

**Therapist-Student-Robot Relationships in the Education of Autistic Children:
A Qualitative Study**

Submitted by

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Notice: This paper is meant to be treated as a recommendation report built from previous research and interviews, as well as help raise awareness on robots used in the education of autistic children. It cannot replace – or should be treated as - an official manual, law document, or policy that dictates on how these robots should be used.

Abstract: To address increasing autism rates, this capstone seeks to provide recommendations to teachers and therapists on how to use robots in the education of autistic children. These robots have been found by scholars and researchers to help in educating and engaging with autistic children – such as measuring attention, playing games, and teaching cognitive skills. However, more awareness needs to be raised on these robots, as well as how to use them. Collecting existing research and input from teachers and therapists in the local area, this paper shares those recommendations, answering the question *‘what is the best approach for Therapist-Student-Robot relationships in the education of autistic children, based on input from therapists/teachers and research about said robots?’* Results from nine interviews with teachers and therapists, indicate that:

- a) differences in age affects opinion and level of acceptance regarding robot use in education
- b) users and developers must be aware of organization policies that affect robot implementation
- c) whoever is interested in implementing them must have cautious optimism and
- d) therapists and teachers are open to using robots, but require more information and training to be comfortable using them

Chapter 1 Purpose of the Study

With autism rates constantly rising, more and more resources are needed to help meet those demands.(Gordon-Lipkin, et al 2016) Robots developed for the education of autistic children exist as a potential solution to that problem. Most of these robots resemble 1.5 - 2ft humanoid dolls and toys, teach various behavioral topics (emotions and cognitive skills for example) and can be programmed to measure attention and do activities with the autistic child and their teacher/therapist. However, not many educators of autistic children are aware of them.³³ Some also fear of robots taking over jobs or causing more trouble when implemented. Additionally, not having enough information on the robot could result in poor implementation of the technology and hinder all involved.

Thus, the question I seek to answer in this paper is ‘*what is the best approach for Therapist-Student-Robot relationships in the education of autistic children, based on input from therapists/teachers and research about said robots?*’ Looking into this question will help therapists and schools on how to approach robots-use in the education of Autistic children, while also introducing best practices for using said robots.

The scope of this study focuses on teachers and therapists from three facilities – one public high school and two therapies for special need children - in the King County area. I aimed to connect with teachers and therapists who have professional experience in educating children with autism. “Teachers” refers to special needs educators that work exclusively within a school district, while “Therapists” refers to people that are employed at organizations outside of the school district. Interviews with teachers and therapists were conducted in person and over phone. Interview responses were later analyzed for common themes to help build recommendations for therapist and teachers on what to look out for when using robots.

Four themes were prominent across the interviews. First is that the age of the therapist or teacher could be a predictor of their eagerness to use robots. Second is that teachers and therapists need to check if the robot compiles with their organization's evaluation standards and requirements prior to using them. Third is that a human professional is always required when using this robot for the education of autistic children. Fourth is that both teachers and therapists are interested in learning more about these robots, some even wishing to try them out, but require more information.

The final recommended approach the to have therapist and teacher reach out to discuss robots use in education, consulting with scholarly research to fill information gaps, raise awareness that robot use must be supervised and carefully evaluated a by a therapist or teacher, and communicating with developers regarding barriers to using this robots to find solutions on how to overcome them.

Chapter 2 Methodology

Overview

The methodology of this study consists of two parts: A literature review and interviews with therapists and teachers. The literature review centers around the robots used in the education of autistic children, also including any related information such as tech use in special education. The interviews were held with therapists and teachers of autistic children located exclusively within the east King county area in Washington state.

Researching literature

For this study, I first consulted previous literature to build an understanding of robots in the education of autistic children. I started with a broad scope, focusing on how technology has been used to benefit children with disabilities, and gradually narrowed down to robots and autism. Most of the literature centers around case studies, where the robots and autistic children interactions were studied. Additional literature focused on related topics, including tech-and special education policies, autism, and innovative technology, and anything in relation to the topic. Gathering this literature was critical in preparing myself with the necessary background information going into the interviews.

Interviews and Interviewees

I conducted nine interviews with three special education teachers and 6 professional therapists working with autistic children. The interviews helped to provide insight into how therapists and teachers use technology to help students with special education, as well as what they think of robots in being used in education. The purpose of these interviews was not to directly educate teachers and therapists but rather focus on collecting their initial thoughts and opinions. The potential interviewees were gathered via snowball sampling, starting with two

therapists and one teacher I could connect directly with. These three interviewees were called ‘the first wave.’

For the first wave of interviewees, I held introductory meetings where I didn’t record conversations for the thesis experiment. Instead I focused on introducing them to the topic of technology in special education, gradually directing the conversation toward robots in the education of Autistic children. After getting my methodology approved by my university’s human resources department, I focused on setting up interviews.

I emailed the first wave of interviewees on what dates to meet. Later, I would ask them the following questions listed in the appendix, explaining the questions in further detail if need be. At the end of the interview, I asked if they knew any other people that I could invite into this study, leading up to additional waves of interviewees. Additionally, participants were requested to sign a consent form to allow me to record their responses. However not signing the consent form wouldn’t prohibit participation in this study or access to the publication of study. After the interview was over, I sent a follow up email thanking them for their participation and provided links to more information on robots in the education of Autistic children. This process was replicated for subsequent additional interviewees, minus setting up introductory meetings. Instead introductions occurred over email where they would be immediately invited into the study. All interviews were granted confidentiality and recordings of said interviews were destroyed after the publication of this study.

Teacher Interviewees

I have given the three teachers interviewed pseudonyms of Fjord, Beauregard, and Mollymauk. All three are special education teachers that work at a middle-class high school with Washington State. The school has a highly diverse demographic of students. Mollymauk is

noted as taking care of the technology aspects within the special education classroom (researching/troubleshooting tech while strategizing how to use said tech in the education of autistic children), with Fjord involved in working directly with the students. Beauregard is the oldest amongst the three, while Fjord and Mollymauk are within their 20-30s. Beauregard and Fjord also teach a social skills class for children with autism. All three have managed children with various disabilities, have developed strategies on how to educate and managed children with autism, have made use of tech such as iPads to help promote communications with autistic children, and work with other staff and student volunteers. They note their job requires an incredible deal of flexibility and managing changing priorities on the fly.

