, that, that, that’s what I need help because something is getting very hard and I don’t know what to do, so I have to tell them I need help.” Ewan commented that the teacher came to him when he needed help and that he does not go to the teachers’ desk.

Ewan was asked if he puts up his hand when he has a question and he said, “Well, I don’t know. I think I just tell them that I need help.” The story then discussed being

‘respectful.’ Ewan was asked what ‘respectful’ means and he said, “respectful means nice.” Asked if he understood the story he said, “I guess so.” Asked if he understood all of the words he said “yup.” The researcher asked if he knew the word patiently and he said “patiently means that you are waiting.”

When the researcher and Ewan finished reading the story he was asked what he thought about the story. Ewan said, “I think it’s pretty good.”

## **Concluding Remarks from Session 2**

Ewan enjoyed using the ‘Social Skill Builder’ app. He watched the videos and had success on the quizzes. He was able to discuss what occurred in the videos and was able to compare them to his experiences in school. Asked if he liked the app he said, “Ya, it was pretty good.” The app stopped working during the quiz at the end. Ewan was very upset by this. He said that this happened between sessions one and two as well.

Ewan had difficulty with ‘Mission Rescue Kloog: Social Skills for Autism.’ The vocabulary was too difficult. He was unable to follow the multiple choice questions and the researcher stopped half way through the quiz as Ewan was getting frustrated with the app. When asked if he liked the app he said, “I guess so, but it’s pretty hard.”

Ewan had some success with the ‘Quick Cues.’ He enjoyed the story that was read and was able to have a conversation with the researcher about it. The vocabulary was at a level that he understood and the story was short enough that he was able to follow it. Asked if he like this app, Ewan said, “it was pretty good.”

### **Session 3 Summary**

#### **Social Skill Builder**

The researcher asked Ewan to open a more challenging module called ‘School Rules.’ Ewan got the first question wrong about the emotions of others in the classroom and responded by saying, “Sorry.” Ewan tried the question again. The researcher asked if Ewan knew the words ‘thrilled’ ‘jealous’, ‘frustrated’, ‘bothered’ and he did not. This caused him to get the answer wrong again. The vocabulary in this module was much more difficult for Ewan. He wanted to continue with the app despite the difficulty. Ewan was engaged and asked the researcher what words meant in order to assist him with the multiple choice questions that came after the videos. One example was when Ewan asked the researcher, “What is a compromise?” Asking the researcher for clarification helped Ewan achieve more correct answers during the module. He began to get excited like he did in previous sessions by yelling, “Yes’ when he got a question correct. This module was much more difficult, but Ewan showed that he was becoming more comfortable with the researcher by asking for clarification on vocabulary he did not understand.

Ewan wanted to complete one more module. He navigated to the ‘Restaurant’ module about appropriate etiquette in a restaurant. Ewan looked at the researcher for affirmation before answering the multiple choice questions. An example of this was when Ewan repeated one of the questions then looked at the researcher. During the videos, Ewan looked at the researcher and said, “I hope I win at this one.”

For the second session in a row, the app froze and Ewan was unable to complete the module, however, he was doing very well and scored 4/5 on the ‘restaurant’ module.

He became frustrated and said, “It’s frozen again.... I want to finish this.” After 3 attempts at reloading the app, the researcher decided to move onto the next app.

### **Mission Rescue Kloog: Social Skills for Autism**

Ewan mentioned at the beginning that he had difficulty getting the app to work between sessions. When he did get it to work he mentioned again that it was too difficult and that after he finally did get it to work, it was too difficult. This app was too difficult for Ewan. The vocabulary was above Ewan’s current reading level. The multiple choice questions were too long for him to process. It was decided that there was no benefit to using the little time remaining in the session on this app. The researcher did install it on Ewan’s personal device so that he could practice it in the future.

### **Quick Cues**

Ewan was asked to open this app so that he could read a social story with the app. Ewan navigated to the story, ‘Friend or Bully.’ Ewan read the story to the researcher and paused to discuss examples that he saw in school. The story discussed how a friend should be. Ewan was asked if it was okay for a friend to take his things and never return them and he said, “I don’t think so, I don’t want that.” Asked if he knew what a ‘bully’ was, Ewan said, “A bully is someone that picks on you.” Asked why a bully picks on people Ewan said, “So they can get your lunch money.” Ewan commented that he did not have bullies in his class at school, which made him happy.

The story then discussed what made a good friend. Ewan commented that a good friend was “someone that stays with you and plays and has fun.” Ewan was asked one

more time if a bully was your friend and he said, “Absolutely not, negative, they are not!” Ewan did very well with this story. He was engaged by the simple vocabulary and simplicity of the story. He was able to discuss what a friend was and what a bully was. He was able to give examples about what a good friend does and how a bully behaved. He was excited sharing his thoughts while reading this story.

With the time remaining the researcher read one more social story called ‘Listening.’ Asked if he was a good listener, Ewan said, “I think I am.” He also said that he listens to the teacher very well. Ewan said that he, “Doesn’t listen to people that are strangers... I think I just listen to Mommy and Daddy, I think.”

Ewan began to converse with the researcher during each slide of this story. He mentioned being nervous sometimes when talking to others. He then brought up the word ‘paranoid’ and ‘paranoia’ saying that it “means you are afraid.”

Another slide discussed listening to people’s opinions. Ewan said, “Opinions are things that you think about.” His opinion of the hockey game that he went to the night before was, “I was happy that the good team won and I’m so happy that the bad team loses.” After finishing the story, Ewan seemed pleased with himself that he had a fun conversation with the researcher about listening and friendships.

### **Concluding Remarks from Session 3**

Ewan strived with the ‘Social Skill Builder’ app. He was engaged by the videos and wanted to achieve a good mark on the quizzes. Ewan became more comfortable with the researcher, asking for an explanation on the words he did not know. The app stopped

working for the second session in a row and Ewan said the same thing happened between session two and three.

Ewan did not use the ‘Mission Rescue Kloog: Social Skills for Autism’ app as it was too difficult for Ewan.

Ewan enjoyed the ‘Quick Cues’ app stories. He enjoyed telling the researcher stories and asked for an explanation on words he did not know. Ewan followed this app and had success with it, which helped increase his engagement.

Ewan was alert during the session and excited to participate. Ewan seemed tired during the other two sessions. It was difficult to determine whether fatigue during the first and second sessions was a factor as very little dialogue occurred or if Ewan had simply become more comfortable with the researcher by the end of the third and final session.

Ewan mentioned that ‘Social Skill Builder’ and ‘Quick Cues’ were his favourite apps and ‘Mission rescue Kloog: social Skills for Autism’ was too difficult.

### **App Connections to the Rocky Point Academy Checklist**

The Characteristics of Autism Checklist (Appendix #1) was used to gage the progress Ewan made with each of the apps. Because each case of autism was different, every participant did not fit into each category. The categories below are the observed behaviours assessed during each session with Ewan.

#### *1. Very little or no eye contact.*

The three apps provided very little eye contact for Ewan. He spent most of the time looking at the ‘Social Skill Builder’ app. He was engaged by the videos and multiple



choice questions. When asked direct questions, Ewan responded with his head looking to the side. The only time when eye contact was maintained was with the app 'Mission Rescue Kloog: Social Skills for Autism.' The reason for this was that the app had the user make certain faces and show them to the researcher. Ewan became comfortable with the researcher by the second session but he rarely made eye contact.

*2. Responds to social interactions, but does not initiate them.*

Ewan showed a lot of improvement in this area over the three sessions. Ewan was quiet during the first session, only wanting to answer questions in the 'Social Skill Builder app.' During the second and third session, Ewan gradually began to initiate conversation with the researcher. These conversations extended from content from each of the apps. Ewan connected situations from the videos in 'Social Skill Builder' to experiences that he had in school. This led to him discussing what he liked and disliked about school.

*3. Does not generally share observations or experiences with others.*

Ewan did not share any experiences during the first session. He enjoyed using the apps but was uncomfortable with the researcher. The 'Social Skill Builder' app gave Ewan a voice. During the second and third sessions, Ewan was excited to share his interpretation of the videos. He would also ask for clarification if he did not understand what was happening in the app. He did this by asking the researcher to explain words he did not know prior to selecting his multiple choice answers.

4. *Difficulty understanding the rules of conversation.*

Ewan did well in this category throughout all three sessions using the ‘Quick Cues’ app. Ewan was shy in the beginning but became more personable each session, enjoying having conversations with the researcher.

Ewan did have difficulty following the rules of conversation using ‘Social Skill Builder.’ Ewan was completely immersed in this app. It was incredibly difficult to pry Ewan from this app. He would tell the researcher to “shhh” and he ignored all questions until he was done a module. This did not improve during the three sessions.

5. *Unaware of/disinterested in what is going on around them.*

Ewan was engaged during the three sessions using the ‘Social Skill Builder’ app. He was on task 100% and was not distracted by anything happening around him.

Ewan was engaged using ‘Quick Cues’ when the stories were of interest to him. When he was not interested, he looked around a lot, and the researcher had to repeat the questions multiple times in order to refocus Ewan.

The only times when Ewan was engaged by ‘Mission rescue Kloog: Social Skills for Autism’ was when the opening video played. While the researcher read the content of the app to Ewan, he would be looking around the room. He got up three times to walk around and the researcher asked many times if he was listening. This was the app that Ewan was most disinterested in and it did not improve from one session to the next.

6. *Ritualistic or compulsive behaviour patterns (sniffing, licking, watching objects fall, flapping arms, spinning, rocking, humming, tapping, sucking, rubbing clothes).*

During all three sessions, Ewan showed excitement when he got a question correct. He often would say words like “yes” or “I’m a winner.” Ewan also twitched a lot, moving

his hands around during the first session but it did not continue during the second and third sessions. Perhaps this was a sign of nervousness for Ewan, meeting someone new for the first time.

7. *Play is often repetitive.*

Similar to the last characteristic, Ewan had a routine during the first session. He used the word “Yes” fourteen times when he did something correct. Ewan also yelled the word “fire” twelve times when he was asked to push a button. These behaviours did not continue during the second and third sessions. Ewan also used the term “I guess” fifteen times during the three sessions in response to direct questions.

It was obvious that Ewan repeated himself but it appeared that it happened most frequently when he was excited. During the second and third session, Ewan was calmer and rarely exhibited repetitive behaviour beyond saying, “I guess” to researcher questions.

8. *Difficulty attending to some tasks.*

Ewan was on task during the three sessions except when using ‘Mission Rescue Kloog: Social Skills for Autism.’ Ewan tried to be engaged with the app but the level of difficulty was too great for him to have success. This led to him becoming disengaged and eventually he stopped paying attention. Ewan did not even use this app during the third session. Instead it was decided to focus on the other two apps.

9. *Inability to perceive potentially dangerous situations.*

This category was included because of the time spent reading the ‘Quick Cues’ story, ‘Safety at home.’ Ewan had difficulty discussing the concept of opening the door to

strangers, calling 911, and answering the phone. This was an area that needs to be revisited with Ewan in the future.

*10. Verbal outbursts and laughs, cries, or throws a tantrum for no apparent reason.*

Ewan demonstrated his emotions during the first session by saying, “Yes” when getting questions correct. He would also flap his arms while watching the videos and high five the researcher frequently with correct answers. This emotion was limited to the first session only.

Ewan became very upset and agitated when the ‘Social Skill Builder’ app froze when he was doing a quiz. He banged the table and was very upset that the app stopped working. He was upset but settled after about two minutes when the researcher got the app to work again. This was the only example of a verbal outburst during the sessions but it raised the question about how Ewan handles himself in social situations when he may have a conflict with others. Ewan was calm during the third session.

*11. Becomes overwhelmed with too much verbal direction.*

Ewan was consistent throughout all three sessions that he did not want to be talked to while watching the videos and answering the questions. He ignored or said “shhh” to the researcher anytime he was asked a question.

Mission Rescue Kloog: Social Skills for Autism also overwhelmed Ewan. There was simply too much text for him. Also, the text was written at a level that was above Ewan’s ability. By the time it was time for Ewan to complete a quiz, he forgot what much of the text was about making the quizzes pointless for Ewan to complete. The only exception was when Ewan had to complete a quiz identifying facial expressions. It was different because Ewan was looking at faces rather than reading text.

*12. Exceptionally high skills in some areas and very low in others.*

Ewan appeared to be a visual learner. He consistently did well with the quizzes relating to the videos in the ‘Social Skill Builder’ app. Ewan had some success with the ‘Quick Cues’ app. He demonstrated an exceptional understanding of the story ‘Friend or Bully’ but he had difficulty with ‘Safety at Home.’ ‘Mission Rescue Kloog: Social Skills for Autism’ was a difficult app for Ewan to use. There was too much difficult text for him to comprehend.

*13. Difficulty with reading comprehension (can quote an answer, but unable to predict, summarize or find symbolism).*

The text in ‘Mission Rescue Kloog: Social Skills for Autism’ was too difficult for Ewan’s current reading level. He was unable to summarize the text from the modules and was unable to complete the quiz because they were too difficult.

*14. Short attention span for most lessons*

Only ‘Mission Rescue Kloog: Social Skills for Autism’ was unable to keep Ewan’s attention span for the reasons mentioned above and throughout this analysis.

### **Concluding Remarks**

Ewan was a visual learner throughout the three sessions. He enjoyed the ‘Social Skill Builder’ app often beginning a module before being prompted. He did well with all quizzes and was very upset when the app froze during session two. He did, however, have difficulty answering any questions from the researcher while he was using the app. He was unable to stop using the app momentarily to have a discussion with the researcher. All questions needed to be asked at the end of the session.

‘Mission Rescue Kloog: Social Skills for Autism’ was an app that was simply too difficult for Ewan’s reading level. He was unable to complete or pass a quiz. The researcher decided that it was best to focus on the other two apps.

‘Quick Cues’ was an app that Ewan had both success and difficulty. Some of the stories were written at a level that he could understand and others were not. This app showed that it had potential to help Ewan as he was able to discuss themes that arose and make personally meaningful connections. It is necessary for Ewan to regularly review this app in order for it to truly help him with his day-to-day social skill development.

## **Participant #2 Cookie**

### **Session 1 Summary**

#### **Background Information:**

Cookie is a 13-year-old, Grade 8 female student. Cookie was in good spirits and receptive to participating in this study. She said that she enjoys her school and that the kids at the school are nice. In math, she has been studying fractions. She said that she liked math but had difficulty with abstract concepts. Cookie said that she was “not really good at fractions.” She also said that she had been working on geometry and angles. In English Language Arts, Cookie had been working on reading responses but did not want to elaborate further on this. Cookie was excited to talk about science. Her class had been working on a cells unit. She appeared to be very knowledgeable of all the parts of the cell. She was able to list them from memory but did not elaborate on what the specific functions of each cell part were. Her favourite class was foods where she gets to cook.

Cookie enjoys sports and hopes to play basketball on the school team this year. She also has a pet turtle that she excitedly showed the researcher. In her spare time, Cookie enjoys playing video games, specifically, 'Super Smash Brothers' and 'Super Mario Maker' for the Wii U. When asked about technology, Cookie said that she liked the computer but does not use it a lot. Asked about whether she uses her iPad frequently, she said that she does not.

During this initial conversation, Cookie was very quick to respond to questions. She was prone to providing short and precise answers. Many questions resulted in 'yes' or 'no' answers. Her responses to questions were very fast. Cookie seemed to process the questions rather quickly rather than thinking about her response. For example, when asked about which game system she liked, she often referred to a specific game like 'Smash Brothers.' It was only when asked if the system was Nintendo, Xbox or PlayStation that she responded to Nintendo. These basic errors in language could be due to the question not being clear or Cookie answering too quickly.

### **Social Skill Builder**

The first session began with Cookie being introduced to this app. Cookie was asked to open the app, type in her name, and choose the video module called 'Classroom Behaviours.' After each short video there was a multiple choice question. Cookie got a score of 7/10 on this module the first time and it took approximately ten minutes to complete. The questions that she got correct involved literal, concrete answers. She got 3 questions incorrect. They were about recognizing the feelings of others.

When she finished using the app, Cookie was asked general questions about the app and how it made her feel. Cookie was asked what her first impression of the app was. She said, “There was no volume.” This was interesting because she went through the app, and did the quiz, which took 10 minutes, and her first impression was that the iPad volume was not turned on when she first started watching the first video. This was an example of how Cookie perceived her surroundings in a very literal manner. She was asked what the app was about and she said, “Watching videos and taking questions.” When asked to elaborate, she again commented that it was like a test, rather than discussing the social aspects of the story.

Cookie was asked if she enjoyed that app and she said, “It was good” and that she liked the questions. She thought that the app was applicable to her but did not elaborate.

Cookie did not like the 3d animations that came at the bottom of the page after she got a question right. She said that it was “weird.” She again said that she liked the app but felt that it is geared towards younger kids primarily because of the animations and encouragement that was provided by the narrator of the app when getting a question right.

Cookie was asked how the developer could make the app better and Cookie said, “Make it more fun.” Asked, how that could be done, Cookie had no suggestions. For the next session, Cookie was asked how she could do better and she responded by saying, “If I don’t get the questions wrong.” She was asked how she would do that. She did not have a response. She was asked if she could do better if she slowed down. She said, “Yes.”



