Rashedi, R., Bonnet, K., Shulte, R., Schlundt, D., Swanson, A., Kinsman, A., Bardett, N., Warren, Z., Juarez, P., Biswas, G., & Kunda, M. (2020) Opportunities and challenges in developing technology-based social skills interventions for youth with autism spectrum disorder: A qualitative analysis of parent perspectives. International Conference on Learning Sciences. p. 673-676.

Opportunities and Challenges in Developing Technology-Based Social Skills Interventions for Youth with Autism Spectrum Disorder: A Qualitative Analysis of Parent Perspectives

Roxanne Rashedi, Vanderbilt University, roxanne.rashedi@vanderbilt.edu
Kemberlee Bonnet, Vanderbilt University, kemberlee.bonnet@vanderbilt.edu
Rebecca Schulte, Vanderbilt University, rebecca.j.schulte@vanderbilt.edu
David Schlundt, Vanderbilt University, david.schlundt@vanderbilt.edu
Amy Swanson, Vanderbilt University Medical Center, amy.r.swanson@vumc.org
Amy Kinsman, Vanderbilt University Medical Center, amy.kinsman@vumc.org
Nicole Bardett, Vanderbilt University Medical Center, nicole.r.bardett@vumc.org
Zachary Warren, Vanderbilt University Medical Center, zachary.e.warren@vumc.org
Pablo Juarez, Vanderbilt University Medical Center, pablo.juarez@vumc.org
Gautam Biswas, Vanderbilt University, gautam.biswas@vanderbilt.edu
Maithilee Kunda, Vanderbilt University, mkunda@vanderbilt.edu

Abstract: Interest continues to be high in the development of technology-based interventions for individuals with Autism Spectrum Disorder (ASD). Designing such interventions can benefit from consideration of the preferences and challenges that individuals on the spectrum often experience with technology. Through 20 semi-structured interviews with parents of ASD children, we explore potential uses of technology for social skills development among children with ASD, and we also investigate how youth with ASD currently integrate technology into their lives. Our findings include observations about individual preferences in genre, content, and platform, as well as both positive and negative effects that technology use can have on mood and behavior. Parents also highlighted several avenues of technology preferences that would be useful for intervention designers to leverage, in order to increase user engagement and to both challenge and appeal to users' areas of social growth and strengths.

Introduction

In light of the considerable time children spend online, educators are interested in how children acquire various forms of technology-related expertise, including writing fiction, film editing, and graphic design, across media platforms. Likewise, educators are examining how children interact in these online communities to develop their own innovative constructions (Kafai, Fields, Roque, Burke, & Monroy-Hernandez, 2012).

This interest in studying relationships that children have with technology extends to educators working with children with Autism Spectrum Disorders (ASD), who often experience challenges in social interactions, relationship-building, and communication, even while often demonstrating strengths in certain areas of reasoning and perception. Researchers have investigated Autocraft, an online community centered on Minecraft, a popular video game, and reported how this community supported the development of self-expression and social skills for children with ASD by providing familiarity in a virtual space, while creating space for children to construct and share novel ideas with others (Ringland, Boyd, Faucett, Cullen, & Hayes, 2017). Individuals with ASD tend to prefer predictability, which technology can provide, in contrast to the more unpredictable nature of human interactions. There has been some research on genre preferences across media platforms among children with ASD, and on how these individuals participate in online communities (Kuo, Orsmond, Coster, & Cohn, 2014). However, more research is needed, especially given the light-speed pace at which technology is changing modes and norms of social interaction across so many age groups, settings, and cultures within our society.

ASD is often characterized by challenges in social interaction and communication, and a restricted repository of interests. Individuals with ASD tend to have difficulty in initiating social pursuits, such as conversations or activities with peers (Orsmond & Kuo 2011). Identifying the technologies that children with ASD prefer and the online communities with which they interact could provide educators and caregivers with insight into how best to develop social skills interventions for this population. Current research on children with ASD has focused on measuring the time spent with various technologies, (hereafter referred to as screen time), and the devices that children with ASD frequently use (Stiller & Mößle, 2018). Such a focus, although informative, does not highlight how children with ASD integrate technology into their lives. Parents' perspectives can offer one valuable window into this topic and elucidate the distinct ways children integrate technology into their lives, as well as inform the design of future social gaming technologies.

With these goals in mind, we conducted a qualitative exploratory study with parents of children with ASD, addressing the following goals: 1) describe how children and teenagers with ASD use electronic devices in their daily lives; 2) identify electronic methods currently used for interpersonal communication; 3) investigate relationships between device use and behavior and mood; and 4) identify the social skills that parents would like their child to develop or improve. The following research questions guided our investigation of content preferences across technologies for children and teenagers with ASD:

1. What aspects of technology do parents report as beneficial for their child and why?
2. What aspects of technology do parents report as detrimental for their child and why?
3. What kinds of social skills do parents believe their child needs to learn?