Therapist Interviewees

The therapist interviewees work at two organizations in the King County area and have experience working with various children on the autism spectrum. In terms of tech use, they make use of iPads and augmentative communication devices for autistic children. They also have very similar policies and ethics regarding using new technologies for their children clients.

I have given the six therapists interviewed pseudonyms of Mercer, Lavore, Yasha, Caleb, Vess, and Clay. The first four, Mercer, Lavore, Yasha, and Caleb, are a part of a therapy organization that educates various children with disabilities and primarily employs ABA therapists. All four have experience in ABA therapy. Vess and Clay operate an independent private therapy that's partnered with Caleb's therapy organization, also working with children with various disabilities for a long period of time.

Chapter 3 Review of Literature

Autism and Treatment

Autism, as defined by the American Psychiatric Association website, is a life-long developmental disorder that can appear at a young age and is generally characterized by having difficulty in participation of social relationships, issues with verbal or physical communication, and reactions to behaviors, activities or interests. (“What is Autism...”) However, the specific symptoms can vary widely from individual to individual. The Autism Spectrum Disorder (ASD) shows that there isn’t one form of autism, the condition doesn’t show any signs of a consistent level of severity. For instance, some autistic people will struggle to respond understand gestures, facial expressions, events, and metaphors throughout their life. Some will communicate through repeating lines from their favorite movies or take interest in specific things like trains or animals. Some will have a strong response to changes in a routine or a how a particular thing is experienced, such as hearing a high-pitched sound or looking directly at a bright light. Some autistic people prefer interacting with objects like an iPad, smart-home device, or a computer rather than with people (Robins, Ben, and Kerstin Dautenhahn, 2004). There is no ‘cure’ or known cause of autism, (Bernier, Raphael, and Gerdts, Jennifer, 2010) but treatment can be provided to help autistic people confront the challenges they face.

The scientific community strongly recommends one form of treatment for children with autism: beginning behavior intervention as soon as possible. Applied Behavior Analysis (ABA) is deemed as one of these most effective treatments for ASD, focusing on specific areas like movement or speech (Bernier, Raphael, and Gerdts, Jennifer, 2010). Different types of ABA are used for different types of children with autism to help progress in certain areas of learning. For example, Pivotal Response Treatment (PRT) is an ABA treatment that focuses on motivation and responding, while Discrete Trial Training (DTT) focuses on breaking down tasks. All ABA

treatments focus on reinforcing behaviors, tracking progress, and collecting information.(Bernier, Raphael, and Gerdts, Jennifer, 2010)

No treatment should be applied to an autistic child without going through an evaluation procedure and reviewing evidence on effectiveness and support. A process of evaluating new treatment methods, provided by Raphael Bernier and Jennifer Gerdts in the book *Contemporary World Issues: Autism Spectrum Disorders*, recommends the following approaches: Retaining hopeful skepticism, watching out for red flags such as harmful treatment methods or being presented as ‘a solution for all autistic children’, and making sure assessment procedures take place before applying new treatment. Things to consider before applying treatment include the children’s safety, how the child will be affected should the treatment fail, does the treatment have scientific validation (most new treatments may not), how specific are the assessment procedures, and determining if applying the treatment would cause instructors to ignore other vital educational elements of a child’s curriculum. In evaluating if a treatment is safe or effective based on evidence, the book outlines four outcomes that rise from reviewing evidence on a treatment and presented them in the following format. (Bernier, Raphael, and Gerdts, Jennifer, 2010)

Table 1: Evidence-based evaluation outcomes from *Contemporary World Issues: Autism Spectrum Disorders* by Raphael Bernier and Jennifer Gerdts

| Evidence | EFFECTIVENESS: LIMITED SUPPORT | EFFECTIVENESS: PLENTIFUL SUPPORT |
|---------------------------|--|--|
| SAFETY: PLENTIFUL SUPPORT | Tolerate; Caution; Closely monitor for effectiveness | Recommend treatment; Continue to monitor |
| SAFETY: LIMITED SUPPORT | Avoid and discourage | Consider tolerating; caution; closely monitor for safety |

Autism diagnosis rates has been increasing in according to records from late 1990s to early 2000s, (Bernier, Raphael, and Gerdts, Jennifer, 2010) going from 1 in 150 children, to 1 in 110 children, to 1 in 68 children by 2013 (Gordon-Lipkin et al 2016). Costs of resources for an Autistic Child – medical and non-medical – increase with age. (Bernier, Raphael, and Gerdts, Jennifer, 2010) More children diagnosed with autism means more resources are required to provide them with education. Specifically, resources to help address areas of behavior problems, emotional problems, learning disabilities, and activity limitations. (Patrizia, Marti, et al 2009) In response, this allowed innovators to present their technologies – such as computers, smart glasses, tablet, and robots - to schools and therapies. However, misinformation, generated by a lack of awareness about autism, allows rumors of miracle cures and incorrect treatment methods to be easily mistaken as fact, especially in the age of the internet. (Bernier, Raphael, and Gerdts, Jennifer, 2010) On the flip side, there has been a rise in new technological developments in autism and education. (Bernier, Raphael, and Gerdts, Jennifer, 2010)

Schools and Technology

In this age where we are so used to adapting to new technologies, it can be easy to overlook that various technologies have been presented to educators with varying chances of being permanently implemented.(Tyack, David B., and Cuban, Larry 1995) Technologies such as television and computers were presented by businesses as a means to re-invent education. One such game changer that's presented in education today is Artificial Intelligence (AI). (Tennyson, Robert D., and Joseph Ferrara 1987) The reason why some technologies have seen little success in staying within education is because businesses had little understanding of the inner workings of the educator's approaches to learning. Teachers would note the technology provided by businesses interfered with their curriculum and wouldn't use them as often as the businesses

were hoping for. Teachers also assumed businesses were more focused on selling products than furthering education.

While it cannot be denied there are benefits to technology, there are drawbacks that we should always consider prior to having them implemented. No matter what technology is provided, even if its advanced as Computer Assisted Instruction (CAI), it will always lack the full elasticity and flexibility that a human educator can provide (Shamsuddin, et al. 2014). One study claims that task of a human in using educational technology, is to analyze the data collected from said technology (Gordon-Lipkin, et al 2016). Thus, the technology's purpose should not ever be in replacing the teacher but instead being another tool for them to use. Clear communication and understanding are also a requirement for using said technology, as a case study presented that when technology such as a computer program or an AI is implemented poorly it can affect the student's performance very negatively (Catapano, Susan M, 2001). Consequences of poor implementation and poor use include miscommunications between teacher and parents evaluating the child's performance, as well as students being held back unfairly. Developers should also be aware that although these technologies are helpful and are used in education (like Amazon's smart device Alexa), they aren't intelligent enough to pick up on sarcasm or illogical actions, and there is a chance an autistic child would establish personal connections with these devices. (Walker, Mark 2017) On a positive note, technology has helped students connect and stay within the classroom such as via virtual reality and VGo (Hill, Rebecca, 2016).