**Mission Rescue Kloog: Social Skills for Autism**

Cookie was introduced to this app by watching the introductory video of a spaceship crashing into earth. This was followed by text explaining that the alien must learn the social customs of people on earth. Cookie read this explanation out loud and then began reading the first story entitled 'Body Language.' She read very quickly. Cookie seemed nervous to read out loud. She was able to read the words properly but she did skip and miss some words. This was due to the speed that she was going. After a short period of time it sounded like she was out of breath. Close to the end of the story, she was beginning to sigh and it was apparent that she was getting frustrated with the text. The researcher finished reading the last few slides. When she did the quiz at the end, Cookie received a score of 5/10 which was not high enough to pass the module. Cookie rushed through the questions. It appeared as though she was not thinking about the answer, as she simply wanted to complete the task.

After the process was completed, the researcher asked Cookie about the app and she said that it was more difficulty than the first app. She said, "It was difficult because I don't have enough right questions." She was asked to elaborate but she did not. The researcher asked if she thought the opening sequence was entertaining and she said, "Not really." Cookie again said that this app was much more difficult than the first app. She said she did not like that it did not tell her how many questions she got right at the end.

Cookie seemed to understand the underlying theme of the app but was frustrated by the quantity of text. Without trying, it is difficult to predict if reading silently vs. out loud would have made a difference or not. Cookie became very agitated during app use; she was constantly looking away and reading quickly as a way to complete the task more

quickly. Had she been more engaged, she likely would have taken her time with the text and the questions. Cookie was asked if she thinks she should slow down, and she said, “Yes.” Asked her how she would rate the app, Cookie said, “3/10.” She was asked to elaborate but she said that she could not.

### **Quick Cues**

Quick Cues was the final app that was tested. Cookie appeared to be getting tired therefore, very little time was spent on this app. Cookie was asked to open the app and select the story, ‘Asking the Teacher for help.’ The researcher read this story slowly to her because she read so much with the last app. The story gave some tips on how to ask for help. Cookie was able to recall the information from the story quickly. Cookie was asked to give an example and she said, “Raise a hand and wait patiently.” She was asked for another example from the story and she could not provide one. She was happy with the vocabulary in the story and gave a discussion on what “patiently” meant. She said that it was important not to talk out of turn. The researcher asked her if she liked the story and if it was useful and she said that it was “because they help me learn more.”

### **Concluding Remarks from Session 1**

Cookie seemed to enjoy using these iPad apps. She was polite and courteous during the sessions however; she made minimal eye contact with the researcher. She would answer any question that was asked directly. Her answers were often very short and literal.

Cookie seemed to enjoy the ‘Social Skill Builder’ app. She liked the videos.

Cookie had a very strong vocabulary but she seemed frustrated with the amount of text in the ‘Mission Rescue Kloog: Social Skills for Autism’ app which was likely why she did not get a passing grade on the quiz. Cookie liked the ‘Quick Cues’ app but time did not permit to explore that further during the first session.

These apps were installed on Cookie’s iPad and she said that she would practice using them prior to the second session.

## **Session 2 Summary**

### **Social Skill Builder**

At the beginning of the second session, Cookie immediately opened the ‘Social Skill Builder’ app. She was able to navigate quickly by opening the app, tapping her name, and opening the story that she practiced between sessions one and two. Cookie was asked how many times she watched the video and Cookie said, “I guess two times.” Cookie seemed to be excited to show the researcher what she was working on. She navigated to the video called, ‘School Rules.’ As she was watching the videos, the researcher asked about Cookie’s class and she said that she had a nice class. When asked if there were students in her class that talked too much she responded by saying, “Ah not really, I don’t know.”

Cookie was becoming tired as she used this app. She selected the Restaurant etiquette module. Cookie again commented that she did not like the animations that were placed at the bottom of the screen when she received a correct answer. Cookie also

commented that the videos were “old.” As Cookie went through the quiz, she said that the questions were too easy. Cookie got 13/15 on the quiz.

### **Mission Rescue Kloog: Social Skills for Autism**

Cookie then showed the researcher what she did between sessions with the ‘Mission Rescue Kloog: Social Skills for Autism’ app. She was asked if it was easy to use and she responded, “Slightly normal until it crashed.” She continued saying that it crashed every time she tried loading the app. She later admitted that she was unable to use the app between sessions.

Cookie started with this app for new content because she was unable to use it between the first and second session. Cookie commented that she did “bad” on the quiz from this app during the first session. Cookie used the researchers iPad to open the app and navigate to the module on ‘Eye Contact.’ Before reading the app, Cookie again was reminded about reading more slowly. During the story the researcher asked if Cookie had a hard time with eye contact. She said, “No.” When asked if looking at people in the eye made her uncomfortable, Cookie said, “Ya.” Cookie was unable to elaborate. After completing the story, Cookie wanted the researcher to read the multiple choice questions to her. With researcher assistance, Cookie was able to do very well on the quiz, getting a score of 9/10.

### **Quick Cues**

Cookie showed the researcher that she read ‘Safety at Home’ and ‘Voice Control’ between sessions. The ‘Voice control’ story was important for Cookie as she had

difficulty in this area. Cookie said that this story was about “using my voice skill.”

Cookie and the researcher discussed what normal conversation volume should be and she said, “Moderate.” The story gives the reader a scale of 1-5 where one was a whisper and five was yelling. Cookie was able to show the researcher what all five levels would sound like. Cookie was asked what number would be best for school and she said, “Two.”

Cookie and the researcher continued to read the story but Cookie was reading very quickly, therefore, the researcher asked Cookie to read slower as this would help with comprehension. Cookie again said that she liked this app but still prefers the ‘Social Skill Builder’ app because it is more interactive.

The researcher and Cookie chose the social story ‘Conversation Tips.’ Cookie was asked, “When you have a conversation with somebody, do you start talking or does somebody else start talking? Cookies response was, “Ah, ah, both possibly.” To clarify, the researcher asked, “Sometimes you’d start; sometimes your friend starts?” Cookie said, “Ya.” The researcher was trying to get Cookie to have more of a discussion by asking about her interests in between reading from the app. Cookie mentioned basketball and video games as her primary interests but she did not elaborate.

The story mentioned “personal space.” Cookie knew exactly what this term meant. Another tip from the app mentioned that bragging was not a good idea. Cookie was asked what bragging meant. She said, “Ah...what do you like? How are you? How are you? How are you?” This term was difficult for Cookie.

To conclude the session, the researcher told Cookie to think of some questions for next time about hockey as a way to have a conversation

## **Concluding Remarks from Session 2**

Almost half of the session was a recap from what Cookie did between sessions one and two. Cookie was excited about the ‘Social Skill Builder’ app. Perhaps the reason for this was that it was the easiest for her to do. Cookie seemed disengaged and frustrated by the ‘Mission Rescue Kloog: Social Skills for Autism’ app. This was because of the amount of reading and the difficult quizzes along with the app crashing on her. ‘Quick Cues’ involved less reading and had easier vocabulary. Cookie understood most of the works and answered direct questions, however, having a sustained conversation with Cookie was quite difficult as a review of the transcripts show most of her answers were one word.

## **Session 3 Summary**

### **Social Skill Builder**

The researcher had a quick conversation with Cookie about this app regarding whether she practiced it between sessions. Cookie said that she did not practice using this app. The researcher was satisfied that this app did not need to be used during the third session because she was able to complete the quizzes related to the video modules, with a high level of success that it was decided that the third session would be spent on the other two apps.

### **Mission Rescue Kloog: Social Skills for Autism**

This app caused problems for the researcher and the participant. The app required Wi-Fi to load the modules. If the Wi-Fi was not turned on, the app would not work. This

was confusing because there was nothing within the app that required the internet. There was no place on the developers' website that suggested that Wi-Fi was required. This caused some delay when beginning to use this app. Cookie said, "I don't know if it is working or not." This is an issue for anyone, but especially for people with exceptionalities when they expect an app to work and it doesn't.

When the app was connected to Wi-Fi, Cookie navigated to the module 'Conversation Starters.' Cookie seemed to enjoy reading this social story because it gave her an opportunity to discuss how she interacted with others. Cookie admitted that she was "Pretty quiet" and "I don't talk that much." She said that she had five close friends but that she did not initiate conversations frequently.

The story mentioned the term, 'breaking the ice.' Cookie was asked if she knew what that meant and she said, "breaking the ice is like a hammer." Cookie comprehended vocabulary in a literal sense. She seemed to have difficulty with idiomatic expressions.

Cookie was familiar with the rules of conversation and etiquette. Cookie was asked, "How do you know when it is your turn to talk?" Her response-"You have to wait until it is your turn... Wait until the person is done talking."

Cookie was asked to initiate a conversation with the researcher. Cookie asked the researcher, "How was your weekend." This was a good conversational starter question, but the day the interview was conducted was on a Friday. This was an example of Cookie's processing speed when talking with others. This will be elaborated on within the analysis within the Rocky Point Academy Checklist. Cookie had difficulty asking any other questions at this time saying, "I have nothing else."

Cookie continued to read ‘Conversation Starters.’ She was observed getting easily distracted and looking around. It was not until the researcher started asking direct questions that she began to refocus. The app mentioned the idiomatic expression ‘Chitchat.’ At first, Cookie was confused by the term; her facial expression indicated that she was unfamiliar with the term. Cookie mentioned that chitchat was “talking to someone that you don’t know... and someone that you will never see again.” From this response it was evident that she had heard the term before but had difficulty making a connection to it.

A common question that is asked every day is, “How are you doing?” Cookie was asked if people every day asked her that question and she said, “No.” Later in the interview she was asked this question again and said that it was a question used to start a conversation.

At the end of this app use, the researcher and Cookie reviewed how to have a conversation. She was asked what the researchers pets name was. She was able to state the name. From there, she was prompted to ask a question. She asked, “How is your bunny doing.” The researcher asked what Cookie’s favourite food was and she said sushi. Cookie then asked the researcher what his favourite food was. The questions that Cookie asked to use in conversation were copied from the questions that the researcher originally asked.

Cookie requested to do the quiz by herself. After question 3 she said, “This is so hard.” The researcher then read the last seven questions and the multiple choice options for Cookie to choose from. Cookie received a score of 6/10. At the end, Cookie said she would do better if, “I don’t get confused again.”



## Quick Cues

The researcher chose ‘Conversation Starters’ to read as it had a connection to the story read with the previous app. Cookie seemed to have more success with this app. As she read, Cookie was able to stop and have a short conversation with the researcher. At the beginning, Cookie asked without prompting, about the researchers rabbit. The rabbit discussions lead to connections being made to her pet turtle. “My turtle is a baby” and then Cookie said what store the turtle came from. Cookie then talked about the other animals that she saw in the pet store.

Cookie was praised for the discussion involving her pet. She was asked to continue the conversation by asking the researcher a question. Cookie asked, “What do you wish to have?” She asked what the researcher wanted to buy. She was asked to continue asking questions. Cookie asked, “How are you?” These questions took at least 20 seconds to come up with.

The next portion of the story discussed ‘common interests.’ Cookie understood what the term meant. She was able to list that the researcher liked cooking and hockey. Cookie was asked if there were any common interests. She admitted liking to cook but said, “Hockey is too dangerous.”

Cookie showed progress using this app, as she was able to have a better dialogue using ‘Quick Cues’ rather than ‘Mission Rescue Kloog: Social Skills for Autism.’

The app provided a quick dialogue on things one should not ask about another during a conversation. These topics include politics and religion. Cookie was asked if it was appropriate to ask others about these topics and she said, “No” because they were

“dangerous” and a “secret.” It was evident that Cookie understood the basic rules of conversations.

Cookie was asked, “What did you learn from Conversation Starters?” Cookie answered this question literally by responding, “Say hello or how it’s going. Say their name. Be respectful. Hide politics and religion. Use who, what, where, when, why. Both people should ask questions.” This response came directly from the text in the story.

The final few minutes were spent on a second story called ‘Conversation Tips.’ This story gave one sentence tips on how to have a conversation with others. The discussions of common interests lead to video games. Cookie said, “I like video games.” She was asked if her friends like video games and she said “I don’t know.” Cookie said that she was a good listener and would pay attention if the researcher talked to her about hockey because it would be polite even though she would not be interested in the topic.

### **Concluding Remarks from Session 3**

Cookie seemed to connect better with the ‘Quick Cues’ app over ‘Mission Rescue Kloog: Social Skills for Autism.’ Cookie admitted that she did not practice using the apps between sessions two and three. She was asked if she would use any of the apps after the study. Her response, “I will use all three to learn more about them.” Cookie said that ‘Quick Cues’ was her favourite of the three apps used for this study. She said that ‘Safety’ and “Conversation’ stories were her favourite to read and discuss.

At the end of the third session, Cookie was asked to discuss all three apps and her feelings towards them. Cookie enjoyed the ‘Social Skill Builder’ app. She found it “easy

and fun to do.” Cookie seemed to be a visual learner and the videos were beneficial for her.

Cookie said that ‘Mission Rescue Kloog: Social Skills for Autism’ was “too hard but fun.” She says the quizzes were “extremely hard.” Cookie said that she would like to continue working with this app with the help of her parents.

Cookie said that ‘Quick Cues’ “Gives me helpful tips.” Cookie said that this app would help her have better conversations with her family and friends

Cookie gave a lot of “yes” answers. It made the researcher wonder whether Cookie only said what the researcher wanted to hear or whether she was not processing the questions and “yes” was her automatic response.

Cookie was asked if she had any questions for the developer and she said, “No.” Cookie was asked what she learned from using these three apps and she said, “Nothing new.” This was an immediate response. She was asked again a few seconds later what she learned and she said, “About how to learn about starting conversations.” Cookie was asked if she had fun participating in the study and she said “yes.”

### **App Connections to the Rocky Point Academy Checklist**

The Characteristics of Autism Checklist (Appendix #1) was used to gauge the progress Cookie made with each of the apps. Because each case of autism was different, every participant did not fit into each category. The categories below are the observed behaviours assessed during each session with Cookie.

*1. Very little or no eye contact.*

During the sessions, Cookie made very little eye contact. This was the same with all three apps. The only time eye contact was made was when Cookie was asked to demonstrate facial expressions to the researcher. Despite three hours being spent with Cookie, she never consistently made contact with the researcher.

*2. Unaware of/disinterested in what is going on around them.*

Cookie enjoyed using the app ‘Social Skill Builder’ during the three sessions. She used this app most frequently between sessions and consistently received high scores on the quizzes. This app was engaging for Cookie. A possible reason for this was because she admitted being a visual learner who liked to watch videos and play video games. Cookie also commented that the questions in the app were easy. This positive affirmation might have led to her consistently going back to this app.

‘Mission Rescue Kloog: Social Skills for Autism’ proved to be very difficult for Cookie from the beginning of session one. There was too much text for her and she began to look around and away from the iPad. Throughout every session, Cookie read very quickly. The speed at which she read made it very difficult to actually process and comprehend the information. It seemed that she wanted to finish using this app as quickly as possible so that she could move on. Cookie did not do well on quizzes that she read independently. Her scores were in the 50% range. The amount of text made it difficult for Cookie to remain focused on the app.

Cookie was fully aware and was interested when using the ‘Quick Cues’ app during all sessions. The fact that the stories were short, and she understood the vocabulary really seemed to help.

3. *Exceptionally high skills in some areas and very low in others.*

Cookie had high levels of success with the 'Social Skill Builder' app. Perhaps this app was too easy for Cookie or maybe the video modules were most useful for her learning style.

4. *Excellent rote memory in some areas.*

Cookie was a fast learner as she navigated through the 'Social Skill Builder' app. After about two minutes of demonstration, Cookie was able to successfully use the app independently. Although her marks were low the first time on the quiz, Cookie practiced and received 100% at the beginning of the second session. It was also observed that Cookie completed the questions very quickly. She would often attempt to tap the answer before all options were given.

Overall, Cookie had a lot of difficulty with the 'Mission Rescue Kloog: Social Skills for Autism' app. Her engagement levels were low as well as the quiz scores, with the exception of one. Cookie did well with the story 'Eye contact.' On this story, she obtained a score of 9/10.

Cookie recalled information quite well. During the sessions, Cookie was able to directly state text from the story and personal information about the researcher. Perhaps Cookie studied the concept of 'eye contact' before and this helped her with the quiz. Despite Cookies ability to recall this information, eye contact was rarely ever made with the researcher.

5. *Does not generally share observations or experiences with others.*

'Mission Rescue Kloog: Social Skills for Autism' led to discussions during each session on top of the reading that occurred. The stories read involved 'Conversation

Starters,' 'Body Language,' and 'Eye Contact.' The stories themselves were difficult for Cookie. The vocabulary was difficult and there was too much text. This is likely why her quiz scores were low.