We present our findings from 20 semi-structured interviews with parents of ASD children who participated in a usability study. Our usability study had children test out a science educational technology and involved interviewing children and parents about their technology use. This paper reports on the parent interviews.

Methods

Procedure

This study adhered to the procedures outlined in an institutional review board (IRB) approved protocol. The duration of the parent interview was between 30 to 60 minutes.

Recruitment

Parents of children with ASD from the metropolitan Nashville, TN, area (United States) were recruited to participate in a study to discuss their social skills and experiences with technology. Additional study participants were children with ASD and typically developing children (findings from these portions of the study are reported elsewhere). Inclusion criteria were: 1) parent of a child with ASD; 2) child is between ages of 10-17; 3) parent could speak and read English; 4) child's cognitive abilities aligned with their chronological age. The latter criterion was applied because the other activities in this larger usability study required English fluency and the ability to complete a technology-based science activity. Participants received a $50 Amazon gift card for each visit. A total of 20 participants participated in this study during the spring and summer of 2019.

Measures

A semi-structured interview approach was used with all parents and included three sections. First, the researcher asked parents about their child's screen time and technology use. Additionally, parents were asked to explain why these technologies were interesting to their child. Parents were asked to describe how technology use affected their child's behavior and mood. Finally, parents were asked to identify the kinds of social skills they wanted their child to develop and strengthen.

Data analysis

Qualitative analysis occurred in two phases: 1) individual quotes were isolated in the transcripts; and 2) a hierarchical coding system was developed based on the interview schedule and a preliminary review of the transcripts. Definitions were written for each category. Major categories were: 1) Time spent for daily electronic use; 2) Types of technology used; 3) Technology-based activities in which the child engages; 4) Environment in which technology is used; 5) Mood and behavior; and 6) Potential computer-based interventions. Each major category was subdivided, and the subcategories were expanded to capture additional thematic detail. Coding was conducted by two coders. Coders were trained on four transcripts and compared each coded transcript to resolve any discrepancies. The transcripts were divided and coded independently. The coded transcripts were combined into a single file and sorted by category.

Results

An iterative inductive-deductive approach was used to analyze the sorted coded quotes (Fereday & Muir-Chochrane, 2006). Deductively, we were guided by social constructivist theory and explored how children and teenagers with ASD actively used technologies and sometimes co-constructed knowledge by using technologies within different kinds of social contexts (Vygotsky, 1978). Inductively, we used the coded quotes to identify relationships between themes. We identified two major themes most relevant to our research questions: 1) parents' accounts of the impact technology use had on their child's behavior and mood; and 2) specific social skills they wanted their child to learn.

Parents' accounts of technology use on children's behavior and mood

Many parents reported positive effects that certain forms of technologies had on their child's behavior and mood. Using technology functioned as a way for children to "decompress," or enhance their "self-esteem." Others described how their child developed technical skills. One parent described how her son wanted to learn how the games worked on the backend and developed coding skills. Similarly, another parent described her daughter's preference for Minecraft: "It's all about what can I do to this world? How can I mold this world the way I want it to be? So it's always creative, and it's always with full permissions that she can have, because then she has full control over it." The parent explained how having the agency to "mold" the game-like world in a manner that her daughter preferred felt "safe." This safety opened the door for her daughter to cultivate creative skills via the gaming experience.

Despite the positive accounts, parents also discussed how technology frustrated their child, particularly during technical difficulties and/or if a game did not proceed in a manner their child preferred. One parent described how technological issues would instigate her son to have a "melt down." Other parents described issues with boundaries, specifically with understanding when it is time to stop playing a game: "Let's say, maybe if she's been on the computer for two hours or more and she is pulled away at that point, she might melt down." In contrast, other parents described how if the games did not go their child's way, they became unhappy. "And when [the] game failed or whatever, sometimes he'd get upset...Definitely not happy with the situation."

Many parents expressed the difficulty in determining if their child's technology use had a net positive or negative impact on their child's behavior. On the one hand, technology seemed to be a self-soothing strategy for many children. At the same time, however, technology seemed to function as a way for their child to escape from situations, or their child spent so much time on the screen that they started "acting like a jerk," in one parent's words. Although communicating digitally removed the child from experiencing live interaction, parents described several positive benefits, such as keeping in touch with loved ones. Nevertheless, there was a fine line between when parents reported that their children used technology so much that they became detached from social interactions and when their children used technologies to actually sustain relationships with others.

Parents' suggestions on targeting social skills for interventions

There were several social skills that parents reported that they would want their child to develop in a technologically based intervention (See Table 1). The first three skills (impulse control, emotional regulation, self-confidence) are related to self-awareness and self-regulation. Parents also wanted technology-based interventions to enhance their child's understanding of nonverbal cues, engagement in social interaction, understanding context, and building relationships. We noticed a connection between understanding context and quality of relationships. One parent described how her daughter did not know when "somebody's pulling one over on her." That is, her daughter could not understand deception, especially deception that could be embedded in a larger social context.