Finally, there are some existing ethics and policies to consider when implementing any technology into schools, especially for the education of autistic children . FERPA limits the power of schools to disclose students' education records. The 'Every Student Succeeds' act

authorized the use of computer adaptive testing. PPRA requires schools to notify parents and offer an opt-out option regarding using technology in education. The Students Privacy Pledge is meant to ensure protection of student data. (Gordon-Lipkin, et al. 2016) Additionally, Autistic children are regarded as a vulnerable group with a diverse array of disorders. When using technology to educate them, autistic children must always be accompanied by a specialist or a qualified therapist (Shamsuddin, et al.2014) and are not to be left alone with just technology.

Tech helping in the Education of People with Disabilities

Technology has been used to help many students who have disabilities. One of these most notable technologies is the LOGO programming environment, which taught deaf students problem solving skills. (Merbler, John B. 1990)(Miranda Robertson. 1976) Results of a study on LOGO indicate a very positive response from both teachers and students regarding using technology in education. However, it also raised issues of whether teachers should be trained in programming technology, (Merbler, John B. 1990) and how can tech be used to assist teachers. (Miranda Robertson. 1976). Special education has been an area of technological innovation and accessibility, though all technologies should strive to teach in a flexible manner and prepare the students for life after school. (O'Leary, Winnie. 2015)

Robots built to help Children with Autism

Robotics grew out of the principles of cybernetics in 1950s. Socially Assistive robots is a subfield of robotics that seeks to 'influence behavior change.'(Kientz, Julie, 2014) Observations suggest that these robots have been positively received and that they greatly assist in diagnosis and promoting a variety of social emotional skills. Experiments with robots and autistic children have been done in places such as Britain, Serbia, Japan ("Teaching Robots...", 2018), and Iran (Taheri, A. R, et al. 2014). Robots can also help specialize in mediating joint attention (When

two people share an interest and understanding regarding an object or event), (Dautenhahn, Kerstin. 2004) help facilitate social interaction, and teach senses to children like sight, hearing, or touch. Robots also use other technologies in teaching autistic children, such as screens and wearables. It is suggested that robots can be used as a model social agent or a documenter of the child's performance, (Kientz, Julie A. 2014) Robot Assisted therapy (RAT) (Coeckelbergh, Mark, et al. 2016) is the practice of using robots to educate autistic children in therapy, similar to how animals have also been used in the past to help children with disabilities. In fact, autism therapy was one of the first applications of socially assistive robots. (Hill, Rebecca. 2016) There are even instances where students are more invested in the robot than the therapist, due to the fact these robots can speak slowly and repeat commands. (Hill, Rebecca. 2016) Other positive factors of robots include the ability to tell stories and repeat answers many times, without getting fatigued. They are seen more as toys by autistic children than complex humanoids. (Sinha, Smita. 2018)

Some of the more popular mainstream robots being used to educate children with autism are NAO, MILO, and KASPAR. (Holz, Susannah. 2017) KASPAR is a social robot that's been around since 1998 and has helped children with ASD improve on complex social interaction skills. MILO has helped teach kids emotions and has a video screen in his chest. NAO is a programmable social robot and teaching assistant for communication, games, instruction, turn taking, and guessing emotions. NAO is very adaptive, and teachers can tailor its programming to their needs. NAO was also used alongside a robot known as 'Alice' in an Iranian pilot study to help improve eye contact, joint attention, and social skills. (Taheri, A. R, et al, 2014) Most of these case studies suggest robots have a very positive impact.

Complex facial expression can overwhelm ASD children. Robots provide co-therapy/therapy. (Farr, Christina, 2014) These robots are very expensive and in recent years the development of robots has become more of a business opportunity than a university-backed experiment. (Farr, Christina, 2014) A study suggested that compared to other children with disabilities, children with autism were the most comfortable with a less complex (more-cartoonish) face for a robot, though a robot be designed to look more like a vehicle or animal. (Patrizia, Marti, et al. 2009) However there is some evidence that autistic children may prefer robot's face to be plain and featureless. (Robins, Ben, et al., 2006) In areas of educating autistic children, artificial intelligence has been tailored to focus on assisting with facial expression (Drigas, Athanasios S., and Rodi-Eleni Ioannidou, 2012)

A notable project that has been exploring the relationship between robots and autism is the AuRoRa project. (Dautenhahn, Kerstin, 2003) The AuRoRa project investigated how robots, therapists and autistic children interact with each other and show how robots reveal communication and social competencies within autistic children. (Robins, Ben, and Kerstin Dautenhahn, 2004) Some advantages noted in their studies were the robots were safe to use, children are interested in robot interaction, robots reflect the social interactions outside of the classroom, and robots can be used as social agents and actors to teach about verbal and non-verbal communication. Additional observations collected by the AuRoRa project include the robots can capture the children's attention through sudden movements that deviated from the robots' usual autonomous movement,(Kerstin Dautenhahn, 2004) some Children were capable of interacting with the robot on their own,(Robins, Ben, and Kerstin Dautenhahn, 2004) and a robot is a fantastic tool to use in imitation learning.