While reading the stories, the researcher asked Cookie questions in an attempt to start a conversation to expand beyond the text of the story. Cookie rarely answered any question with more than a one or two word answer. Cookie did follow the big themes behind each. She was able to memorize certain terms that came up, but Cookie had difficulty sharing what she had learned beyond simple answers. This app was difficult for Cookie from the reading, to the quizzes, to the vocabulary. Other than the general topic, this app did not help Cookie whatsoever.

#### *6. Difficulty understanding group interactions.*

During the sessions Cookie maintained that she had close friends but rarely began conversations. The researcher attempted to have Cookie initiate conversations during each session but this did not happen. Cookie only asked questions of the researcher that the researcher asked her. For example, the researcher asked how her day was and Cookie responded by asking how the researchers day was. Cookie understood how to act in a group but the 'Mission Rescue Kloog: Social Skills for Autism' app was unable to keep her engaged long enough to discuss the tips on having a conversation.

#### *7. Difficulty attending to some tasks*

Cookie had difficulty attending to tasks with the 'Mission Rescue Kloog: Social Skills for Autism' app throughout each session. She yawned and regularly looked away. She was also frustrated with the quizzes where her marks were quite low. Cookie seemed to attend to tasks less each session.

*8. Difficulty with reading comprehension (can quote an answer, but unable to predict, summarize or find symbolism).*

Based on the quiz scores using ‘Mission Rescue Kloog: Social Skills for Autism’ app, Cookie did poorly; however, the questions were about abstract scenarios for which Cookie might not be able to process properly. Because of the amount of reading, Cookie was unable to focus throughout. As she read, she would read very quickly to complete the task.

Cookie was able to understand the vocabulary in ‘Quick Cues.’ She was able to convey the meaning of the stories, often citing the examples that were found within. This app offered a level and amount of reading that Cookie could follow and understand.

*9. Short attention span for most lessons.*

As stated throughout the analysis, Cookie was unable to remain focussed while using the app, ‘Mission Rescue Kloog: Social Skills for Autism.’

*10. Responds to social interactions, but does not initiate them.*

‘Quick Cues’ was beneficial to gauge whether Cookie comprehended social situations and conversations. Cookie made sense of the vocabulary in the app and seemed genuinely engaged by the subsequent dialogue that occurred with the researcher. Despite the high levels of engagement, Cookie only responded to questions and never really initiated them unless prompted.

Although Cookie understood the rules of interaction, ‘Quick Cues’ did not help her initiate a conversation. Cookie admitted during the session that she was quiet and only really talked when asked questions by others. Although she understood the text in the ‘Quick Cues’ stories, she did not initiate conversations. More time was needed to be

spent with Cookie using this app in order to determine whether it could be an influential tool for her.

*11. Difficulty understanding the rules of conversation.*

The researcher and Cookie had conversations during each session about the stories that were read. Cookie fully understood the rules of conversation and was polite throughout the study.

*12. Difficulty maintaining friendships.*

Cookie mentioned that she had a few close friends. She said that she did not often initiate conversations and that she was quiet most of the time.

*13. Speech is abnormally loud or quiet.*

The researcher noticed during the first session that Cookie had difficulty with the pitch in her voice. Cookie read the story, 'Voice Control' within the 'Quick Cues' app between sessions one and two. She read the story again with the researcher during the second session. When reading the story and the tips that it gave, Cookie demonstrated the different levels she could use her voice where one was a whisper and five was shouting. Immediately after completing the story, Cookie seemed to have better control of her voice volume. During the third session, Cookie's voice again was loud. This app definitely had a short-term benefit to Cookie, but frequent review of the app would be beneficial.

*14. Often uses short, incomplete sentences.*

Although the apps brought up many conversations, they were researcher initiated. Cookie had difficulty elaborating on most questions beyond one or two word answers.



## **Concluding Remarks**

Cookie had a high level of success using the ‘Social Skill Builder’ app. She enjoyed the videos, did well on the quizzes, and was engaged.

‘Mission Rescue Kloog: Social Skills for Autism’ was difficult for Cookie. She was disengaged, bored, and yawned while using the app. The text was too difficult and she did poorly on the quizzes.

“Quick Cues” was an app that was easy for Cookie to use. She said that this app was her favourite. The text was written at a level that she could understand and the stories were short. Cookie made improvements with her voice control during the second session after reading the story; however her voice level was not controlled during the third session. The researcher concluded that in order to have success, Cookie needed to regularly review the stories in order for this app to be beneficial.

There were many instances throughout the three sessions when Cookie provided a different answer to the same question minutes apart. One example of this was when she was asked what she learned from participating in the study. She responded that nothing was learned. When asked less than a minute later, Cookie said that she learned about “having a conversation.”

Cookie followed the other stories in a literal sense. She was able to understand the tips provided on having a conversation based on the stories read; however, she was unable to take the theory and put it into practice.

Minimal progress was made with any app in regards to having a conversation with the researcher. Cookie processed information very quickly. This led her to getting confused by some of the questions that the researcher asked. The apps themselves

provided information to Cookie, which she could memorize but in the time the researcher spent with her, the apps did not overly help with her social skill development. More time was needed to be spent in order for the apps to have a lasting impact on Cookie's social skill development.

### **Participant #3 Jason**

#### **Session 1 Summary**

##### **Background Information:**

Jason is 15 years old and a student in grade 10. Jason enjoys school, specifically music and the performing arts. He has been passionate about music since he was in grade 6. Jason enjoys math but finds it difficult. When Jason is not at school he likes to spend his spare time listening, and creating music. He really enjoys The Beatles.

Jason is also very passionate about exercising and working out. He told the researcher that he works out multiple times per day. Jason does not play video games and watches little television.

He does not enjoy organized sports, but enjoys running.

Since Jason is in grade 10, the researcher asked Jason if he knew what he wanted to do after grade 12 and he responded by saying, "Sing and become one of the greatest artists that I've ever known."

Jason has his own iPad but admits to only using it rarely to watch online videos and listen to music.

Jason gave the impression of a very soft spoken, shy student. He was a bit nervous at the beginning of the session, rarely making eye contact. He looked around a lot but was very willing to participate in the study.

### **Social Skill Builder**

Jason was shown this app first. The researcher explained that this app was for enhancing a person's social skill development. Jason opened the app, typed in his name and chose to watch the videos entitled 'School Rules' focussing on completing assignments and giving presentations. Jason listened to the videos and answered the questions quickly. He did not need to ask the researcher for help or clarification. Jason got a score of 9/10 on the quiz.

The researcher asked Jason his first impression of this app and he mentioned that students in his class sometimes had difficulty with presentations. When asked what he learned from watching these videos, Jason said, "Never cover your face, be brave, don't be afraid, and speak loudly."

Jason said that this was a good app to help people in social situations for students in grades 7 and 8. His only criticism was the picture quality within the app. Because of the simplicity of this app for Jason, it was necessary to move onto a more challenging app.

### **Mission Rescue Kloog: Social Skills for Autism**

Jason was asked to open the app and watch the introductory video. He was asked if he could do the reading silently. Jason commented that the reading at the beginning of

the app “was fast.” He commented that the premise of the app was that the alien, “needs my help understanding human skills. And that’s all I know.”

Jason wanted to complete the module ‘Facial Expressions.’ He asked to read the module and complete the quiz silently. Upon completion, Jason said, “It was hard for me. I’m not good at memory and stuff.... I try to remember things but I keep forgetting them.” Jason also said, “there was too much reading. “Jason got a score of 7/10 but that was not enough to pass. He was asked if he wanted to complete the task again with the researcher reading with him and he said, “No” and that it would not make a difference.

Jason said he was engaged by the opening video but not the overall concept of the app where the premise was completing stories to get ship parts so the alien could get back to his planet. Asked if he liked the app, Jason said, “No.” Jason seemed frustrated with this app. After failing the quiz, Jason began to breathe heavy and frequently. Asked how he could improve his result, Jason said, “Read.” Jason said that the vocabulary was of “medium difficulty.”

### **Quick Cues**

The researcher explained to Jason that this app involved short social stories that could assist him in daily social situations. Jason was asked to pick from one of the five categories a story that he wanted to read with the researcher. Jason chose from the ‘Life Skills’ category a story called ‘Exercise.’ Jason said he picked this story because “I work out and I exercise, and eat healthy.” Jason seemed anxious to read out loud and he started reading quickly. Jason said that he exercised twice daily, “before I go to school; I exercise after school.” Jason seemed to enjoy discussing this topic. He mentioned eating

very healthy. “It makes me feel good to stay healthy. I eat oatmeal, fruit, and toast in the morning.” Jason said that he never eats fast food because “I don’t want to die.”

The term ‘energy’ was used in the story and Jason said that the term meant “pumped up.” Jason then connected this to his mood and said that he regularly had “bad days” due to stress. Jason mentioned that “homework” was something that stressed him out. He said, “I am worried about repeating my grades and being here forever.” Jason mentioned that graduating was important to him. He said, “I want to be a singer when I am done. I practice a lot of music.” Jason told the researcher four times during the session that he wants to become a singer. He mentioned this at times when other topics were being discussed during the ‘Exercise’ social story.

The researcher had Jason open a second story within the category ‘Getting a Job.’ Jason selected the story, ‘Getting Along with Others.’ Jason said that he got along with people at school and at home. Jason said that he was “always polite” and considerate of others feelings.

The story discussed eye contact. Jason said that this was “very difficult” for him but did not know why.

The story mentioned vulgar language. Jason said that he has never used inappropriate language and that it made him very uncomfortable. He said, “It bothers me a lot. Everyone swears, swears all the time.” Jason admitted that he has never told his friends that vulgar language upsets him and that, “I am always nice. It is a bad thing to say and hurt someone’s feelings.” Jason does not want to tell his friends that vulgar language upsets him because he never wants to hurt anyone’s feelings. Jason connected

this conversation to music where music in this era has vulgar language and isn't as good as older music.

The end of this story focussed on having a positive work environment and being 'organized.' Jason said that he was not organized and this was an area that he needed to improve on.

Jason was asked what he learned from this story, Jason said, "Getting to know each other, being polite to others, and respect." Jason said that this app was "great" and that "I will use it." He gave this an app a 10/10

### **Concluding Remarks from Session 1**

Jason exhibited a very quiet disposition. He seemed quite nervous at the beginning of the session. He mentioned that working out, eating healthy, and music were important to him 8 times during the fifty minute session. Jason did very well with the 'Social Skill Builder' app. He was very polite when assessing the apps but admitted that it was for someone younger. 'Mission Rescue Kloog: Social Skills for Autism' was more challenging and Jason admitted that he did not care for the app. 'Quick Cues' provided rich dialogue about what was important to Jason and how he behaved in social situations. He enjoyed the app and the conversation with the researcher.

### **Session 2 Summary**

#### **Social Skill Builder**

Jason spent time using this app between session one and two. Jason completed the video module 'Classroom Assignments.' The researcher asked if he remembered what the

videos were about. Jason said, “How the class behaves and how the class is not behaving. How they act.” Jason liked, “How they act nice, they sit there quietly and they were not talking, laughing or giggling.” Jason said that he enjoyed the module and got 14/15 on the quiz.

Jason also completed the video module, ‘Friends house.’ He said that, “It was about friendship and how they, how you share with them, and how you be nice to them.” Jason got 14/15 on the quiz. Jason said that he did not work with any other app between sessions.

After explaining what he did between sessions, Jason opened the module ‘Restaurant.’ These videos focus on teaching the user about appropriate restaurant etiquette. Jason was not feeling well during the session. He took four breaks during the session. Jason was fairly quiet. He wanted to watch the videos silently. There was no dialogue between the researcher and Jason while using this app. This was very different than the first session when Jason was very vocal. Jason demonstrated that he fully understood the content and the social behaviours associated with going to a restaurant. Unfortunately, the app froze before Jason was able to finish the quiz. Rather than begin again, it was decided to move onto the next app.

### **Mission Rescue Kloog: Social Skills for Autism**

Jason opened this app and the researcher noticed that Jason had completed a number of modules. Jason said that it took a lot of time and that the quizzes for the app were “difficult.” He said that he did not pass them on the first time but did after studying them a few times.

Jason was asked to open the module, 'Facial Expressions.' He did this module during the first session, but did not pass. The researcher decided to try the same module again to see if Jason would improve on his score. The beginning of the app mentioned what others thought. Jason said, "I care what people think, like my parents and my family." Asked if he cared what people think about him at school, Jason said, "Not really."

Jason was not feeling well and made the comment, "I am going to need some lozenges or medicine" four times. Jason took a lengthy break while reading this app with the researcher.

After returning from a break, Jason was asked to demonstrate the different facial expression that people could make. Jason was able to make many faces and explain what they meant. Jason explained the term 'sad' as "your face gets weak." Jason was able to demonstrate all the faces that were used during this module including happy, sad, worried, angry, bored, disgusted and neutral. Jason did much better the second time with this module. He got 10/10 on the quiz. There was more dialogue and interaction between the researcher and Jason the second time. Perhaps this played a role in him obtaining a perfect score on the quiz.

### **Quick Cues**

Jason opened the story, 'First date.' Asked why he chose this story, Jason said, "I was thinking of a girl." Jason said that for a first date he could, "Ask a friend or get a taxi" to drive them somewhere. Jason also read, 'Asking someone on a date.' Jason said he would ask someone on a date by, "Waiting until the other person is alone and talk



nicely to the other person.” Asked if he had asked someone out before, Jason said, “I never asked someone.” He also went on to say that he would like to ask someone out in the near future. The app said not to be pushy. Jason responded by saying the term ‘pushy’ meant to “Be patient.”

## **Concluding Remarks from Session 2**

Jason was sick. The researcher spent one hour with him, but thirty minutes was spent waiting for Jason as he needed to continually blow his nose. Jason was fairly quiet and only answered direct questions.

The ‘Social Skill Builder’ app was too easy for Jason. He was very polite and seemed to be engaged by it, but he was able to answer all questions very quickly. He also understood what the vocabulary meant.

‘Mission Rescue Kloog: Social Skills for Autism’ was more of a challenge for Jason but it was one that he enjoyed. Jason showed that he was a strong reader and was capable of completing the modules. He did say that the quizzes at the end were difficult and that he did not pass the quizzes the first time.

Jason enjoyed ‘Quick Cues.’ He said to the researcher, “I wish I could use this in my phone to give me advice.”

## **Session 3 Summary**

### **Social Skill Builder**

This app was too easy for Jason. It was decided that the third session would be spent using the other two apps.

### **Mission Rescue Kloog: Social Skills for Autism**

Jason opened the module ‘Asking Questions.’ The researcher wanted to determine how Jason conversed with others and this module provided insight into how Jason interacted with others. Jason said that he, “Never starts a conversation” with others. He said that starting conversations with others made him feel uncomfortable. The researcher asked Jason to ask the researcher some questions. He was quick to ask, “What do you do for a living?” He also asked, “What year did you get married?” Asking questions was not difficult for Jason. The reason he did not initiate conversations with his peers was because he was shy, timid and reserved.

Jason said that he was mindful of others feeling and did not interrupt others. Jason said that he was well behaved and, “I never talk inappropriately: to others.” Jason was asked if it was okay to ask his friends if they liked someone. Jason said, “Sometimes...only a close friend.” This example showed that Jason understood the concept of appropriate and inappropriate conversations with others. Jason was aware that he shouldn’t ask just anyone if they had a crush on someone.

The app presented the terms ‘who, what, where, when, and why.’ Jason understood these terms and was able to ask the researcher questions using each of these terms. This conversation went on for some time. The researcher then asked Jason questions relating to ‘who, what, where, when, and why.’ One question that was asked to Jason, “Why do you think you care so much about eating healthy and exercise?” Jason said, “Because I don’t want to be the kid I used to be.” Jason went on to say, “I am training like Bruce Wayne.” Jason wanted to continue the conversation about exercise by

saying that he works out in the morning before school and after school at home. He said that he did not use the exercise room at school because he had not gone to get a pass.

The conversation then focussed on appropriate talk with others. Jason said that “You are not allowed to ask the price” in response to how much someone spent on a gift. Jason also said, “It is rude to ask an adult what age they are.” Jason went onto say that it was okay to ask your best friend how old they were.

Before reviewing a second story, Jason mentioned that he learned about the term ‘white lies’ between sessions one and two. Jason gave the example that a white lie can be used when “you kinda want to get out of a conversation quickly.” He said that an example one might use is, “I have some homework to do.”

This led to a discussion about how people may have differing opinions using the ‘Commenting’ module. Jason showed that he was able to share an opinion. He explained the term and said that he enjoyed the movie ‘The Dark Knight.’ The researcher wanted to have a brief conversation about Batman. Jason said that he thought it was the best movie and the researcher played the opposite role saying that it was not good. Jason was able to have an excellent debate explaining why he thought it was a great movie. He finished by saying, “It is a movie you might want to watch again and again.”

The point to this dialogue was to see how well Jason could follow the rules of conversation while debating. He was able to do this in a calm and respectful manner. Jason also carried on a healthy debate about the pros and cons of winter. This module showed the researcher that Jason was very familiar with the rules of conversation. He was able to begin, and carry on a conversation. The dialogue was excellent; however Jason only got 8/10 on the quiz which was not enough to pass.