Limitations

These interview data represent parents' opinions and beliefs. A remaining question is the extent to which parents' accounts accurately represent their child's typical technology use, patterns, and effects on behavior and mood.

Discussion

This study investigates parents' observations about the effects that technology has on their child's behavior and mood. Consistent with prior literature, parents shared how technology supported the development of their child's creativity and self-expression by creating a safe space for their child to construct novel ideas (Ringland et al., 2017). We found that most parents reported that the predictability of technologies induced calmness for their child (Orsmond & Kuo, 2011). However, there were also instances of parents reflecting on when their child would not disengage from a technologically centered activity and avoid in-person social interactions.

Our findings may inform the development of future technology-based social skills interventions for youth with ASD. Designing a technology that invites players to delve into a virtual world and have the agency to create a story in the gameplay experience is one often-discussed route for sustaining engagement and building confidence (Kafai et al., 2012). Likewise, a technological intervention that fosters a community and ways for players with ASD to co-construct knowledge can enhance engagement, in addition to facilitating the development of players' abilities in understanding context and building relationships – two key skills many parents identified as areas for growth (Kafai et al., 2012). Future research is needed to understand the degree to which the social skills learned by children with ASD from technology-based interventions could be generalized to in-person social interactions.

Table 1: Summary of Parents' Target Social Skills

Social Skill	Description	Example
Impulse Control	Being able to pause and think before acting; controlling impulsive behaviors, such as inhibiting the impulse to say inappropriate or rude remarks	"Sometimes she just doesn't like who she's sitting next to, and she'll be very vocal about it."
Emotional Regulation	Identifying one's own emotions, whether they are positive or negative, and being able to regulate one's emotions in various situations, especially in unknown circumstances, disruptive situations, etc.; understanding how to manage emotions during transitional periods	"Internally she's about ready to start throwing things and yelling and screaming and running around."
Self-Confidence	Having trust and positive beliefs about one's abilities, qualities, etc.	"It's hard to get him to advocate for himself. He doesn't realize what's going on."
Nonverbal Cues	Understanding nonverbal cues from others, such as facial expressions, gestures, posture, and being able to infer how to approach or interact with someone based on those cues	"I'm facing you. If I start turning this way, you immediately realize oh she is tuning me out. She is not interested. Just scenarios, games that help them to do that."
Social Interaction	Understanding the social rules for interaction, personal space, etc.; understanding boundaries	"Personal space and personal awareness, because sometimes she'll just come up to me and be like, "Hi, how are you?" And I'm like, okay, let's take a step and personal space. And then voice, like voice"
Social Communication	Knowing how to say the right things at the right time; engaging in a reciprocal conversation, such that there is a back and forth between two people, using appropriate intonation for social situations, practicing listening skills	"Also, just learning when it's an appropriate time to speak…find something funny that's not really funny or whatever, like in a classroom setting or whatever."
Understanding Context	Not taking things literally, not taking things black/white, Understanding common catch phrases/idioms and how to use them grammatically, understanding that actions may not represent reality, understanding humor	"I can generally tell when someone is being fake or lying to me…I don't know how to teach her that skill...I really wish she could tell when somebody's pulling one over on her."
Building Relationships	Skills for making friends, building relationships	"So when they [friends] come to the house they are always really nice... But he doesn't really have a friend."

References

Fereday, J., & Muir-Cochrane, E. (2006). Demonstrating rigor using thematic analysis: A hybrid approach of inductive and deductive coding and theme development. *International Journal of Qualitative Methods*, 80–92.

Kafai, Y. B., Fields, D. A., Roque, R., Burke, W. Q., & Monroy-Hernandez, A. (2012). Collaborative agency in youth online and offline creative production in Scratch. *Research and Practice in Technology Enhanced*.

Kuo, M. H., Orsmond, G. I., Coster, W. J., & Cohn, E. S. (2014). Media use among adolescents with autism spectrum disorder. *Autism, 18*(8), 914-923. doi:10.1177/1362361313497832

Orsmond, G. I., & Kuo, H. Y. (2011). The daily lives of adolescents with an autism spectrum disorder: Discretionary time use and activity partners. *Autism, 15*(5), 579-599. doi:10.1177/1362361310386503

Ringland, K. E., Boyd, L., Faucett, H., Cullen, A. L. L., & Hayes, G. R. (2017). Making in Minecraft. *Proceedings of the 2017 Conference on Interaction Design and Children* - IDC '17. doi:10.1145/3078072.3079749

Stiller, A., & Mößle, T. (2018). Media use among children and adolescents with autism spectrum disorder: A systematic review. *Review Journal of Autism and Developmental Disorders, 5*(3), 227-246.

Vygotsky, L. S. (1978).*Mind in society: The development of higher mental processes*. Cambridge, MA: Harvard University Press. (Original work published in 1933).

Acknowledgments

The research reported here was supported by the Institute of Education Sciences, U.S. Department of Education, through Grant R324A180171 to Vanderbilt University. The opinions expressed are those of the authors and do not represent views of the Institute or the U.S. Department of Education.