A survey held in the EU states that 48% saw it was ethically acceptable for robots to be used in therapy, 30% disagree and 29% were neutral on social robots replacing therapists. 54% agree it's acceptable for robots to look like animals, 31% agree and 32% nor agree nor disagree that children can see robots as friends. (Coeckelbergh, Mark, et al. 2016)

Across the several articles, including those provided by the AuRoRa project, researchers concluded that these robots aren't meant to replace teachers and therapists but instead to be used to work with teachers and therapists, providing a co-therapeutic relationship.(Drigas, Athanasios S., and Rodi-Eleni Ioannidou., 2012) Results suggest that children interacted with the robot similar to how they interacted with a human, though subtle differences between interacting with the robot and the human were recorded. (Wood, Luke, et al., 2013) Additionally there is 'no-one-size-fits-all' robot that would fulfill each need for all children with ASD. (Teaching Robots, 2018) With ASD being a lifelong disorder and robots being a growing area of research, projects like AuRoRa can provide guidance on how to use robots to facilitate social interactions and measure progress.(Feil-Seifer, D., and M.J. Mataric, 2008) With the robot, the child could start with simple scenarios and proceed to more complex ones - and gain more comfort and confidence in their social skills. Something the studies note when using the robot is to make sure to minimize the distress towards the autistic children when used. (Robins, Ben, and Kerstin Dautenhahn, 2004)

However, robots haven't seen an abundant amount of attention or utilization recently in the education of autistic children compared to other technologies, largely due to the fact robots were too complicated and costly as of 2014, (Grynszpan, Ouriel, et al, 2014) thus not enough knowledge has been gathered on how to use them. A study compared robots to artificial intelligence and computer simulation in their application to special education, revealing robots

were the slowest technology to be grasped by people in special education compared to the other two. (Yin, R. K., and G. B. Moore., 1987) However, robots in the education of autistic children are still considered to be ‘an exciting area for future development’.(Kientz, Julie A. 2014) The study in this paper will follow up on questions previous research answered – specifically, “*Are robots something to be used in the education of autistic children?*” - moving onto the next question of the implementation process which is “*How should therapist and teachers – the users of these robots – approach these robots and what are their thoughts or current knowledge on them.*” Answering this question helps provide an understanding of where therapists and teachers stand on this technology, collecting their views, concerns, hopes, and thoughts around it.

Chapter 4 Results and Discussion

Over the course of the interviews four major themes became apparent amongst the interviewees, parts of it supporting and parts of it conflicting with the existing literature on robot use for the education of autistic children.

Theme 1: Age differences among therapists and teachers affect eagerness to use robots

Younger interviewees expressed more openness to using robots as opposed to the older interviewees. Even though this was the first time they heard about these robots, younger teachers and therapists kept considering the possible benefits robots could bring to the education of autistic children.

“I think it would be a really interesting situation for the therapist to be able to watch the interaction between the child and the robot rather than just BE the interaction between the child and robot to see what other social situations the child can handle or is ready to learn about. I mean, you can also do that with other kids but having a robot working on social and emotional goals with autistic kids – as a therapist you can be an observer, as well. I think that would give more feedback and information on where to go with programming and how to best educate the child” – Lavore

“I would love to if those [robots] became available. Again, I think the biggest prohibitors for me are cost and efficacy, I would still want to make sure that I could still accomplish my goals and use them to teach effectively ... I am definitely very interested in utilizing all the growing technology that is coming out of education and therapy and ABA in general to really enhance teaching – I have a lot of faith that it could be beneficial just

because we've seen technology benefit so many other fields and other aspects of our life. I would be interested in utilizing them."

– Yasha

"Well now I do [want to use them] now that I am interested, it would be a pretty interesting thing to try and to see how [Robots] worked." – Mollymauk

Meanwhile, older therapists were more cautious about embracing robots, and kept stressing the need to have them tested first and making sure use of the robot followed the ethics and flexibility required on the job. Two of the older interviewees thought some teachers would be hesitant to embrace new technologies.

"So the best practice in general is that if you are going to implement any kind of tool it needs to be able to be used across settings - unless it's a tool used for an SPI, specially designed instruction, like it's going to teach something. Then it would be the therapist's job to help transfer that newly tested skill into other environments." - Vess

"I would say I am cautiously optimistic where I do believe in technology and I do believe it's going to be a force that will be very useful in our field for the next several years but I am cautious because with any new intervention it takes a lot of research and a lot of time for the data to support whether or not it's effective and without that I really can't be like 100 percent on board with something like this it's brand new. It's easy for parents to fall into 'ooh that looks new that is shiny' but it would be very dangerous to rely on that

impulsivity so I think in this field – ABA professionals and teachers – let’s wait for the evidence let’s wait for the data to support” – Caleb

“In terms of ethics, just because we write that on the protocol for using doesn’t mean we use it that way but that’s always an issue with anything in terms of caters - instead of doing something you do the right way, I think sometimes people take a step back and say ‘play with this toy’ or ‘use this app’ and they are not actually presenting it the ethical and proper way. That’s an issue anywhere so I think that would be the primary concern – not really concern, the primary issue that people need to be aware and responsible for”
– Clay

I’m trying to think in general...in terms of teaching new strategies I think it would be very similar - you know. If I saw a conference on how to use robots in therapy. I probably wouldn’t just jump on it cause to me technology is hard in general, so I am kind of in that in between age where some people jump on board with all the new technology and people like me never update our phones until we have to so...” - Clay

“I think the way that it’s moving there are people that would definitely be more open to this. What’s always difficult in education is that there are teachers who have been teaching for 30 + years and who are very ‘stuck’ - which is too intense of a word - but are just very used to how they have been teaching things for so many years and so that buy-in could be really difficult with those teachers.” – Fjord

“If a student with autism generally has issues with social skills that is in my mind that is humongous, so it’s my job to be able to narrow that down – what actually is the targeted intervention that needs to happen in order to improve those things? And by nature of model of the disability, what would make the most meaningful progress. Once you figure that out – that’s the hard part - then the tools to get to that point whether that’s a robot or another app or technology, that’s the part that comes later... Those of us that have been doing this for a long-time sort of have ‘our way’. I think newer therapists who haven’t been doing this for a long time might be more open to expressing questions, concerns or knowledge about these kinds of things.” – Vess

This doesn’t mean that just younger interviewees would embrace robots or that older interviewees are the only group that is exercising caution; all interviewees expressed caution and openness to varying degrees about trying out robots. These results do suggest that people at different ages are more likely to react to robots one way or another, likely due to different amounts of accessibility to technology over the course of their careers. It could also mean that younger therapists may be more tempted to use these tools, and not take as enough caution. Thus, it would be advisable for all therapists and teachers to remind each other to exercise caution when implementing and embracing this technology.

Theme 2: Therapists and Teachers’ differences in implementation and use of robots

Therapists note that within their organizations there is an enforced process to evaluating and implementing new technology in the education of any of their children, and that the robot would have to go through the same process. Teachers also mentioned a similar process, saying it must

first go through district policies and supervisor evaluation before being approved. However, therapists expressed more signs of cautious optimism toward evaluating the robots. Judging from therapists' responses, this might be due to the therapists having a larger amount of accessibility (and responsibility) in what technology they can utilize, and thus must take more caution to not implement technology incorrectly.