## Quick Cues

Jason first opened the story, ‘Socialization with Others.’ Asked about socialization, Jason said that he did not socialize with others and that he did not text. Jason said that he, “Does not socialize enough” He said, “I don’t have the words to say.” He also said “It’s too difficult and I get nervous.” Jason was asked how he could approach a potential friend and he said, “If I know a person that I would be interested in hanging out with, I could ask that person what they like to do.”

The researcher asked Jason if he ever approached students in his music classes to see if they wanted to hang out. Jason said “I’m too scared.” Jason said that he would like to perform for the school and make friends that way but again he said that he was too scared. He then asked the researcher, “Why am I so scared?” Jason was emotional at this time. He said, “I do not wish to see others suffer the way I do.”

Using this app, Jason demonstrated a very good understanding of how to socialize with others. He explained what to do. Jason told the researcher, “I just want to be happy.” The issue for Jason was to get the courage to approach others. He mentioned that he was afraid of rejection and this was why he doesn’t talk very often with his peers.

Jason discussed again his passion for music and singing. He said, “I always sing alone whenever I am sad. I sing to cheer me up.” Jason then sang the song ‘Glory’ to the researcher. He sounded very good. He later admitted that he was afraid to use his talent as a way of initiating conversation and making friends.

The researcher wanted to read one more story called ‘Conversation Tips.’ The researcher had a short conversation with some of the points from this story. One tip mentioned a way to start a conversation was to ask ‘how they are doing.’ Jason was asked

if he could do this and he said, “I always stay silent every day; in front of everyone.”

Jason again admitted that he was “quiet and shy.” Jason enjoyed the conversation with the researcher. Jason passed and said that this app, “Relates to me. It is giving me a lot of advice.”

### **Concluding Remarks from Session 3**

Jason was asked his impressions of the three apps. He said ‘Social Skill Builder’ was a good app that gave him “a lit bit of advice.” He said he did not like the videos because “it was blurry, old, and bad quality” He rated the app a 6/10.

Jason thought ‘Mission Rescue Kloog: Social Skills for Autism’ gave “good advice about conservations and stuff.” He said he liked it, “A little bit.” He said that the reading was difficult. He rated this app a 7/10.

Jason really liked ‘Quick Cues.’ He said, “It has given me lots of great advice and the words relate to me a lot.” Jason also said, “I understand the vocabulary and I love this app.” He rated the app 10/10.

Jason was asked if he enjoyed participating in the study. He said, “Yes, it was very, very useful.”

### **App Connections to the Rocky Point Academy Checklist**

The Characteristics of Autism Checklist (Appendix #1) was used to gage the progress Jason made with each of the apps. Because each case of autism was different, every participant did not fit into each category. The categories below are the observed behaviours assessed during each session with Jason.

*1. Very little or no eye contact.*

Jason did not maintain eye contact with the researcher consistently during the first session. He glanced at the researcher but looked around a lot. Jason was a little better during the second session. Jason became familiar with the researcher and maintained eye contact throughout the third session.

*2. Responds to social interactions, but does not initiate them.*

Jason used these three apps to assist in conversation. During the three sessions, Jason regularly discussed exercising and eating healthy. He was able to carry on a conversation when the researcher initiated it, however, he did not initiate a conversation at any time.

*3. Does not generally share observations or experiences with others.*

Jason was comfortable talking with the researcher. These apps provided a starting point for conversations. Jason wanted the researcher to know how important exercise, eating healthy and singing was to him. While using the 'Quick Cues' app during the third session, Jason opened up by telling the researcher that he was sad and wished he had the courage to initiate conversations with others. Jason also sang a song to the researcher during the third session. The 'Quick Cues' app helped Jason converse with the researcher while at the same time giving him advice that he could use to improve his social skills.

*4. Difficulty understanding jokes, figures of speech or sarcasm.*

Jason had a very serious demeanour throughout all sessions. It was unclear if Jason understood jokes or not but he did not smile with the researcher despite jokes being told.

*5. Difficulty reading facial expressions and body language.*

Jason completed a module called, 'Facial Expressions' using the app 'Mission Rescue Kloog: Social Skills for Autism.' He got 100% on the quiz and was able to demonstrate the different kinds of facial expressions. This would suggest that Jason was able to perceive the different facial expressions that people made.

*6. Difficulty understanding the rules of conversation.*

Jason understood the rules of conversation when using the apps with the researcher. The only exception to this was during the sessions when Jason mentioned exercising and eating healthy. This was very important to Jason and he mentioned this many times when making connections to the apps but also randomly over the three sessions.

*7. Difficulty understanding group interactions.*

Connecting this category to Jason was difficult. In theory, as proven by Jason's quiz scores, he comprehends group interactions. He knew the rules about interacting with others. The issues facing Jason were his reluctance to take the theory and move it to practice. The app 'Quick Cues' helped Jason realize that he could take advice from the app and use it to initiate group interactions. He said that this was something he wanted to begin doing after participating in the study.

*8. Gives spontaneous comments which seem to have no connection to the current conversation.*

Exercise, eating healthy, and music were brought up many times by Jason during the three sessions. Many times these were connected to conversations occurring while using the apps but sometimes Jason would spontaneously begin talking about these things.

*9. Prefers to be alone, aloof or overly-friendly.*

Jason mentioned spending a lot of his time alone. He said that he was shy and nervous talking to others. The app 'Quick Cues' gave Jason advice which he hoped to use so that he could interact with his peers more often.

*10. Difficulty maintaining friendships.*

Jason spends much of his time alone. He does not have problems with others; he simply is shy and chooses to not interact with others. He believed that these apps might provide him with the courage to improve in this area.

*11. Unaware of/disinterested in what is going on around them.*

Jason was very polite and courteous with the researcher throughout the study. The only app that Jason was disinterested in was, 'Mission Rescue Kloog: Social Skills for Autism.' He found the vocabulary in the app difficult. Jason looked around a lot while reading this app.

*12. Talks excessively about one or two topics (dinosaurs, movies, etc.).*

As stated above, exercise, eating healthy and music were mentioned a lot by Jason during the three sessions.

*13. Often uses short, incomplete sentences.*

Jason displayed a high intelligence and ability to converse with the researcher. Jason spoke a lot with the researcher. The third session, Jason spoke a great deal, in particular when using 'Quick Cues.'



*14. May have a very high vocabulary.*

Jason demonstrated a high vocabulary with the researcher. Jason did however speak slowly and took his time answering questions.

*15. Difficulty with reading comprehension (can quote an answer, but unable to predict, summarize or find symbolism).*

The only app that was difficult for Jason was ‘Mission Rescue Kloog: Social Skills for Autism.’ The amount of reading was a bit too much for Jason. The difficult vocabulary, along with the abstract quiz questions led to Jason failing many of the quizzes on the first try.

*16. Short attention span for most lessons.*

Jason maintained his attention while using all of the apps except, ‘Mission Rescue Kloog: Social Skills for Autism’ for the reasons mentioned above.

### **Concluding Remarks**

Jason said that he benefitted a great deal from participating in this study. He said that he loved ‘Quick Cues’ and would regularly use the app for advice. He thought that this app would help him get the courage to talk to others. Jason also thought that ‘Mission Rescue Kloog: Social Skills for Autism’ was helpful but not as interactive as ‘Quick Cues.’ ‘Social Skill Builder’ was too easy for Jason and he deleted the app from his iPad at the end of the third session. Overall, Jason had success with these apps and he believed they would help him interact with others.

## **Participant #4 Sara**

### **Session 1 Summary**

#### **Background Information:**

Sara is a 15-year-old student in grade 10. Sara was incredibly shy and timid when the researcher first went to meet her. She was reluctant to enter the room to meet the researcher. It took her approximately five minutes before she was willing to sit with the researcher. Sara was very timid and spoke very little throughout the first session. Her voice was soft spoken and she was sometimes hard to hear. Sara thought a lot about her responses to questions before answering them. When she did, answers were short.

After a few minutes with the researcher, Sara became more comfortable and began answering some introductory questions. Sara said that her favourite subject in school was sewing and that she was making pillows in her class. Sara also said, “Sometimes, I like gym.” Sara said that she likes all subjects in school but “I’m not very good at reading.”

When Sara is not in school she likes to, “Watch TV, listen to music and sometimes I will ride my bike in the summer and sometimes I will hang out with my friends.” Sara mentioned that she did not play video games and did not use the computer frequently. She only uses her iPod for listening to music.

#### **Social Skill Builder**

Sara was asked to open this app first. She entered her name and was asked to select the video module under ‘My Community’ then the specific videos were called ‘Friends House.’ Sara had difficulty with the very first video. The videos showed a boy

knocking on the front door of his friend's home and his friend's mom answering the door. The boy asked if his friend was home. Sara had difficulty with the first multiple choice question. She waited for 30 seconds without making a selection and then the researcher told Sara that she could re-watch the video. Sara was nervous to select an answer but after researcher encouragement, Sara made her selection and got the question correct. Sara went very slowly when it came to answering the multiple choice questions.

Sara consistently looked at the researcher, looking for affirmation before making her selections. It felt as though she was afraid to get an answer incorrect. Sara often put her finger by one of the multiple choice options then looked at the researcher to see if she would get a hint whether the option she was ready to pick was correct. The researcher told Sara four times during the session that the decision was hers to make.

Sara had interesting facial expressions while watching these videos. One example was when the boy in the video was acting silly and said that he was going to stay at his friend's house all weekend. Sara thought the video was silly and that the boy was immature. Another video showed the boy stealing one of his friend's baseball cards. Sara raised her eyebrow, showing that she knew what the friend was doing wrong.

Sara seemed very nervous about getting the wrong answers. If she was unsure, she took a long time placing her finger by an answer then looking at the researcher. If she was really unsure, she would re-watch the video. She did this 3 times while using the app. In the end, Sara did well with the quiz, scoring 12/15.

Despite the good quiz score, Sara did not want to talk about the app with the researcher. The researcher asked what this app was about. There was a 45 second pause then the researcher needed to ask more direct questions like, "What were the two boys

doing?” to which Sara said, “Playing a game.” The researcher asked, “What did the one boy take?” Sara responded, “The card.”

Sara was asked what she thought about the app and she smiled and put up her thumb. She would not talk about it or explain why she liked the app. The researcher continued to ask Sara questions to which she used her hands to signal a response, nodded, or smiled. She would not verbally answer the questions of the researcher. When asked if the questions were easy or difficult, Sara used her hands to make a ‘so-so.’ gesture. Sara was asked to rate the app out of 10 and she smiled and put up ten fingers. Sara was asked if there was anything about the app that she didn’t like and she shook her head.

### **Mission Rescue Kloog: Social Skills for Autism**

The researcher explained that there was a lot of reading in this app. Sara’s eyes got large, as it appeared that she became instantly uncomfortable about reading. Asked if Sara wanted to read the text out loud she profusely shook her head. Asked if she wanted to do the reading silently, she also shook her head. Sara wanted the researcher to read the text to her out loud.

Sara opened the app and the introductory video began. After the video, the researcher read the text outlining the premise of the app to Sara. The text automatically advances, so it was necessary to read very quickly in order to fully understand the app. The researcher had difficulty reading the text quickly enough before the next page automatically opened. There was no way to control the speed for this text at the beginning of the app.

The researcher then explained that the goal of this app was to successfully complete the missions (modules) in order to obtain ship parts so that the alien could repair his ship. Sara was asked to select the first module called 'Body Language.' Sara again was asked if she would like to read and she shook her head. The researcher read the entire module to Sara. The researcher asked Sara if she understood what the text meant and she nodded. She did not say one word while this app was being read.

Sara did however yawn three times and she frequently looked around the room while the researcher was reading. Sara wanted the researcher to read the multiple choice questions to her and then she picked the answer. Sara wanted the researcher to read three of the questions multiple times. She may have wanted this because the questions and possible answers was a lot of text. Sara might have had difficulty remembering all of the text. Sara did well on the quiz getting a score of 9/10.

After using the app Sara was asked what she thought about the app. Sara said that she enjoyed the app and that they were useful to her but would not elaborate. Sara said that she did not care about the mission about collecting the space ship items but enjoyed the app. All answers were given as a smile, nod, or with facial expressions.

### **Quick Cues**

The researcher asked Sara to open this app and showed Sara the categories of stories that could be read. Sara was asked to choose one story. She picked, 'Friend or Bully.' Sara said that she witnessed bullying but was not a victim of it. Sara nodded her head when asked if she liked this app. She said that she would use this app if she owned it. Asked how she would rate the app on a scale of 10, Sara said 10/10

### **Concluding Remarks from Session 1**

Sara was very nervous at the beginning of the session. She became more comfortable as the session went on but she rarely spoke. Her communication with the researcher was mostly done through body language. Sara gave all the apps a positive review even ‘Mission Rescue Kloog: Social Skills for Autism’ where she consistently looked away and yawned. Overall, Sara demonstrated a thorough understanding of all the apps by getting good marks on the quizzes.

### **Session 2 Summary**

#### **Social Skill Builder**

Sara navigated without a problem to the video module entitled ‘Hanging Out.’ She smiled while watching the first video, which was about some boys asking for help with their homework. Sara thought the video was, “a little strange.” Sara thought that most videos in this module were silly, especially some of the multiple choice options that Sara immediately realized were not correct. This showed the researcher that Sara knew exactly what was happening in the videos. Sara also completed the multiple choice questions quicker than she did in the first session. Asked what she liked about the app during the second session, Sara said, “The questions.” Sara would not explain what she liked about the questions. Sara said that she would like it if the questions were made to be more difficult.

These videos about bullying opened up a conversation with Sara about whether she ever got in trouble. Sara said that she always behaved at school and got along with everyone. Asked if everyone at school was nice, Sara said, ‘Not all of them.’

### **Mission Rescue Kloog: Social Skills for Autism**

Sara was asked to open this app and the researcher asked if she remembered this app and what she thought. Sara said, “It’s ok.” Sara was asked if she liked the introductory video and she shook her head to signify a ‘no answer.’ Sara was asked if she wanted to read but she wanted the researcher to read the text to her. The module that was read was ‘Eye Contact.’ Sara was asked if she was good at looking at people in the eye and she nodded.

Sara was disengaged by the text. She looked away a lot and the researcher needed to remind her to follow along with the researcher. Sara thought that the pictures that went along with the text were “silly.”

The text of this story brought up the concept of respect at school. Sara mentioned that it was respectful to “Talk in an indoor voice” when in the classroom and “Put your hand up” when needing help from a teacher.

The module discussed staring at someone and how others might perceive that as abnormal. Sara laughed when reading about staring at other people.

The multiple choice questions involved scenarios on how to interact with others during a conversation. These questions were difficult for Sara. She took her time processing which answer to select. When questions were easy, Sara would shake her head at the options that were obviously incorrect then nod when she saw the right answer. When Sara did not know the answer she went very slowly, often taking up to one minute before making a selection. When she was unsure, she made noises and began tapping the table.

Sara was frustrated with the app. During the last question she said, “Oh my god!” She said the “questions” were too difficult but she said that she understood the text. Sara appeared embarrassed to know that she did not pass the quiz. She received a score of 7/10.

### **Quick Cues**

Sara was asked to select a story to read with the researcher. She chose, ‘Exercise.’ Sara again was asked to read but she would not. Sara said that she was taking Phys-Ed at school and that she liked to work in the fitness room. Asked if she participated in games with the class, Sara said, “Not very often, but I think I did a couple of times though.” Sara said that she did not exercise a lot but liked to “Ride my bike” at home. Sara was excited when discussing her bike saying, “I go really far.”

Asked why Phys-Ed was important, Sara said, “To stay healthy.” Further, Phys-Ed can lead to a lifetime of better health. She said without exercise she would, “Probably end up having problems when I’m older.” Sara mentioned that she had another Phys-Ed class that she attended. “We also have another Phys-Ed class that we go to. Like it is just for all the special needs kids and I go there too sometimes and we do really fun stuff.”

Sara chose to select a second story to read. It was called ‘Avoiding Conflict on the Job.’ Sara picked this story because she would like to get a summer job. Asked if she would prefer a food or retail job, she emphatically said that she would prefer to work in a “clothing store.” The first slide mentioned the term ‘supervisor’ and Sara said that meant “boss.” The story mentioned that sometimes people work with others that they don’t like, and Sara connected this to working in a group at school. Asked if she yells at someone



whenever she disagrees with them she said, “Usually, I ignore them but if it gets really messed up in my head, I start to say stuff that I don’t really mean.” Sara seemed to really enjoy this app. She became more vocal with the researcher and seemed to enjoy talking about the potential of getting a job and exercise. Sara seemed excited about having this app installed on her personal iPod.

### **Concluding Remarks from Session 2**

Sara began to open up during the second session. Sara still answered many questions by nodding and smiling but she talked twice as much in the second session as she did in the first. Sara regularly thought about her responses. She said, “Mmm hmmm” 20 times in response to questions that were asked.

Sara was most engaged by the ‘Quick Cues’ app. She spoke more during the two stories read than she did over the entire two sessions. Sara enjoyed this app most and was excited about having it on her iPod so that she could use it whenever she wanted. Sara did well with ‘Social Skill Builder’ but she felt that it was easy and for younger people. Sara found ‘Mission Rescue Kloog: Social Skills for Autism’ difficult. The text seemed to be at a level she understood but the questions were difficult. She was frustrated using this app and not passing the quiz.