“So, the first steps I would take are identifying in whether or not the robot would be an appropriate tool to use with a client. There would definitely be an exclusion criteria involved. That may be looking at if the client would use the tool as a projectile. Would they take it and throw it across the room? So, someone who has demonstrated past challenging behaviors would not be a good fit to work with a robot. I would also look at children who would be distracted by the robot so perhaps using a very young kid who is easily distracted by other things may not be able to stay focused on the robot, or the play or a delivery instruction. I think what I would do is look at the kids that would benefit from the robot instruction, and to do a fidelity check on the programming essentially... if a child is more involved or less involved, then a therapist would want to know if whether that data is reflective of experiences with a human therapist or with a robot.” – Mercer, Therapist

“I think it would have to go through some major testing phases, and that may vary from company to company. So whatever company a therapist is working with or if they are working on their own, I guess, what are the standards to look for? How does it respond to any given situation? Are there sounds associated with the robot? When

there is an error, is there a big 'Beep' when that happens? Are there sounds or lights that go off signifying something is wrong with the robot? That would be a concern. how do we manage that? how do we make it less intrusive? So again, probably the logistics side."

– Lavore, Therapist

"So, I think just ethically we work out of evaluations. So just putting a robot with a kid and expecting something to happen is not like any curriculum. So if you buy a curriculum online and just give it to a kid, that's not really going to do anything, it has to be adapted and programmed and trained by people who actually understand the disability, the nature of the disability, and the behavior that surrounds it. Ethically, it seems like it is a tool not a 'fixer' if that makes sense... Our students typically do not have a ton of flexibility, that's why it's important to have continuity, about how things are taught if that makes sense. So, thinking about it, if schools implemented it in one setting typically, we don't implement tools that can only be implemented in one setting." – Vess, Therapist

"I think it would be a case-by-case basis per student. I would have to run some small trials, maybe try 5 minutes at first and then see if it's useful and increase the time, based on the student reaction if the student seem a little bit adverse to the robot, if they are not interested and working with it, then I wouldn't implement it. But if there was student interest, I would utilize it more often... I think that the idea of using a robot to help the students and to aid in learning is very different so I can definitely see the

positives of something like that being implemented in my class room over using iPads and cellphones or other technological devices... I would say that the district could possibly be a barrier, it can be difficult for us to get new curriculum approved by the district, so I think it would be like if we brought any new technology into the classroom. It would be difficult to get district approval.” – Fjord, Teacher

“Yeah I think it could have a really positive effect - I would definitely worry about...them replacing therapists not only from a job standpoint but also just the mediation that I think you need in education with some sort of human interaction especially in special education but it’s sounds like the research is supporting that these can be really helpful when mediated or moderated with a human therapist or teacher being present. Keeping up with modern technology and using modern technology as a strength rather than fearing it or kind of backing away from it is definitely a positive so I would feel very good about using these sorts of robots in my work.”

– Yasha, Therapist

“I think the way we evaluate any activity, any video, any book, anything we are still using to teach that takes data to see if we are teaching a new skill and we’re taking data to see if the skill is being generalized, so I don’t see how it would be that much different it’s kind of like a try it and see – you try and that’s how it is with any activity we do any material that we’re using we give it a try and if it’s engaging to the kids and they are learning new skills then we use it again, and if no then we adjust what we are

doing or try something else – my guess is that it would probably be very similar to that strategy” - Clay, Therapist

“It can be an advanced puppet...but maybe not as much human error or eliminate that part. I do think you evaluate its efficiency the same way you evaluate ours. By taking data and seeing how that progress is going, seeing if it is able to pick up on those nuances and address means that come up versus what is just the set focus or lesson and I do think that would be the biggest thing” – Mollymauk, teacher

“I am definitely open to the idea. I don’t think it’s something that would be off the table for me. As for my work, there’s probably two components to it; the first is our technology is not new. Our clients use assisted communication devices...there is specific technology which is very cool and very beneficial overall... but they do take a certain level to program and ensure they are being used correctly in a way that’s essential to produce the results they are designed to do... There’s an additional component that people will have to be trained and become experts on programming and utilizing technology...” – Caleb, Therapist

From the responses it can be inferred that all institutions have different ethical and implementation policies for technology. Developers need to be aware of these policies when sharing and designing their robots with therapists and teachers.

Theme 3: All express skepticism/realism around benefits and repeat a phrase from the literature: “A human therapist/a teacher is always necessary”

Despite the literature showing evidence that these robots provided educational benefits to children with autism, most of the teachers and therapists express skepticism towards the benefits of the robots for two reasons: 1) having little to no prior knowledge of these robots being used to educate autistic children and 2) believing human interaction is always needed for autistic children’s needs. This doesn’t however dissuade them from regarding the possible advantages the robot could bring to their line of work, but they do point out that policies and ethics around autistic children requires human professionals involved throughout implementing and using said technology

“As far as closing statements, I think anytime you have that opportunity to utilize technology and achieve learning outcomes is definitely really interesting as long as it’s being responsibly managed.” – Mercer

“If I knew more about it, if I knew that I could guarantee these are the interactions, potentially I would be more comfortable having those be unmonitored, but for now I’d rather they be monitored.” – Lavore

“I think, it’s cool that people are thinking a little bit of into what technology can do for these students, but it’s always going to take a trained therapist or person or educator who understands the disability, the nature of the disability, and is able to do differential diagnosis...” – Vess

“My only concern is that lack of human contact. So, I am glad to hear [from the studies that Robots] would never replace the therapist or teacher because that would be my main concern.” – Fjord

“...there has to be a very specific intent behind it and not where a child is just left alone with a robot to play or learn. It’s the same thing like educating with an app on the iPad, because that’s what I am familiar with; I wouldn’t just give the child the iPad - it always needs to be right about somebody who understands why you are using that technology or why you are using that robot – you know what you should do with it to keep that child engaged in and always remembering that it’s really a social interaction – a skill to enroll. So, if it’s a teaching tool that’s great but we need somebody there that’s going to educate in using it as a teaching tool and not a teacher” – Clay

“Yeah, I think if a human is available and they are able to keep an eye on what’s going on then I think it could be very advantageous, ‘cause it may be something - I have a lot of staff in my room - it might be an opportunity for a staff member to take a break and the robot might come in” – Beauregard

The phrase ‘a human therapist must always be necessary in the education of autistic children’ is something that all teachers, therapists, supervisors, developers, experts, and users of the robot must follow. Risks associated with having the robot (or other technology) being treated like a teacher include poor implementation practices, students damaging the robot, job security

issues, and hinderance towards maintaining the appropriate educational environment for the autistic child.

Theme 4: Therapists and teachers first need more info/evidence but also expressing openness to try out the robot

Following up on the previous theme, the therapists and teachers would mention that they needed more information, some mentioning that this experiment was the first time they had heard about robots being used for the education of autistic children. However, all the interviewees expressed they are open to using it (or at least trying it out or seeing it in action). Additionally, they are also open to meeting with academic experts, robot developers, and others involved in these robots, a small number even mentioning that they have collaborated with tech developers for other technologies, such as augmentative communication devices or iPad apps, in the past. Forms of collaboration and providing more information on how to use these robots that were suggested by the interviewees include videos, conferences, check-in appointments, a platform for troubleshooting, workshops, case studies, academic literature, and demonstrations. Thus, the idea of using a robot in the education of autistic children isn't off the table, but it requires more information and evaluation.

“I know just from my experience that kids in general and often times with autism can be so captivated by technology and by these novel things that I could see that being much more motivating potentially than a human-to-human interaction...this is a very cool thing you are looking into and an important area . I think it got me really thinking of what would prohibit teachers and therapists from using that and I think that one of the most

important things that would have to be addressed is getting people to actually buy into this and become interested in this but it sounds like just based on other research you've kind of presented at the beginning that there is a lot of growing support to be able to utilize it." – Yasha

"Yeah I mean we definitely have ethical obligations to ensure that we communicate with the parents if they come to us and say that they are going to pursue a treatment that is not evidenced-based and could potentially be harmful for their child we do have an obligation to provide them with research and information that would help them to understand the risks." – Caleb

"Since it would be a new thing the reason I keep coming back to our AAC – augmentative communication devices - is when we first introduced them, I feel we'd need to introduce robots in a similar way so it would be me-the-robot-and-the-student-relationship, so the student can see what the robot does and as a teacher I'd be able to see how the robot interacts with the student... I think a lot of people are still unaware of it... myself included, until Fjord was telling me about it. I've seen a few things with robots. I don't know if I would ever see it targeted to work with kids with disabilities, but it's very intriguing to me – Beauregard

"I am always comfortable sharing my background and my knowledge. I think there is value in that I've done that before with people who were trying to write apps for helping non-verbal children ...I mean in terms of barriers just in general I think people like me

who would want to be interested in it but are not very tech-savvy are going to be the hardest people to get to...it would push me to figure out something new technologically speaking and again if I saw a video or if I saw something where I saw how it worked I would be so much more into it.” – Clay

“I think somehow a dialogue would just need to be opened between all those channels. It would be cool if the developers of these robots could have some sort of community or town hall focused-group with people – both people with autism and people who are family members of folks of autism and teachers and therapists to disseminate a lot of knowledge and give space to voice concerns. I would need to know more about what their capacities were and what sort of programs they could run. But I know just from my experience that kids in general and often times with autism can be so captivated by technology and by these novel things that I could see that being much more motivating potentially than a human-to-human interaction.” – Yasha

“I think that it would be incredibly helpful for those manufacturers and designers to reach out to teachers and see how it could be implemented within their classrooms. I think about coming from an elementary background that’s how I taught initially, and even just between high school and elementary I could see robots as just being implemented in such a different way based on the students’ developmental level and what they are currently working on so I think that input and that collaboration with teachers would be very important...I think that...where I could see myself using [robots] most often would be for retention of different skills. So, for example for students with autism, if

you don't practice maintenance of certain skills sometimes those skills can be lost... I would love to see it in action and see what this looks like I am definitely open to it, but I would just like to see a little bit more.” – Fjord

“...what most professional therapists consider to be important is the ‘why’. The questions a therapist will ask you is the why - why is this going to be beneficial to my student and what meaningful impact is this going to have across settings. Right? And when you can explain the why to people like me, we are much more wanting to see how this could help our kids. – Vess

“So, I think if we were to utilize robots in our ABA sessions, there would be a lot of questions. I think that when you are working with kids and teaching kids with autism or other disabilities or without disabilities, you're always looking for different tools and techniques to help achieve the learning goal. So, utilizing a robot would be a really cool and interesting method for teaching and learning, growing and experimenting with data collection and that's good. But my concerns, which would be concerns around confidentiality that I mentioned, and just in ensuring that confidentiality wouldn't be breached. Also looking at costs, and also ensuring whether a robot was covered by insurance or not - providers are typically reimbursed for services via insurance. I imagine other providers would be interested in getting more information as well because anytime that you have another support and resource to help a kid learn, it's really attractive and really interesting.” – Mercer

The therapists and teachers expressed that having more of an understanding of how robots can help and what to use them for would help them significantly. As utilizing technology for children with autism is a case-by-case thing – with some robots or technology being better than others – developers and academic experts should connect with therapists and teachers to start spreading awareness on how to make use of this resource. With teachers and therapists interested in it and considering many benefits robots could perform, robots could be used in future, should the appropriate outreach, consultation, and training efforts be taken.

Chapter 5 Conclusion

This paper seeks to answer the question of “*what is the best approach for Therapist-Student-Robot relationships in the education of autistic children, based on input from therapists/teachers and research about said robots?*” as a means to address increasing autism rates and to determine how and if to use robots in the education of autistic children. Through collecting existing research along with input from teachers and therapists in the local area, this paper shares those recommendations.

What this research has found out is that there are differences in eagerness to use robots with younger therapists more likely to do so, therapists and teachers having different implementation and evaluation policies, all support the idea that human professional is necessary in the use of the robot when educating autistic children, and that with more information they are more likely to use it. This could mean that while robot use may not be present in all areas of autistic education, this does indicate that with more information, training, and careful evaluation teachers and therapists could make use of these robots. However, this also indicates that because there is a major lack of information and communication, there is a lot of skepticism and caution around using these robots.

This research recommends teachers and therapists to reach out to developers of these robots, academic experts, and national organizations for the autistic community to discuss robot use in education. Additionally, consulting with scholarly research and academic experts who have conducted case studies on these robots would also help fill address any information gaps. Additionally, therapists and teachers can help raise awareness to robot developers and the autistic community (especially parents and educators eager to use the robots) that robot use must always be evaluated and supervised by professional human therapists or special education teachers, and

that robot use may not be appropriate for all children with autism. Developers should also be aware of the barriers teachers and therapists have in implementing and communicating about these robots and try to work around them via the solutions teachers and therapists suggested (such as holding workshops or providing demonstrations).