### **Session 3 Summary**

#### **Social Skill Builder**

Sara again said that she liked this app. She wanted to use the app one more time. She chose ‘School Assignments.’ These videos focussed on how to behave in a classroom

setting. By the third session, Sara had become more comfortable with the researcher. One question mentioned a ‘compromise.’ For the first time, Sara asked the researcher, “What does this mean?” After an explanation of this word, Sara seemed to understand and was able to select the correct multiple choice answers.

Sara found one video funny where the actors were fighting, rather than compromising. She looked at the researcher and laughed for about ten seconds. Sara was asked how old she thought the actors in the videos were and she responded by saying “two” followed by laughter. Sara really began to get comfortable with the researcher during the third session. Sara did well on the quiz, scoring 15/15. She said that these videos were “weird.” Sara said that she went very fast when she was confident about her answers and said she went slowly when she was thinking.

### **Mission Rescue Kloog: Social Skills for Autism**

Sara was asked to open this app. She wanted to skip the introductory video. Sara opened the module ‘Conversation Starters.’ Sara said that she had conversations with “My friends.” The first page used a term “breaking the ice.” Sara was unfamiliar with this term and still had difficulty after the researcher explained it. Sara was asked about her friends and she said that she had been friends with them since she was very young. She said that she did not regularly meet new people.

To start a conversation, the researcher asked Sara what she did the last few days. Sara said, “Shopping... I got this thing from Bath & Body Works.” Sara was asked about having conversations with her teachers and she said that she did not often initiate a conversation or ask for help when she was not sure what to do. Sara was asked where she

could meet new people. She said, “At day camp.” Sara discussed enjoying going to camp because it was fun for her and she could meet new people.

Sara was asked to begin a conversation and she asked the researcher, “What is your favourite colour?” The researcher responded and Sara said her favourite colours were “pink and black.” Sara took a long time asking the researcher a second question. She then asked what the researcher’s favourite food was. Sara then said her favourite food was, “My aunties’ chicken stroganoff.” Sara then said that her favourite unhealthy food was, “Pudding. I could eat a whole box in one day.”

These questions led to an explanation about ‘chitchat’ which was a concept that Sara seemed to understand. Sara connected chitchat to people asking others how they were doing or how the weather was. She said that she was asked this almost every day.

Sara was able to answer direct questions asked by the researcher. She was much more open during this session. Sara had difficulty explaining concepts like ‘chitchat’ and ‘small talk’ but could follow a conversation. Sara had a difficult time with recall questions that the researcher asked like what grade the researcher teaches or questions the researcher asked connected to the app.

Sara laughed during the quiz at the end. She thought some of the questions were silly. One question was about how one should behave when talking to the dentist. One of the multiple choice options was “you should hide behind your mom.” Sara laughed at this option. This was an example that showed that Sara did understand appropriate social behaviours because she knew that this would not be a normal reaction for a person Sara’s age to have when going to the dentist.

Sara found six of these questions funny, laughing out loud for an extended period of time before selecting the correct answer. Sara took a long time for questions that she did not know. She would want the researcher to read the question a second time. Also, Sara said, “hmmm” almost every time that she did not know the answer immediately. Sara got a score of 9/10 on the quiz.

### **Quick Cues**

Sara selected the story ‘Asking a Teacher for Help.’ Sara was asked what she should do in school if she did not know what to do. She said, “Ask for help.” The researcher asked what she should do if the teacher was busy and Sara signalled raising her hand. Asked what else she should do, Sara said, “Wait patiently.” Sara was asked if she was ever rude. She said, “I’m not rude at school but a little more at home.”

Sara was asked to pick a second story. She picked, ‘Internet Safety.’ Sara picked this story because she regularly used the internet. Sara was asked how the internet could be a dangerous place. Sara responded by saying, “There could be like, strangers that are trying to talk to you and stuff.” Sara said that she had incidents using the internet saying, “Actually it has happened to me a couple times. I got creeped out and had to delete them.” Sara said that Twitter and Facebook had caused her problems in the past. An example that she faced from Twitter was, “There was this one girl from my school, she started threatening me and stuff and I was getting really angry.” Another example came from Facebook. “This one girl was into Facebook messaging and she was messaging me saying awful things and stuff, and she was swearing at me and I like got so mad that I had to tell my parents and guidance councillor.”

Sara was asked how she could be safe on the internet. She mentioned not to tell people “where you live, your phone number, or credit card.” Sara also said that people on the internet using dating websites often “lie” about themselves in order to make them sound good.

The story mentioned internet safety controls and Sara mentioned that she knows how to block people from the social media platforms that she uses.

Sara was engaged by the stories that were read. She talked a lot with the researcher by giving examples and sharing her feelings. This did not occur during the first two sessions. By the end of the third session, Sara had become more comfortable with the researcher and the apps.

### **Concluding Remarks from Session 3**

Sara became much more comfortable with the researcher during the third session. She continued to increase the amount of talking that she did and she was very open and honest. She had a very good conversation using the ‘Quick Cues’ app as a starting point especially discussing internet safety.

Sara seemed to understand the content in the app ‘Mission Rescue Kloog: Social Skills for Autism.’ She found many of the questions silly, but she did very well on the quiz. Sara would not read any of the text. Because she did not read anything over the three sessions, the researcher wondered what reading level Sara was at.

Sara did very well with ‘Social Skill Builder.’ This app was too simple for Sara but she enjoyed watching the videos and answering the questions.

Sara was asked about her experience participating in this study and she said “Good.” Sara said that she liked the “questions” that came from the ‘Social Skill Builder’ app and ‘Mission Rescue Kloog: Social Skills for Autism’ app.

### **App Connections to the Rocky Point Academy Checklist**

The Characteristics of Autism Checklist (Appendix #1) was used to gauge the progress Sara made with each of the apps. Because each case of autism was different, every participant did not fit into each category. The categories below are the observed behaviours assessed during each session with Sara.

*1. Very little or no eye contact.*

Sara did not maintain eye contact with the researcher during the first session but did in sessions two and three.

*2. Responds to social interactions, but does not initiate them.*

Sara was very shy. She did not initiate any conversations with any of the apps during any session.

*3. Does not generally share observations or experiences with others.*

Sara rarely shared any observations verbally during sessions one or two. Sara used gestures like nodding or shaking her head to answer questions. Sara did start talking during the third session when discussing internet safety using the ‘Quick Cues’ app. Sara would likely be more talkative if the researcher met with her a fourth or fifth time.

*4. Difficulty understanding jokes, figures of speech or sarcasm.*

Sara demonstrated an understanding of jokes using the ‘Social Skill Builder app.’ She laughed when watching videos where the actors were doing something silly. She also laughed at many of the obviously incorrect multiple choice question options.

*5. Difficulty reading facial expressions and body language.*

Sara did not demonstrate any difficulty in this area.

*6. Difficulty understanding the rules of conversation.*

Sara showed that she understood the rules of conversation with the researcher as well as with the modules she completed while using the apps. Sara did well with quizzes relating to conversation. Despite understanding the rules of conversation, Sara rarely spoke to the researcher until the end of the third session.

*7. Difficulty understanding group interactions.*

Sara did well with the quizzes in ‘Social Skill Builder.’ Some video modules were about group interactions in school. Sara said that she had close friends at school that she was vocal with.

*8. Aversion to answering questions about themselves.*

Sara did not talk about herself until the end of the third session.

*9. Prefers to be alone, aloof or overly friendly.*

Sara said that she liked to hang out with her friends a lot.

*10. Difficulty maintaining friendships.*

This appeared to be a non-issue; however, Sara said that she did have issues with people in the past.

*11. Unaware of/disinterested in what is going on around them.*

Sara was engaged by the apps. Sara took her time answering multiple choice questions and often asked the researcher to re-read a question. Sara was disinterested with ‘Mission Rescue Kloog: Social Skills for Autism.’ Sara refused to read the content from the app. She wanted the researcher to read everything. It was unclear exactly what reading level Sara was at because she refused to read throughout all three sessions. Sara was disengaged while the researcher was reading as she often looked away and yawned frequently.

*12. Speech is abnormally loud or quiet.*

Sara talked very quietly during all three sessions.

*13. Often uses short, incomplete sentences.*

Sara used mostly one word or very short answers for most of the three sessions. Sara often said, “Mmmhmmm” instead of saying ‘yes.’ It wasn’t until the end of session three that Sara became comfortable enough to share her ideas and opinions.



*14. Ritualistic or compulsive behaviour patterns (sniffing, licking, watching objects fall, flapping arms, spinning, rocking, humming, tapping, sucking, rubbing clothes).*

Sara often looked at the researcher for affirmation before making her multiple choice selections. This subsided by the third session as she became more comfortable with the apps.

*15. Difficulty with reading comprehension (can quote an answer, but unable to predict, summarize or find symbolism).*

The researcher could not identify Sara's reading level. She told the researcher during the first session that reading was difficult for her. The researcher asked Sara many times during the three sessions to read but she refused. Sara did not pass many of the quizzes in 'Mission Rescue Kloog: Social Skills for Autism.' This was likely because the reading was too difficult which made the comprehension difficult.

*16. Short attention span for most lessons.*

This only occurred with 'Mission Rescue Kloog: Social Skills for Autism.'

### **Concluding Remarks**

It took Sara a long time to become comfortable with the researcher. It was not until the end of the third session when Sara would converse with the researcher beyond a few words. Sara was polite and engaged. She seemed to enjoy the 'Social Skill Builder' video modules. She had success with them; however, it did take her a long time to complete the quizzes.

‘Mission Rescue Kloog: Social Skills for Autism’ contained text that was above Sara’s reading level. Sara did not have success with this app.

Sara enjoyed ‘Quick Cues’ but only had a conversation about the app during the third session. Sara was excited to have access to this app on her iPhone. It was difficult to get feedback about her opinions of the apps because she was so shy and quiet; however she said that she enjoyed the experience of participating in this study

### **Participant # 5 Robert**

#### **Session 1 Summary**

##### **Background information:**

Robert is a 17-year-old, grade 12 student. In the study initial interview, Robert stated that his teachers are helpful and students are kind for the most part by saying, “There are lots of people to help.” Robert likes that the school had many extra programs to offer students that go beyond core subjects. Robert particularly likes the ‘Life Skills Program’ which he said, “helps him to become self-independent.” He enjoys all subject areas, particularly Science, Math and English. When he does not know what to do on a particular assignment or concept, he will seek outside assistance and tutoring to help him.

When Robert is not in school he enjoys video games and hanging out with friends. He considers himself to be a very sociable person who describes himself as a leader and not a follower.

After Grade 12, Robert wants to become a health care aid. He made this decision about three years ago. He attributes this desire to the time he spent in the hospital a few years ago. He also has family that works in the medical profession.

When Robert was asked about what this study was about he was quick to respond that it is to, “See how it helps people with autism.”

### **Social Skill Builder**

Robert was introduced to this app first. He was told that the app contained videos that he would watch followed by answering multiple choice questions. He was given the iPad and asked to open the app.

He began by typing his name in the app and then navigated his way to the first video module entitled, ‘Going to the Restaurant.’ He scored 10/15 on the quiz at the end. He commented that the videos were “corny” and “silly.” He laughed when one multiple choice question said, “You can’t go home.”

He thought that some of the questions were way too easy for him. “It was weird. Um..it was like...they were all questions you obviously knew the answer to, some of them just felt like being ridiculous when I answered them but um..it is a good app for younger people.” He mentioned that Grade 6 would be a good age for people using this app. He maintained that he got 5 questions incorrect because he was not paying attention, and that he wanted to see what would happen if he got some of the answers wrong.

One criticism of the app that Robert had was that it needed to be updated because the videos were of poor quality. He also commented that the videos were “Pretty old because in the video they talk about smoking. You cannot smoke in public.” Robert believed that this app was easy, but yet enjoyable. One comment that Robert would make to the developer was, “I thought it was a really interesting app in terms of like the

different scenarios. They were interesting but I feel like you need to make the questions a bit harder.”

### **Mission Rescue Kloog: Social Skills for Autism**

During the first session, Robert was introduced to this app by the researcher through a discussion about what the app was about. He was told that there were a series of social stories that he would read followed by a quiz at the end. Robert was also told that by passing the test, he would be given an award by the app that would go towards fixing the ship so that the alien could go back to his planet.

He stated that his initial impression was that the introductory video was “Boring and that I wanted to skip it.” Robert explained the premise of the app by saying, “Well the guy crash landed on earth and now he needs some social skills to get along with people.”

Robert selected the ‘Body Language’ module. He chose to quietly read the first slide and then he decided to skip through all the reading and go directly to the quiz. Robert took his time on the quiz. He said that he was “dissecting” the questions. Robert received a score of 9/10. Robert said that this module was about “Intellectual Skills.” He mentioned that the vocabulary was much more difficult than ‘Social Skill Builder’ and ‘Quick Cues’ but that the app was not as engaging as it could be if it had more video. He said, “I thought the questions were boring and I think they should be a little harder.”

One suggestion Robert made to improve the app would be:

“To say how many questions there are throughout the whole thing. While I’m playing this, I don’t know how many questions I have to answer, and it’s like how much

longer. The other one told you how many questions... and to have more video involved with it.”

### **Quick Cues**

Robert was introduced to ‘Quick Cues’ at the end of the first session. Robert was told that the app contained many short social stories that he would read along with the researcher and then discuss them. Robert was given the iPad to open the app and then to select a category, followed by a story that he felt was applicable to his life. Robert chose the story, ‘Avoiding Conflict on the Job’ as he was currently volunteering at a veterinary hospital. He was also hopeful to get a job in the near future. Robert made many comments about the term ‘expectations’:

“Expecting is like, you know, you’ll go to a restaurant and you are expected to sit and not jump around. You go to a hospital and you are there to expect to get treatment, not to be waiting there forever. I think some people’s expectations for things are a lot higher than others and I don’t think that is very good sometimes, but I think as well, there are some places that have low expectations... like McDonalds. You would go there dressed in pretty much anything, but you look at some place really fancy restaurant that is really classy, like Moxie’s or some restaurant at a hotel, like in the Fort Garry or something and they have higher expectations that you will come and dress up; that you won’t come all terrible looking. You go to McDonald’s and they don’t care if you dress up. You go to a Wal-Mart and they don’t care. Let’s say you shop at some other place, like a market they may expect you to have higher expectations.”

This extended dialogue showed how Robert was very much aware of the meanings within the ‘Quick Cues’ story. Robert showed that he was well aware about expectations in the workforce. He thought that good tips came from using this app. Robert discussed wanting to get a part time job at a retail store.

Asked what the employer expectations might be for a retail store, Robert said, “Well mannered, respects company policy, shows up on time, always shows a positive attitude. I mean like positive attitude, that’s a reality for the most part, but you know, you aren’t going to expect everybody to always have a positive attitude.”

Asked if he got along well with others, Robert said, “I do, ya. I think I get along with a lot of people good, but, sometimes you don’t and that’s the reality of things. You don’t get along with everybody in society.”

He made a comment at the end of the first session that the app was beneficial and that he would like to have access to it on his iPhone.

### **Concluding Remarks from Session 1**

Robert demonstrated excellent conversational skills with the researcher. He was honest when discussing the apps. He gave constructive feedback about each of the apps and enjoyed sharing his opinions. These apps were all at a level that Robert was able to understand. He did however become silly when using the ‘Social Skill Builder’ app saying that he purposely got questions wrong, “To see what would happen.”

Robert skipped much of the reading from ‘Mission Rescue Kloog: Social Skills for Autism.’ This meant that there was not a lot of dialogue while using this app.

‘Quick Cues’ provided the most dialogue between Robert and the researcher.

Robert appeared to enjoy this app the most as it related to his current interests.

## **Session 2 Summary**

### **Social Skill Builder**

Robert identified ‘Social Skill Builder’ at the beginning of the second session. He wanted to have another opportunity to use it because he was “annoyed” about his mark during the first session. Robert chose the ‘Hanging Out’ video module to watch. He said that he liked this app because he was a “visual learner.” This was a dramatic change from the first session where he maintained that the app was too easy and was for younger people. Robert requested to watch the video module using his headphones. There was very little conversation happening during this time. He finished the videos and received a score of 9/10 on the quiz at the end. Robert again, talked about the app being a lot of fun. He said he liked it because there was “less reading.” He said that the multiple choice questions were “too easy” but he liked that. This was very different from his first impressions of the app.

### **Mission Rescue Kloog: Social Skills for Autism**

Robert was more cooperative during the second session using this app however he wanted to skip the introductory video. He agreed to read out loud and have a discussion as he went through the text. He wanted to read the story entitled ‘Conversation Starters.’ Robert considered himself to be a sociable person who often started conversations with

his peers and adults but “feels nervous meeting new people because you don’t know what to expect.” Robert seemed to enjoy reading and discussing this story.