Some drawbacks and limitations with this study include that the sample size doesn't represent all special needs educators in Washington state, and that this interview focused exclusively on teachers and therapists within three facilities in King County. Additionally, not all potential interviewees that I reached out to had contacted me back, thus there is some input that was never collected for this study. Future studies could look to a larger interviewee group, such as all the therapists in Washington state or special educators in other countries. Additionally, they could also take the form of surveys instead of interviews to outreach to a larger audience. Future studies could also interview the robot developers or academic researchers directly and provide their views on the development of robots in the education of autistic children.

Appendix

Table 2:

| Question/interviewee number | <i>How do you feel about these robots being used to educate autistic children? would it have any effect on your work?</i> | <i>What existing ethics and policies need to be considered in using Robots to educate autistic children?</i> | <i>What do you think can be done to help Therapists and Teachers manage Robot-student-teacher relations in the education of autistic children?</i> | <i>What do you think can be done to allow Therapists and Teachers to voice their views on this matter to both developers of robots and to the autistic community?</i> | <i>What is the best area/best practice/best use for these robots in the education of autistic children?</i> | <i>Do you want to eventually use Robots in the education of autistic children? Why/why not?</i> |
|-----------------------------|---|---|--|---|---|--|
| Mercer | Believes there would be an effect in utilizing the robots in tandem with therapist. Considers Robot could provide additional level of support. Before using, first would identify if the robot is appropriate to be used with client (AKA Autistic Child). The more challenging the behavior the less likely to be a good fit. Second, would run a fidelity check on the programing and look at kids that would benefit the most from robot use. Third would record if robot use increases or decreases client involvement in therapy activities. | Two major policies include 1) use of audio and video recording and 2) clear written consent and communication on how to use a public or private robot . If either policy is breached, client confidentiality can be at risk | Need to have supports in place during introductory period, like quick troubleshoot, having training videos for families/therapists/clients on how to use the robots and what to use them for | Reach out to potential clients and providers of the therapist. Having meetings and check-ins (before they receive it, 30 days after they receive it, and having multiple check-ins after it's received) and being able to send alerts to developers when a problem occurs (Via non-complex process) | Depending on the robot, language, (non-verbal, translating, being an augmentative communication device) teaching and modeling emotion, storytelling, modeling social behavior, working alongside a therapist | Always looking for different tools and new techniques. But concerned about confidentiality, and who would reimburse the cost robot (and how), and which clients would benefit from the use of the robot . Admits that it's potentially useful but needs more information on it and wants to ensure it's used responsibly |

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| Lavore | <p>Doesn't know positive benefits of robot yet but is interested in observing robot-children interactions.</p> <p>Notes that a major barrier is mastering operation of and maintaining the robot</p> | <p>By having the company work with the therapists they could run some tests to analyze how to make the robot's logistics and functions less intrusive towards therapists and Autistic children. Isn't sure if every therapist would be open to communicating with researchers and developers of these robots but wants to have a solid line of communication between developers' researchers, program writers and more</p> | <p>Having data be easily accessible to teachers and therapists (as well as having them informed of who has access to the data) and having interactions with the robot be monitored and reported for the time being.</p> | <p>Running surveys, workshops (Hosted by developer or University), Connecting with employees and companies, meeting with staff of public and private schools. A lack of understanding keeps therapists and teachers from using robots. Suggest to 'educate the educators' on how to use the products and encourage participation</p> | <p>Occupational therapy tasks + Social and emotional communication</p> | <p>Would really be into it – sees innovation in education as a critical part of being alive; interested in hearing more about it</p> |
| Vess | <p>States that robot will not figure out parental diagnosis of what students need, believes it takes a trained professional to do the diagnosis. Would still need to know what the robot does, and first needs to evaluate student needs and if the robot can fulfill those needs</p> | <p>Ethically works out of evaluations; new therapies and strategies must be adopted and programmed and trained through special designed instruction. Robot is to be treated as a tool not as a fixer</p> | <p>Needs to take allot of training on how to implement correctly in practice and public schools. Needs to make sure it's able to be implemented across multiple settings like an iPad</p> | <p>Therapists and teachers should consider 'why' this would be beneficial to the students. Training how to use it is a barrier, especially people who have been doing it 'their way' rather than the way newer therapies operate, and considering which kind of autism to focus on with the robot</p> | <p>Isn't fully sure but urges that it needs to be able to be implemented across different settings if used</p> | <p>Is always willing to use things if they 1) demonstrate meaningful progression 2) fits into treatment plan 3) could be used across settings 4) promote a specially designed instruction or a goal.</p> <p>Ends by saying it will always take a trained therapist or teacher to do the prognosis and come up with (being the hardest part of the job) and dismisses that robot (or tech in general) can't solve all the concerns that parents have for their child.</p> |

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| Fjord | <p>Sees benefit of using robots in classroom. Relieved that robots would never replace therapists. Would have to run evaluation trials for robot for every student's case. Would utilize it based on student interest and if new curriculum/tech can get approved by the district</p> | <p>Questioning data use and if district can afford it for less than peer educators. Would be comfortable reaching out to researchers and developers alongside speech language pathologist and occupational therapist</p> | <p>Involving the speech language therapists and occupational therapists in technology use to help further progress on a goal and track data, depending on what the goal is</p> | <p>Have manufacturers and designers reach out to teachers and see how it could be implemented in classrooms (Would differ across grade levels and development levels of students) and needing testimonies from teacher in similar districts. A lack of information on robots and needing district approval are also factors that are holding them back from being fully implemented</p> | <p>Retraining different skills (like math) to avoid having them forgotten (especially over summer)</p> | <p>Would love it and is open to it but need more information. Teachers who prefer to not use technology may not be on board with it, despite increasing tech use is becoming more normal with every generation</p> |
| Yasha | <p>Thinks it could have a positive effect, would worry about them replacing therapists, but trusts the support in the research. States in education (esp. Special education) you need human interaction. Keeping up with modern tech, instead of fearing it can result in a positive outcome.</p> <p>Biggest barrier would be cost for smaller clinics. Wondering how technical problems would be addressed</p> <p>First would look at goals to accomplish with the robot, have it assessed by peer therapists, and then evaluating if robot can perform functions</p> | <p>In ABA, to review social validity in using the robot, who exactly can afford to use it, the robot's limits, and making sure quality of service isn't compromised for 'ease of delivery'. Open to reaching out to others developing these robots</p> | <p>Gaining more knowledge on the robots and their limits as well as giving more knowledge to teachers and therapists.</p> | <p>Opening dialogue with the Autistic community and robot developers. Have developers meet in a town hall meeting for people with autism and people that educate/take care of them. Another thing that can be done is to provide a space for such groups to voice concerns</p> <p>Skepticism and cost around robots may prevent them from being used, as well as educator's personal preferences in teaching and tech implementation, concerned if it lowers the quality of teaching</p> | <p>Data Collection and instruction</p> | <p>Would need more information, as well as need more people to become interested in it. They are interested in it themselves and would consider using it based on research showing growing support to utilize</p> |