He stopped on almost every page to have a conversation and link it to personal experiences. Robert referenced that, “I can talk to people I don’t have a lot in common with.” Robert showed that he was able to have and carry on a conversation but the scope of conversation was limited to what the researcher initiated.

Robert mentioned that he was good at reading social situations. Robert said, “Ya. You generally, at a funeral for example, wouldn’t want to make a funny joke about dead people, like; it’s a funeral, not about fun.” Despite knowing how to act in social situations, Robert gave the following example about how he made a mistake in a social situation:

“There is a kid at my school, and he was talking about his dad, and how he never sees his him, and I said, ya my dad is a total jerk too and he said, my dad’s dead. But the thing was after he said his dad died, he went on this big, huge rampage about how I was so insensitive and such a total jerk, like he lost me completely and lost all of my moral support for him because of that. Especially the drama that ensued after that – it was stupid and ridiculous.”

Robert provided literal interpretations of the text. This literal interpretation may have made the quiz at the end of this module more difficult as he only scored 5/10. Robert said the quiz was “pretty difficult.” This quiz score seemed to embarrass Robert. He asked to do the test again during the third session.



## **Quick Cues**

During the second session, Robert wanted to read the story, ‘Getting to Sleep.’ He said that he had difficulty sleeping at night and that this had been an issue for years. He said that it had nothing to do with stress or going to bed and thinking. He admitted to taking sleeping medications sometimes when he was having a very difficult time sleeping. The conversation he had with the researcher discussed stress, relationships, and triggers that made it difficult for him to sleep.

## **Concluding Remarks from Session 2**

Robert gravitated to the ‘Social Skill Builder’ app. This app was too simple for Robert but he still wanted to spend a considerable amount of time on this app despite admitting that he wasn’t learning anything from it. Robert did take the other two apps more seriously. This led to fruitful conversations about having conversations with others. Although Robert was able to have strong conversations, he struggled with the quiz in ‘Mission Rescue Kloog: Social Skills for Autism.’ The reason for this was likely because he was overthinking the questions. Robert also said, “I feel like I wasn’t really studying it that much and I was getting a bit cocky with it cause I wasn’t actually expecting there to be a test at the end of it.”

## **Session 3 Summary**

### **Social Skill Builder**

During the third session, Robert focussed on the other two apps, however, he wanted to use ‘Social Skill Builder’ one more time despite Robert saying that it was “way

to easy.” As per his request, Robert again selected the ‘Hanging Out’ video module.

Despite Robert getting 10/10 on the quiz, Robert commented that the apps were old and the quiz was too easy but he was still excited to use it. Again, he wanted to use headphones for the videos and complete the quiz silently.

Robert’s concluding thoughts about this app were that it was a “good learning tool for visual learners.” He believed that this app was useful for people that do not like reading. Beyond comments about the app videos being old, Robert said “I don’t like the way you get achievement.” Robert would like to see this app give rewards for successfully completing video modules rather than just a small mark after completing the quiz. When asked if he learned anything from using this app, Robert said, “I don’t know if I learned anything from this one.”

### **Mission Rescue Kloog: Social Skills for Autism**

At the beginning of the third session, Robert was keen to redo the ‘Conversation Starters’ quiz. He acknowledged underestimating the difficulty of the quiz. “No it’s not easy. I can’t imagine how kids manage to do any of this.” He skipped the reading and went directly to the quiz. He scored 10/10 the second time around. After getting a perfect score Robert reacted to re-doing the test when he said, “I was more into it this time. Last time, I didn’t take it seriously because I thought it was going to be a corny quiz.”

The researcher asked Robert if he was learning from this app and he said, “ya there is some learning going on but it is somewhat memorizing too, because in order to learn something you have to memorize it. You don’t just learn it from reading it and you’ve learned it. You have to memorize it and remember what it is.”

The app involved plenty of discussion between Robert and the researcher. Gaging improvement is difficult; however, an analysis of the conversations can help determine whether learning from the app is occurring.

### **Quick Cues**

During the final session, Robert wanted to read, ‘Avoiding Conflicts’ and ‘Changing Topics.’ These were stories that Robert admitted he had difficulty with. Robert said that he was leader in the class and could work with others even if he does not like them. “I mostly try to take charge and I’m like, you know what, I’m in charge now and if they don’t like it, I’m like... too bad, because you know what – I don’t like you and you don’t like me so let’s just get this over with.” Robert was asked to give an example of a conflict he recently had. Robert said:

“I bumped into an EA and he got all PO’d at me, and I was like, you are being really rude about it and I wasn’t going to give him an apology because of the way he behaved about it, and I ignored him and I went back to class, and I said this guy is acting like a total idiot. He comes into my class, and starts saying, “He deliberately pushed me...” this and that, and I was like, “no I didn’t”, “no I didn’t. I was giving you respect” and, I told you that you bumped into me and I do not want to apologize. I was being respectful and he didn’t like it. He said, “Well if you bump into me again, you are going to the office.” And, my classroom teacher, he is like sitting down, we are both sitting down with each other, and my teacher says, “So what do you say when there is an accident?” I said, “Generally, the person that caused it says they are sorry. And he looks

up at me and says, “Next time you do it, you’re going to the office.” I am like, “No I’m not.”

This story really helped Robert as he admitted that he got in arguments with people “once a week.” “I feel like once a week something stupid is coming up. I feel like it is pretty ridiculous.” Robert also said:

“I generally feel like it’s the other person’s fault... I don’t like to say “I’m sorry,” because that is an admission of guilt. The situation of me bumping into the teacher – I truly didn’t want to say sorry to him because I felt that would be an admission to guilt - admitting that I am guilty for bumping into him.”

Robert believed that he was generally the victim during altercations with others and that he was not to blame.

Robert also read the story ‘Changing topics.’ Robert mentioned that he changed topics frequently. Asked if that could lead to people thinking he was rude, Robert said, “It could.” Robert said that he cannot fake interest. After a lengthy dialogue, Robert admitted that this could be part of the reason why he had conflicts. He thought that this app might help him rethink how he handles social situations in the future and that the number of conflicts he has with others may decrease.

Robert said that this app was for “someone older.” He liked the app and wanted it available on his iPhone so that he could reference it when needed. He believed the stories “Needs more detail” and that the stories “Aren’t too deep.” Robert enjoyed the conversations that emerged from use of this app and it made him rethink how he should collaborate and converse with others.

### **Concluding Remarks from Session 3**

Robert enjoyed participating in this study but admitted that he would need to spend more time with each of the apps in order for them to be beneficial for him. ‘Quick Cues’ was the most relevant app for Robert. It offered him advice when dealing with conflict that he hoped to use in the future.

### **App Connections to the Rocky Point Academy Checklist**

The Characteristics of Autism Checklist (Appendix #1) was used to gauge the progress Robert made with each of the apps. Because each case of autism was different, every participant did not fit into each category. The categories below are the observed behaviours assessed during each session with Robert.

#### *1. Excellent rote memory in some areas*

During the sessions, Robert completed quizzes relating to social situations like going to a restaurant and hanging out with friends. He received a score of 10/15. He maintained that he was not really trying and that he was fooling around. There may be merit to this claim because he got 9/10 and then 10/10 during the second then third sessions. His mark gradually increased. During the third session, Robert completed the same video module ‘Hanging Out’ as he did during the second session using the ‘Social Skill Builder’ app.

Robert did not perform well on the quiz within the ‘Mission Rescue Kloog: Social Skills for Autism’ app during the first session. He received a score of 5/10. The second time he scored 10/10. Robert was asked how he went from 50% to 100% the second time and he said that he was “more alert” the second time. He admitted that he found the quiz difficult the first time. Robert was asked whether he learned from his mistakes or whether

he memorized answers. He said that he was “more into it and took it {the quiz} more seriously.” It bothered him that he only got 50% the first time. Robert gave an example of him failing his driver’s test the first time and sometimes practice is necessary in order to achieve a desired result. Robert was asked if he simply memorized the correct answers for the quiz or whether he was learning and he said, “There is some learning going on but some memorizing is happening.”

## *2. Difficulty reading facial expressions and body language*

The first video, “Going to a Restaurant” within the ‘Social Skill Builder’ app incorporated elements of reading facial expressions and body language expressions. During the three sessions, this was his most difficult task based on his mark of 10/15. Robert maintained that he was not trying while using this app but discussions had with him regarding the other apps suggested that reading body language and facial expressions of others may be a challenge for Robert.

## *3. Short attention span for most lessons*

Robert showed a very short attention span using the ‘Social Skill Builder’ app for the first time. During the videos, he was looking around a lot and noticing the music in the background. Robert commented about the videos being “corny” and “silly.” This may have caused a low score on the quiz at the end. The second and third time this app was used, his attention span was maintained throughout use. This led to scores of 9/10 and 10/10. It was possible that Robert felt embarrassed with his poor mark on the first one and then became motivated to do better the second and third time.

During the first session, Robert admitted to not paying attention to the app, ‘Mission Rescue Kloog: Social Skills for Autism’ calling it boring and wanting to skip

the introductory video. After obtaining a score of only 50%, Robert seemed embarrassed and began taking this app more seriously during the second and third session. He admitted at the end that it was an appropriate app for people who needed improvement with their social skills.

*4. Resistance or inability to follow directions*

Robert followed the directions for all three sessions. At times, Robert looked around and was off task, but he always followed directions.

*5. Difficulty understanding jokes, figures of speech or sarcasm*

Robert did not demonstrate any difficulty in this category using the 'Social Skill Builder' app. Robert demonstrated an extensive vocabulary, which he connected to what was literally happening. He was able to identify behaviours and facial expressions easily in the videos and had no difficulties with the quiz questions relating to this category.

Robert provided literal interpretations of the text from 'Mission Rescue Kloog: Social Skills for Autism.' When asked if he was good at keeping conversations appropriate Robert said that he was. He also said that he knew when not to joke. Robert mentioned funerals. He said, "You wouldn't want to make a funny joke about dead people."

*6. Makes honest but inappropriate observations*

During the first session, Robert spoke very candidly about the 'Social Skill Builder' app calling it "corny," "silly," and for little kids. He asked a pointed question, "Does this app cost money?" insinuating from his body language and expressions that this was not a good app. After the first session, Robert took this app more seriously and

no inappropriate observations were made. There was definitely progress made by Robert over the three sessions as he became more engaged by this app to the point it was his second favourite app.

During the discussion of “Conversation Starters” in the ‘Mission Rescue Kloog: Social Skills for Autism’ app, Robert was asked if he could think of a time when he made inappropriate observation. Robert mentioned making a comment about someone’s dad, to which the other student responded that he, was dead. This created some tension that did not resolve itself. This was an example where Robert made a comment that he later regretted. He admitted this was an area that needed improvement.

*7. Responds to social interactions but does not initiate them*

Robert described himself as a leader when interacting with others. He likes to begin conversations and lead them. He admitted to taking control of situations and not faking the interests of others very well. Robert said if he was not interested in what others said, he would often “cross his arms.” He admitted that he needed to work on his overall body language when interacting with others.

Robert was very quick to start conversations and give examples during the three sessions. Robert and the researcher had a lengthy conversation about the term “expectations.” Robert discussed having high vs. low expectations. He used the example of eating at McDonald’s vs. Moxies, and how you would/should dress when going to these restaurants. Robert discussed wanting to work at a retail store and said that he fully understood the expectations that would be needed like being, “Well mannered, respects company policy, shows up on time, and have a positive attitude.” This excellent conversation came using the ‘Quick Cues’ app.



8. *Difficulty understanding the rules of conversation*

Robert fully understood the rules of conversations. He explained them during the use of 'Mission Rescue Kloog: Social Skills for Autism.' During post app use, Robert admitted to not being as respectful of others when they are speaking. This app allowed for a dialogue, which led to Robert admitting he needed to work on his body language when in conversations with others about topics that he was not interested in.

Robert followed the rules of conversation throughout the use of the app 'Quick Cues and 'Social Skill Builder'.

9. *Often uses short, incomplete sentences*

Robert was very capable of having intelligent conversations with others, using complete sentences while using all apps.

10. *May have a very high vocabulary*

Robert demonstrated his strong vocabulary through dialogue with the researcher using all apps.

11. *Difficulty with reading comprehension (can quote an answer, but unable to predict, summarize or find symbolism).*

Robert was able to follow the text within each app. There was some vocabulary that Robert had difficulty with. He did not admit this difficulty until the third session when he began asking for clarification on vocabulary that he did not know. Perhaps the reason he asked for help was that he became more comfortable with the researcher.

*12. Very little or no eye contact*

Robert had regular eye contact with the researcher during all three sessions when using all apps.

*13. Irregular sleep patterns*

Robert specifically chose the story “Getting to Sleep” while using the ‘Quick Cues’ app because he had a lot of difficulty sleeping at night. Robert said that he was “easy going” and does not get “stressed much.” He said that he did not use his phone much at night and went to bed at around 10:30PM. He claimed to play a lot of video games at night. After a lengthy conversation, Robert admitted that “games are the issue” as to why he does not sleep well at night and if he were to stop playing them he would get a much better sleep at night.

*14. Does not generally share observations or experiences with others*

The story, ‘Changing Topics’ using the ‘Quick Cues’ app had a positive impact on Robert discussing his demeanour and appropriate body language. He said that, “I generally don’t like to fake interest.” Robert said that he thought it was rude to fake interests when talking to others and that “sociably it’s respectful” to simply tell others that you are not interested in what they have to say. Robert was asked whether he had verbal arguments or fights because of his demeanour or body language. Robert said that he did. Robert was asked, “Does the story make you think differently about talking to others?” Robert said “Ya! I think this app could help me.”

### *15. Difficulty understanding group interactions*

This was an area Robert admitted having difficulty with. Robert said he takes control during group assignments in class. He said, “I am type A personality” which makes it difficult for him to work with others like himself. He said that he “takes charge” and this sometimes causes issues with others. Robert admitted to having conflicts with others about once per week. When asked about that Robert said, “A once a week conflict is ridiculous.” He was then asked whether he was ever to blame for conflicts with others and Robert said, “Generally, I feel like it is the other person’s fault.”

### **Concluding Remarks**

Robert seemed to enjoy participating in this study. The results show that he was very strong when it came to literal interpretations. He was able to determine the correct answer after thinking about them. Robert enjoyed having conversations about social situations and “Mission Rescue Kloog: Social Skills for Autism” and “Quick Cues” enabled him to do that. The stories read, gave Robert an opportunity to reflect on his interactions with others. These two apps were beneficial for Robert whereas ‘Social Skill Builder’ was too easy for him. Robert believed that these apps could help him in his day-to-day life but it was important that he reviews these stories on a regular basis so that it would have more of an impact.

### **Common Themes Amongst the Participants**

Every participant had a unique experience using these apps. This analysis showed the successes and challenges that each participant had with the apps. It was difficult to compare these case study results because each child came from different age groups and

varying levels of cognitive ability. There were however a few common themes that arose from each of the participants.

**Visual.** First, each participant had success with the app ‘Social Skill Builder.’ The visual component of this app kept the participants engaged and the quiz at the end of each module was at a level that allowed each person to have success. Next, each participant did share the same concerns that the videos were old and the quality was poor. Three of the participants also had issues with this app freezing while using it. The app stopped working with three different iPads and it stopped working while listing the multiple choice options after a video.

**Use.** “Mission Rescue Kloog: Social Skills for Autism” was an app that provided similar responses from all of the participants. Everyone felt that there was too much reading, not enough video, and that the text was very difficult. Every participant also commented that the quizzes were very difficult. Every participant also became disengaged many times while using this app. This app only provided useful dialogue with one out of the five participants. Further, this app only worked if the Wi-Fi was enabled. This caused a delay for the researcher and participant during the first two sessions.

Every participant enjoyed the app, ‘Quick Cues’. Each participant was adamant that they would use this app after completing their participation in the study. Each participant read different social stories from this app, yet each participant took away tips that they could use to enhance their social skills.

**Technical.** As with any technology, complications do arise. This study had two issues that came up with multiple participants. First, the app ‘Mission Rescue Kloog: Social Skills for Autism’ had issues loading after the apps introductory video. The app

modules would only load after a Wi-Fi connection was established. This was not something that was advertised with this app. When the researcher began using it with participants, it was necessary to find a location that had access to a Wi-Fi connection. This posed some minor inconvenience.

The other complication came using the ‘Social Skill Builder’ app. Three participants with three different iPads had the app freeze on them while completing the quizzes. The video would play and when the multiple choice options were presented, they would freeze. The app would need to be restarted and then the video module and quiz would need to be started from the beginning. This caused substantial frustration with the participants. This is something that should not occur.

In the next chapter, a conclusion will be made as to whether the claims made by the developers of these apps are true based on the results of this particular study. The implications that these apps have on education and what needs to be done next will be explored. Finally, how educators should select appropriate apps for their students will be discussed.

## **CHAPTER V**

### **Discussion and Conclusions**

This chapter discusses the hypothesis that was made in Chapter 1. Connections to other studies that have recently been completed in this area are discussed. Educational implications that a study using iPad's can have will be discussed. Limitations within the educational setting that need to be addressed are presented. Finally, the conclusion is based on a collective overview of the data.

#### **Revisiting the Hypothesis and Thesis Questions**

The hypothesis for this study was that free and moderately priced iPad apps could be used in the development of social skills in children with autism. Based on this premise, the results showed that 'Social Skill Builder' and 'Quick Cues' were apps that helped and encouraged the participants to think about the way they interact with others. These apps also demonstrated to the researcher that the participants understood the rules of conversation and the way in which to interact with others. These two apps were not free.

'Mission Rescue Kloog: Social Skills for Autism' did not assist four of the participants. No progress was made in terms of the demonstration of social skill development for the participant. Discussions with the participants showed that this app was too difficult to understand because of the challenging text and quizzes. Further, this was the one app in the study that was free.

The main question that was posed at the beginning of this study was: How does the use of Apple iPad apps assist or not assist children with autism to demonstrate their

understanding of socially accepted behaviours and mannerisms? There were also four sub-questions that were posed. These questions were:

- (a) In what ways does the child (participant) respond to the selected apps?
- (b) How quickly does the child adapt to the apps?
- (c) How does the child demonstrate independence using the apps?
- (d) What attitudes does the child exhibit when using the apps?

As stated throughout this thesis, each student with autism is different and each student also demonstrates a unique set of gifts and challenges. In order to connect each case study to the original case study questions, it is necessary to discuss each separately.

### **Ewan**

Ewan was the youngest student in this study and he benefitted from the app ‘Social Skill Builder.’ He enjoyed the video modules that he completed. The quiz questions were at a level that he could understand. The success that he had using this app demonstrated to the researcher that he understood acceptable social behaviours. Ewan was able to demonstrate independence very quickly with this app, as he was able to use it after one demonstration. Ewan responded very positively to this app. He showed this with smiling, and high 5’s to researcher.

‘Mission Rescue Kloog: Social Skills for Autism’ was an app that was too difficult for Ewan. The only success that he had was completing the module ‘Facial Expressions.’ The likely reason that he had success with this module was because it gave a lot of visual prompting rather than text. Other than this module, Ewan was unable to use this app to demonstrate an understanding of any social skills. Ewan never adapted to this

app and he was unable to demonstrate any independence with it. This was due to his current reading level, which would not allow him to have success with the app. His attitudes and responses to the app were mostly negative. This was because he was disengaged by the amount of reading involved.

Ewan also showed some success with the app 'Quick Cues.' This app allowed the researcher to evaluate whether Ewan could discuss social situations. Ewan had success discussing friendship versus bullies. Other social stories using this app were too difficult for Ewan. The vocabulary and themes were not at a level that he could understand and therefore he was unable to discuss. Ewan did not show independence using this app. The researcher led all discussion and Ewan only answered direct questions that he was asked. He seemed to enjoy talking about friendship and bullies but he was unable to discuss any other social stories that were read during the three sessions. Ewan never adapted to the app as it was researcher led and Ewan simply did his best to answer the researcher's questions.

## **Cookie**

Cookie also had the most success with the app 'Social Skill Builder.' She too benefitted from the videos. This app showed the researcher that Cookie did understand many of the socially accepted behaviours and mannerisms. She did very well with the quizzes with this app. She demonstrated her independence after the first instruction and her understanding became obvious when she was ready to answer the quiz questions before all multiple choice options were presented. Cookie presented a neutral attitude



towards the app. She was comfortable, and demonstrated a good knowledge of social behaviours but getting a high quiz score never overly excited her.

‘Mission Rescue Kloog: Social Skills for Autism’ did not show any impact for Cookie. Cookie was able to read the modules, but they were too long. By the time she reached the quiz, Cookie had forgotten much of the content which made the quizzes too difficult. She was able to use the app, but it did not assist in her social skill development.

‘Quick Cues’ was an app that Cookie had some success with. She was able to read and navigate through the app with minimal instruction but discussion only occurred when the researcher asked direct questions. Cookie demonstrated her understanding of socially accepted behaviours by directly answering questions asked by the researcher. Cookie provided very short answers. She adapted somewhat to the app and admitted that she would need to spend more time with it in order to have a lasting effect.

## **Jason**

Jason had success with ‘Social Skill Builder.’ This app was very easy for Jason. He demonstrated his understanding of socially accepted behaviours very quickly when completing the video modules. He learned how to use this app very quickly and consistently received high scores on the quizzes. His attitude towards the app however was fairly negative as it was too easy for him. At the end of the study, he told the researcher that he was going to delete the app but keep the other two apps.

‘Mission Rescue Kloog: Social Skills for Autism’ allowed Jason to have discussions with the researcher that allowed him to demonstrate his understanding of socially accepted mannerisms. He was able to demonstrate independence after the first

use. Jason found that this app provided helpful advice that he would continue to use after the study. His attitudes towards the app were mostly positive. The only exception was that he found the quizzes difficult. He also said that he did better the second time he would do a quiz.

‘Quick Cues’ provided the most dialogue and evidence of Jason’s understanding of socially accepted behaviours. He was able to demonstrate that he knew what to do in social situations, but he had difficulty in them. Jason said that this app gave him great advice on what to do in social situations and that he would regularly use this app in the future. Jason had nothing but positive comments about this app. He was able to master how to use the app and was capable of having rich dialogue with the researcher. This was the most useful app for Jason.

## **Sara**

Sara demonstrated success with the ‘Social Skill Builder’ app after the first session. She showed her independence and confidence the most with the app during the third session. During the first two sessions, Sara was very slow using this app. She took her time with the quiz questions and regularly looked to the researcher for affirmation before making her selection. Her understanding of whether she understood socially accepted behaviours came from her high quiz scores. Sara did not verbally share any insight when using this app as she only smiled for a correct answer or shook her head with a wrong answer.

‘Mission Rescue Kloog: Social Skills for Autism’ only showed that Sara could answer multiple choice questions. Because she would not discuss the app, the researcher

was only able to determine that she understood some of the socially accepted behaviours that were presented in the modules. The researcher was unable to get Sara to elaborate or explain her opinions. Sara admitted to having difficulty with reading and therefore, this app may have been too difficult for her. The researcher had to lead each time this app was used because Sara would not read out loud or silently.

‘Quick Cues’ was slightly better for Sara. During the third and final session Sara started to have conversations with the researcher about Internet safety and bullying. She demonstrated that she knew what to do in certain situations. Sara really enjoyed this app and said she would use it in the future for advice. This app was written at a level that she understood and could help her in the future. Had there been more sessions, additional information as to how well Sara understood socially accepted behaviours would be evident. The issue was that she would not discuss anything with the researcher until the third session.

## **Robert**

Robert demonstrated independence with the app ‘Social Skill Builder.’ He also showed that he understood all themes that arose from the modules that he completed. Robert commented that this app was very easy but he always wanted to review during each session despite the researcher suggesting that this app was too easy for him. He enjoyed the videos and the success that he had using this app. This app did not teach Robert anything new about social skills that he did not already know.

Robert had success with ‘Mission Rescue Kloog: Social Skills for Autism.’ Robert admitted that the app was difficult for him and he did have problems with some of

the module quizzes but he enjoyed the challenge and he was able to discuss the socially accepted behaviours that arose. He liked the app and he was able to navigate through it after only being shown once what to do. The text and quizzes were at a level that he was comfortable with despite not passing every quiz on the first time.

Robert found his greatest success with 'Quick Cues.' He was able to discover some social issues that had happened to him. This made Robert think about the way he acted during conflicts with others. Robert only had positive comments about the app and that it gave him advice that he could review when he was unsure about what to do in social situations.

### **Connections to Other Studies**

There have been very few studies that focus on the use of the iPad and its purported usefulness in schools. One study that was conducted by Hickey (2012) discussed how iPad's could make assessments easier and less time consuming for school administrators when evaluating teacher performance. The study concluded that the iPad was useful for the 18 administrators that used it but also claimed that more research would need to be done.

Another study by Jesso (2012) conducted a study with students who have visual impairments. The study used the iPad feature 'Voiceover' in conjunction with 30 apps to determine whether the Voiceover function was an influential tool. The results were positive however there were challenges that arose using this function.

Debora Kagohara seems to have the most number of studies published in the area of iPad technology for students with exceptionalities. A few of these studies involve the

iPad app 'Proloquo2Go.' This app is designed to help students who struggle verbally. The app was designed to give these people a voice and to help them communicate with others. Reviews were generally positive for the app. One issue has been the price. As of February 2016 the app is \$350 USD.

Only one study was found that resembled this study. Voroshina (2015) compared the traditional methods of teaching with pen and paper to using iPad apps with students with autism. The focus was on solving addition math problems. The results showed that the students had more success with the traditional form over the use with the iPad.

These studies all contribute to the study of iPads and the potential that they have. The researcher was unable to find any studies that directly evaluated social story apps in terms of their ability to assist students with autism.

### **Educational Implications**

Apps that are being created using the iPad like 'Proloquo2Go' are allowing students with autism to have a voice that they previously may never have had. Other apps are also assisting people within their core subjects. Apps such as the ones evaluated within this study are helping people with their social skill development. There are many implications that a study like this can have in education. These implications can affect students, teachers, and parents.

### ***Students***

This study has helped students enhance their understanding of socially accepted behaviours through text and video modules. At least one of the apps from this study assisted each participant. This was demonstrated through quizzes and discussions. The

apps in this study provided an opportunity for students to discuss social situations and how they interact with others.

### ***Parents***

These apps provided a tool that their child can use to discuss socially accepted behaviours. These apps can be used between a parent and their child to review social behaviours at any time in one location. Beyond simply reading social stories, these apps give the opportunity for parents to have organized, rich dialogue with their child.

### ***Teachers***

The apps from this study could be used with students at school as well. A teacher or educational assistant can use these apps with their student as part of their day to day routine. These apps could also be used as a calming mechanism if or when conflict arises. These stories can be implemented as a review or an organized discussion about appropriate social behaviours.

### **Limitations**

There are limitations with this study. First, limiting the study to five participants helped focus the collection of data and organize a systemic approach where the data could be collected while the same apps were still in current use. In order to get a broader sample of the effects of each specific app it would be advantageous to have a larger pool of participants but for the purpose of this study this number of participants was sufficient.

The amount of time that was spent with each student was limited to three sessions in order to achieve the collection of data efficiently. In each case, more dialogue would have become available and that in turn would then lead to more in depth data that could

be reported. In one case, one of the participants would rarely speak until the end of the final session.

### **Future Research**

When beginning this study it was evident at the onset that very little research had been done that focussed directly on the impact that an iPad can have for a student with autism. Only recently, are schools starting to recognize the potential of these devices. More research needs to be done in the area of iPad apps as a tool to help students with autism in the area of social skill development. This research could be used as a possible starting point to collate all social skills apps and their reported usefulness for parents and schools. This will help them make the best decisions they can on what apps are the best and are worth spending the money on.

It is important that future research include detailed information on the app developers. It is important for users to know who they are and their qualifications. It would also be beneficial to have quantitative data available showing the number of times someone has downloaded an app and the ratings that the app received. Having this kind of data in one location would be valuable and could help a user when making a decision about whether an app is worth purchasing.

### **Conclusions**

This study focussed on the use of free and moderately priced apps as an assistive tool to enhance the social skills of children with autism. Participants ranged from grades 6-12. There were 3 boys and 2 girl participants. Each participant had 3 sessions lasting

approximately 1 hour. Each participant was introduced to the app ‘Social Skill Builder’ ‘Mission Rescue Kloog: Social Skill for Autism’ and ‘Quick Cues.’

All 5 participants had success with at least one of the apps. All participants enjoyed and had success demonstrating socially accepted behaviours with the ‘Social Skill Builder’ video modules and quizzes app. The results of this study showed that this app would be beneficial to those who need assistance when in social situations. The quizzes help demonstrate how a person with autism perceives a particular situation.

‘Mission Rescue Kloog: Social Skill for Autism’ was useful for only one of the participants. This participant demonstrated an overall higher ability with reading and comprehension than the other participants. This app would be beneficial for older students with a strong vocabulary.

Finally, ‘Quick Cues’ proved to be beneficial for all 5 participants. All participants read different social stories and shared with the researcher their interpretations and understandings. All 5 participants said that they valued this app and that it would help them socially. Further, all 5 said that they would be using this app after the study concluded in order to obtain advice for specific social scenarios. This app would be useful for many people with autism. The social stories are written in a way that most people will understand. Further, people with autism can use this app to assist in the way that they interact with others.

The results of this study proved the hypothesis that iPad apps could be used to improve the social skills of students with autism. Social story apps whether they are text or video based had a positive impact on each of the participants. Beyond the quizzes, these apps started a conversation between the researcher and the participant, which gave



the participants an opportunity to reflect on the way they act around others in social situations and evaluate whether they need to change this behaviour.

Conducting this research study has allowed the researcher to reflect on the time spent with Charlie before this thesis was ever considered. The work that was done using technology and the way he was able to use it as a way to independently collaborate with his peers provided the framework for this research study. It was from this point that the researcher wanted to study autism and how the iPad could be used as assistive technology to help develop social skills.

It is important that others will continue to research the benefits that the iPad can have for students with autism. The small sample size of participants and number of apps selected for this study is just the beginning. More research done in this area will be beneficial to the advancement of educational practices for teachers and parents. The long term effect that this could have on children with autism is endless. It is this researchers hope that someday there will be a database of research completed specifically on iPad apps explaining how each can positively impact the lives of students with autism.

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## **APPENDICES**

The following Appendices #1 through #5 contain documents utilized to this thesis research. Appendix #1 is the complete checklist for ‘Characteristics of Autism’ that was approved by the Rocky Point Academy for use in this study. Appendix #2, 3, 4 are the protocols that were followed during each of the three sessions. Appendix #5 is the ethics board approval certificate received in order to conduct this research.

## Appendix 1: Rocky Point Academy Checklist

This set of characteristics is adopted from Rocky Point Academy. This questionnaire is utilized to determine which symptoms associated with autism are present in the participants in this study and to gauge whether progress is being made with app use.

### Characteristics of Autism

Circle the most appropriate answer to each question:

#### **Social skills**

Very little or no eye contact.

Always      Usually      Sometimes      Rarely      Never

Resistance to being held or touched.

Always      Usually      Sometimes      Rarely      Never

Tends to get too close when speaking to someone (lack of personal space).

Always      Usually      Sometimes      Rarely      Never

Responds to social interactions, but does not initiate them.

Always      Usually      Sometimes      Rarely      Never

Does not generally share observations or experiences with others.

Always      Usually      Sometimes      Rarely      Never

Difficulty understanding jokes, figures of speech or sarcasm.

Always      Usually      Sometimes      Rarely      Never

Difficulty reading facial expressions and body language.

Always      Usually      Sometimes      Rarely      Never

Difficulty understanding the rules of conversation.

Always      Usually      Sometimes      Rarely      Never

Difficulty understanding group interactions.

Always      Usually      Sometimes      Rarely      Never

Aversion to answering questions about themselves.

Always      Usually      Sometimes      Rarely      Never

Gives spontaneous comments, which seem to have no connection to the current conversation.

Always      Usually      Sometimes      Rarely      Never

Makes honest, but inappropriate observations.

Always      Usually      Sometimes      Rarely      Never

Seems unable to understand another's feelings.

Always      Usually      Sometimes      Rarely      Never

Prefers to be alone, aloof or overly friendly.

Always      Usually      Sometimes      Rarely      Never

Difficulty maintaining friendships.

Always      Usually      Sometimes      Rarely      Never

Finds it easier to socialize with people that are older or younger, rather than peers of their own age.

Always      Usually      Sometimes      Rarely      Never

Unaware of/disinterested in what is going on around them.

Always      Usually      Sometimes      Rarely      Never

Talks excessively about one or two topics (dinosaurs, movies, etc.).

Always      Usually      Sometimes      Rarely      Never

Overly trusting or unable to read the motives behinds peoples' actions.

Always      Usually      Sometimes      Rarely      Never

Minimal acknowledgement of others.

Always      Usually      Sometimes      Rarely      Never

### **Linguistic/language development**

Abnormal use of pitch, intonation, rhythm or stress while speaking.

Always      Usually      Sometimes      Rarely      Never

Speech is abnormally loud or quiet.

Always      Usually      Sometimes      Rarely      Never

Difficulty whispering.

Always      Usually      Sometimes      Rarely      Never

Repeats last words or phrases several times. Makes verbal sounds while listening (echolalia).

Always      Usually      Sometimes      Rarely      Never

Often uses short, incomplete sentences.

Always      Usually      Sometimes      Rarely      Never

Pronouns are often inappropriately used.

Always      Usually      Sometimes      Rarely      Never

May have a very high vocabulary.

Always      Usually      Sometimes      Rarely      Never

Uses a person's name excessively when speaking to them ("Mary, we are having lunch. Right, Mary?").

Always      Usually      Sometimes      Rarely      Never

Speech started very early and then stopped for a period of time.

Always      Usually      Sometimes      Rarely      Never

Difficulty understanding directional terms (front, back, before, after).

Always      Usually      Sometimes      Rarely      Never

### **Behaviours**

Obsessions with objects, ideas or desires.

Always      Usually      Sometimes      Rarely      Never

Ritualistic or compulsive behaviour patterns (sniffing, licking, watching objects fall, flapping arms, spinning, rocking, humming, tapping, sucking, rubbing clothes).

Always      Usually      Sometimes      Rarely      Never

Fascination with rotation.

Always      Usually      Sometimes      Rarely      Never

Play is often repetitive.

Always      Usually      Sometimes      Rarely      Never

Many and varied collections.

Always      Usually      Sometimes      Rarely      Never

Unusual attachment to objects.

Always      Usually      Sometimes      Rarely      Never

Quotes movies or video games.

Always      Usually      Sometimes      Rarely      Never

Difficulty transferring skills from one area to another.

Always      Usually      Sometimes      Rarely      Never

Perfectionism in certain areas.

Always      Usually      Sometimes      Rarely      Never

Frustration is expressed in unusual ways.

Always      Usually      Sometimes      Rarely      Never

Feels the need to fix or rearrange things.

Always      Usually      Sometimes      Rarely      Never

Transitioning from one activity to another is difficult.

Always      Usually      Sometimes      Rarely      Never

Difficulty attending to some tasks.

Always      Usually      Sometimes      Rarely      Never

Gross motor skills are developmentally behind peers (riding a bike, skating, running).

Always      Usually      Sometimes      Rarely      Never

Fine motor skills are developmentally behind peers (hand writing, tying shoes, scissors).

Always      Usually      Sometimes      Rarely      Never

Inability to perceive potentially dangerous situations.

Always      Usually      Sometimes      Rarely      Never

Extreme fear (phobia) for no apparent reason.

Always      Usually      Sometimes      Rarely      Never

Verbal outbursts.

Always      Usually      Sometimes      Rarely      Never

Unexpected movements (running out into the street).

Always      Usually      Sometimes      Rarely      Never

Difficulty sensing time (Knowing how long ten minutes is or three days or a week).

Always      Usually      Sometimes      Rarely      Never

Difficulty waiting for their turn (such as in a line).

Always      Usually      Sometimes      Rarely      Never

Causes injury to self (biting, banging head).

Always      Usually      Sometimes      Rarely      Never

### **Emotions or sensitivities**

Sensitivity or lack of sensitivity to sounds, textures (touch), tastes, smells or light.

Always      Usually      Sometimes      Rarely      Never

Difficulty with loud or sudden sounds.

Always      Usually      Sometimes      Rarely      Never

Unusually high or low pain tolerance.

Always      Usually      Sometimes      Rarely      Never

Intolerance to certain food textures, colours or the way they are presented on the plate (one food can't touch another).

Always      Usually      Sometimes      Rarely      Never

Inappropriate touching of self in public situations.

Always      Usually      Sometimes      Rarely      Never

Desires comfort items (blankets, teddy, rock, string).

Always      Usually      Sometimes      Rarely      Never

Laughs, cries or throws a tantrum for no apparent reason.

Always      Usually      Sometimes      Rarely      Never

Resists change in the environment (people, places, objects).

Always      Usually      Sometimes      Rarely      Never

An emotional incident can determine the mood for the day - emotions can pass very suddenly or are drawn out for a long period of time.

Always      Usually      Sometimes      Rarely      Never



Becomes overwhelmed with too much verbal direction.

Always      Usually      Sometimes      Rarely      Never

Tends to either tune out or break down when being reprimanded.

Always      Usually      Sometimes      Rarely      Never

Calmed by external stimulation - soothing sound, brushing, rotating object, constant pressure (hammock, rolled in a blanket).

Always      Usually      Sometimes      Rarely      Never

May need to be left alone to release tension and frustration.

Always      Usually      Sometimes      Rarely      Never

### **School-related skills**

Exceptionally high skills in some areas and very low in others.

Always      Usually      Sometimes      Rarely      Never

Excellent rote memory in some areas.

Always      Usually      Sometimes      Rarely      Never

Difficulty with reading comprehension (can quote an answer, but unable to predict, summarize or find symbolism).

Always      Usually      Sometimes      Rarely      Never

Difficulty with fine motor activities (colouring, printing, scissors, gluing).

Always      Usually      Sometimes      Rarely      Never

Short attention span for most lessons.

Always      Usually      Sometimes      Rarely      Never

Resistance or inability to follow directions.

Always      Usually      Sometimes      Rarely      Never

Difficulty transitioning from one activity to another in school.

Always      Usually      Sometimes      Rarely      Never

**Health/movement**

Walks on toes.

Always      Usually      Sometimes      Rarely      Never

Unusual gait.

Always      Usually      Sometimes      Rarely      Never

Difficulty changing from one floor surface to another (carpet to wood, sidewalk to grass).

Always      Usually      Sometimes      Rarely      Never

Odd or unnatural posture (rigid or floppy).

Always      Usually      Sometimes      Rarely      Never

Difficulty moving through a space (bumps into objects or people).

Always      Usually      Sometimes      Rarely      Never

Walks without swinging arms freely.

Always      Usually      Sometimes      Rarely      Never

Incontinence of bowel and/or bladder.

Always      Usually      Sometimes      Rarely      Never

Constipation.

Always      Usually      Sometimes      Rarely      Never

Frequent gas (flatulence, burping) or throwing up.

Always      Usually      Sometimes      Rarely      Never

Appearance of hearing problems, but hearing has been checked and is fine.

Always      Usually      Sometimes      Rarely      Never

Seizure activity.

Always	Usually	Sometimes	Rarely	Never
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Allergies and food sensitivities.

Always	Usually	Sometimes	Rarely	Never
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Irregular sleep patterns.

Always	Usually	Sometimes	Rarely	Never
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Apparent lack of concern for personal hygiene (hair, teeth, body odours).

Always	Usually	Sometimes	Rarely	Never
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## **Appendix #2: Interview Protocol for Session 1**

The researcher attended to these protocols for each respective app and also recorded anecdotal case study observations and notes about each participant. The first session began with general questions that allowed the researcher to learn more about the participant. Questions that were asked included:

- a. Hello. First I need some demographic information. Please tell me your name. I will be giving you a fake name (pseudonym) for the research study results and publication to help retain your anonymity.
- b. How old are you?
- c. What grade are you in?
- d. What is your favourite subject in school? Please describe this.
- e. Do you like using technology? Please describe this.
- f. What are your favourite types of games to play? Please describe this.
- g. What are some other things you like to do in your spare time?
- h. What would you like to be when you grow up?
- i. Do you own/have an iPad? (Student will explain their access to the iPad: sole user, borrowed from school, shared with another, etc.)
- j. How often do you use the iPad?
- k. What do you use the iPad for?

Following these questions the researcher explained and demonstrated each of the three apps following the protocol below:

### **A. Social Skill Builder Protocol**

Social Skill Builder was used to assess whether the child obtains better scores with each session. There are many videos that can be used within this app. The videos selected were chosen based on the needs of the child. The theme videos from the app include “My School Day’ with videos relating to transition time, walking in the hall, the playground, playing games, lunch time, school rules, assignments and playing with friends. Other videos have themes involving going to restaurants, ordering food, and paying for your bill. There are also videos geared specifically to young elementary school children. The child received a demonstration on how to use the app from the researcher during the first session, watch the video, and answer the 10 multiple choice questions. The participant was then given the opportunity to use the app with researcher assistance during the first session. After the first session, the participant was asked to use the app independently before the second session. At the beginning of the second session, the researcher asked questions relating to the students experiences using the app. During the second session, the participant demonstrated independent use of the app following the initial instructions that were provided in the script below, within this appendix. The same procedure was followed during the third session.

Upon completion of the videos and the multiple choice questions, the researcher asked questions to the participant regarding their learning and understanding of the videos.

## **Social Skill Builder App Script**

The following script was followed during the first session to demonstrate how to use this app:

Hello, my name is Mr. Ruppenthal and I will read you a script to assist in the process of using the app “Social Skill Builder” The developer of this app provide detail on what the app is and instructions on how to use it. I will read this script and instructions and observe you as you use the app. At the end of the session, I will ask you questions about how you feel using the app. The following information regarding the benefits of this app is found at: <http://www.socialskillbuilder.com/itunes-app/>

Social skill video modeling is one of many autism strategies for teaching social skills to children with autism and special needs. Our apps are excellent for:

- Social skill development for preschoolers with autism
- Modeling interactions for kids with autism
- Improving social skills for teens with autism
- Improving social skills for summer play dates
- Providing autism strategies for teaching social skills to children with autism

## **Instructions**

1. Please find and tap “SSB MDSD Full” app on the iPad
2. Type your name under “New Player”
3. Tap “New User”
4. Tap “Yes” When asked, “Do you want to create a new user named ...”
5. Tap “Play” at the bottom right corner
6. Tap “School Rules”

7. Tap “Start”
8. Tap “Classroom Assignment”
9. Tap “Tap to start”
- 10 Watch the video
11. Tap the correct answer or answers. There may be more than one
12. Tap continue at the bottom right to continue or select another option if you were not correct
13. Continue through the ten videos and answer each question the same

Thank you for using the app. Next time we will follow the same directions using the “Hanging Out Video” In the future you will also be using the “Friends House Video” and “Restaurant”

### Chart for Recording Correct Responses:

[illegible]

**Questions that followed after the initial use of the app “Social Skills Builder”:**

1. What is your first impression of the app?
2. How does this video make you feel?
3. What do you think about the actors in the video?
4. What lessons did you learn from this video?
5. How can you improve your score for next time

**B. Mission Rescue Kloog: Social Skills For Autism**

This app is being used to gauge the students understanding of the text that was being presented. Participants read a series of short text based stories. At the end of each story they were asked to complete ten multiple choice questions. If the participant answered 9 or more questions correctly they passed in accordance of the rules within the app. If the user received less than 9, they were asked to redo the quiz. The number of stories read, per session were limited to twenty minutes.

The following script was followed during the first session to demonstrate how to use this app:

**Script: Mission Rescue Kloog: Social Skills For Autism**

Hello, my name is Mr. Ruppenthal and I will read you a script to assist in the process of using the app “Mission Rescue Kloog: Social Skills For Autism” The developer of this app provided detail on what the app is and instructions on how to use it. I will read this script and instructions and observe you as you use the app. At the end of the session, I will ask you questions about how you feel using the app.



The following paragraph was written by the developers of this app. “The app is designed to be fun and at the start of the app the user will meet Kloog, an Alien from another planet who has crash landed on earth and does not understand our social customs or social situations. The user will have to help Kloog understand our social rules and customs and go on a journey with Kloog through our social world and learn with him as he interacts with people to get parts and fuel for his ship so that he can return home. User understanding is tested throughout the program. The app can be used independently or with the assistance of a parent, teacher, tutor or assistant depending on ability and existing levels of social skills.” If you would like to know more about the app, information can be found at <http://kloogsocialskills.com>.

### **Instructions:**

We will now begin using the app.

1. Tap the App labelled “Mission Rescue”
2. Watch the Opening Video
3. Read out loud the story “Who is Kloog?”
4. Tap “Create Account”
5. Add your email address and create a username and answer the 4 questions on the right
6. Tap “Lets Go”
7. Tap “”Repair the Ship”
8. Tap “Body Language”
9. Tap “Lets Go”

10. Begin reading the story out loud. When finished each page select “next”

11. Answer the ten multiple choice questions

12. Repeat steps 6-11 with the next story

\*\*\* There were 17 stories in total. You will complete as many as possible during the time permitted within the session\*\*\*

The researcher kept track of the number of correct and wrong answers that the participant made using the template below:

Name of Social Skill Story	Session #	Number of Correct Responses

### Interview Questions:

1. Do you find the app entertaining?
2. Are the stories in this app useful to you?
3. Would you use this app outside of the study on your own time?

4. What lessons did you learn from these stories?
5. How can you improve your scores for next time?
6. How do you feel about reading the story out loud? Does it help or make the questions more difficult?

### **C. Quick Cues Protocol**

The following script was followed during the first session to demonstrate how to use this app.

#### **Script for Quick Cues**

Hello, my name is Mr. Ruppenthal and I will read you a script to assist in the process of using the app “QuickCues”. The developer of this app provided detail on what the app was and instructions on how to use it. I will read this script and instructions and observe you as you use the app. At the end of the session, I will ask you questions about how you feel using the app. All instructions about the app were taken from the official “Quick Cues” website at:

<http://www.fraser.org/Fraser/media/Assets/pdfs/Products/QuickCues-User-Guide.pdf>

#### **QuickCues User Guide**

Quick Cues is a social script app for the iPod Touch, iPhones and iPads that helps teens and young adults on the autism spectrum handle new situations and learn new skills.

Quick Cues was created to provide direct instruction without visual or audio distractions. Content and reading levels are geared to teen and young adults with high functioning autism and Asperger’s Disorder.

## **Background**

In working with young adults in social skills groups, Fraser identified a need for new supports for those on the spectrum who have challenges picking up social cues and understanding appropriate behaviour. Quick Cues contains social scripts in five categories that provide information and rules specific to those issues.

In the past, these young people were coached to write scripts and reminders on paper, but they were reluctant to do so as they were easily lost or they experienced anxiety over “looking different.” Using a mobile device makes managing their scripts more practical, and accessing content on an iPads, iPods or iPhones does not appear out of the ordinary.

## **Plan for Users**

1. Identify an on-going worry that impacts your quality of life. Create a plan to address this worry that fits with your personal interests, time restraints, and preferences. In your plan, include the following:

- The worry
- How the worry makes you feel? How does it interfere with other things you want to think about?
- Identify how and where you could write your worry down when it is getting in the way. On paper? In a planner? On a list you have saved on your computer or hand held device? Is it stored where you will be able to find it?
- Exercise is a critical need we all have in staying healthy. Many people will take a walk, go to the gym, or get out on their bikes to calm down and focus. Does this work for you? If so, what are some things you can do if your worry gets too big?

Are there some small things you can do if you only have a little time like a short walk with some deep breathing or a trip up and down the stairs? List your options on your worry list.

- Does getting more sleep, or eating something good for you help you feel more in charge of your worries? Put that on your list too.
2. Share your strategies to control your worries with a trusted family member, teacher, or therapist. They will be better prepared to help you with controlling your worries if they've seen your plan and know how to help.
  3. Review the Quick Cues script, "When My Worries Get Too Big." Consider your personal plan for controlling your worries. Quick Cues will remind you of your plan, no matter where you are. It will be there if you need a reminder or you want some support in following your plan.
  4. Feel great knowing you have a plan that can always stay with you. You are another step closer to being in charge of your life!

I am now going to ask you a few questions regarding the use of the app and your feelings about it. (See questions below in this appendix)

In the next session you will identify an area that you would like to improve on and we will follow this same format with a different story. Thank-you for using this app today. I look forward to seeing you next week. Have a great day!

### **Interview Questions**

1. Which story did you choose to read?
2. Explain what you think each page means?
3. What words don't you understand?
4. Tell me what you learned from this story
5. How can you make better choices after reading this story?
6. Can you give me an example where this story would be valuable?

### **Appendix #3: Interview protocol session #2**

The following protocol took place during session 2:

1. At the beginning of the session, participants were asked questions relating to their app use between sessions. These questions are:

- Which apps did you use since the last session?
- How much time did you spend using each of the app?
- Were you able to use the apps by yourself?
- Which stories did you work on?
- What were your scores on the quizzes?
- Are your scores getting better with practice?
- Did you enjoy using the apps?

2. The researcher invited the student to open each of the apps one at a time and navigate them in a demonstration of their use for the researcher. In as much as was possible, the researcher did not interfere with the participants demonstration of their use of each of the apps and the researcher acted as observer of use, later taking reflection notes on this.

They followed the guidelines demonstrated during the first session as outlined in (Appendix # 2). The researcher only provided instruction if needed by the participant.

3. At the end of the session, the researcher asked the questions located under the app protocol (Appendices # 2A, B, and C).

#### **Appendix #4 Interview protocol for session #3**

The following protocol took place during session 3:

1. At the beginning of the session, participants were asked questions relating to their app use between sessions. These questions were:

- Which apps did you use since the last session?
- How much time did you spend using each of the app?
- Were you able to use the apps by yourself?
- Which stories did you work on?
- What were your scores on the quizzes?
- Are your scores getting better with practice?
- Did you enjoy using the apps?

2. The researcher invited the student to open each of the apps, one at a time to navigate through them in a demonstration of their use for the researcher. In as much as was possible, the researcher did not interfere with the participants demonstration of their use of each of the apps and the researcher acted as observer of use, later to take reflection notes on this. They followed the guidelines demonstrated during the first session as outlined in (Appendix #2). The researcher only provided instruction if needed by the participant.

3. At the end of the session, the researcher asked the questions located under the app protocol labeled as (Appendices # 2A, B, and C).

3. The researcher asked concluding questions to each participant. These questions were:

- What are your impressions of the 3 apps?
- Did they become easier to use?



- What did you like/dislike about the apps?
- What would you ask or say to the developer of the app?
- Now that you have had a longer time to use the apps, which app(s) did you like the best/least? Explain.
- Did you learn anything from this experience that you find valuable?
- Do you imagine that you will use the app after the study? How?