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| Clay | Believes whatever the child is interested in that's what will be used to help educate them. Concerned with generalization of autism from others, would be all for it if they could figure it how to incorporate it. States they still need more information on how it works and how it looks. Will have to test it with the child to see if robot is fit to be used in the work | Needs a very specific intent behind using the robot (cannot just give it freely) and remember what skills need to be trained, and make sure the app is presented in an ethical and proper way. Is comfortable sharing background and knowledge with people who work on robots (has done it in the past with people who designed apps for iPad) | Hesitant to embrace new technology but at the same time wants to embrace it (notes a generation gap between those that do and those that don't) | Having organizations like American Speech and Language Association and Washington State Language association, consult developers on how to use new technology. Notes that voicing views to other clinicians may result in nothing happening, | Lists teaching discrete skills and helping kids be engaged in the classroom more | Much like the iPad, anticipates it being helpful once they figure out how to use it and tailor it's used to educating children. Notes Autistic people may be interested in robots due to their static-ness, still needs more information |
| Beauregard | I think it sounds great for students – could be used in all group settings. Hopes it can be used like a peer educator. Worries students might damage robot and if the robot has glitches and what must be done to keep it functioning. Seeks to use robot for Augmentative communication and to interact without frustration. Thinks it could be very advantageous if a human is near and if interacting with the robot is seen as a reward for the students | Making sure the data the robot takes is reliable, valid, and confidential. Allow staff and adults to access data and making sure job security isn't threatened by the robot. Also need to make sure robot use doesn't become inappropriate for school or leak personal info, making sure the students can't program the robot. Is interested in contacting with outside researchers and organizations | Having a period where the robot is introduced to teachers and students (seeing what relationship roles form, as well as what the robot is capable of) and perhaps training peer instructors on how to use the robot | Using surveys to gather what need to be addressed from parents' teachers and students if possible. Presenting the idea of using the robot during special education development days or meetings. A lot of people are still unaware of the robot and are unable to provide feedback on it yet. Anticipates outside therapists having a different understanding of robots | Still needs to keep track of cost and what it can do, but anticipates it best use for emotion and social skills for a one-on one or one-on-two group instruction in a small individualized setting | Would be great to try. Anticipates people being afraid of new tech and not knowing what benefits exist. Considering it a different form of instruction that may be of huge interest to the children with autism (That may see it more fun and engaging than a peer educator). Is also concerned with how it will be divided and used across school districts; would it be one robot per learning community or one per elementary school or one per middle school. Also concerned with how it's to be funded |

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| Mollymauk | <p>As they are said, they remind them of puppets. It's found that students have tendency to connect more with puppets than with humans since children with autism have difficulty connecting with people who have different emotions. Barriers to using robot includes determining if robot is flexible enough for the what their job demands. Wants to evaluate it based on how its collects data and how it can adjust on the fly</p> | <p>Determining what kind of data, it's collecting and if it fulfills the job requirements of dealing with autistic children</p> | <p>Having hands on training and continuing education on using the robots</p> | <p>Interviewing and talking about it is a start, having national organizations look at it and allow teachers and therapists to voice their concerns, consulting with local universities on this matter too. Lack of awareness on the robots appears to be keeping teachers and therapists from voicing these views, as well as needing to consult with district, privacy, or technology policies. Getting a university involved would help</p> | <p>Identifying emotions, helping students share needs and wants, help nurture social interactions (like a therapy dog)</p> | <p>Very interested in robot use for the education of Autistic children.</p> <p>Not surprised it's happening at some private therapies first (They have more leniency) could also see these robots helping children outside of ones that have autism.</p> |
| Caleb | <p>Would need to understand more about how they would support the educator and teach skills. Is open to this idea, but majority of the technology they use isn't new, needs to ensure robots are being used correctly, think they would initially increase workload but with time and training they would decrease workload.</p> <p>The robot would need to go through training and expertise making sure it's used appropriately. Cost and accessibility are barriers. The client's condition and whatever data is taken over time determines if robots are a good fit to be used in that line of work.</p> | <p>Ethical consideration to consider is making sure robot is backed up by evidence + experience that proves it's effective and not something that's just new or recommended</p> <p>Would be comfortable reaching out to developers, academic experts, especially if there is an expert that can train staff and agencies on how to use it prior to interviewing with it (have attended seminars or trainings on new strategies in the past)</p> | <p>Needs to make sure that professionals are comfortable and understand clearly how to use the robot, and making sure they keep up to date with any updates the robot goes through and heavily supervising them when children are interacting with the robots</p> | <p>Have creators of the technology communicate with actual end users (teachers and therapy staff), and testing it out thoroughly before providing it to the public, and to avoid marketing it as a miracle tool (a claim that's largely exaggerated and undermines its credibility)</p> <p>Barriers to voicing these views are that the parents have the final word on how they want to educate their children, therapists should not use technology that doesn't have enough evidence to back it up</p> | <p>Considers it having good imitation skills, while also roleplaying as a social skills partner or help teach emotions</p> | <p>Isn't 100 percent certain but is open to learning more about it. Been in the field for 7 – 8 years and has implemented much tech into their practice, and would first need to be thoroughly trained in using it and would need to first determine if it's good for therapy, is cautiously optimistic – very easy for a parent to believe that if a robot is brand new tech then it's great (not checking if it's safe or effective first). Concludes it's best for therapists and teachers to wait for the evidence and for the data to support robots.</p> |

Interview Script and Questions

Introductory Rap

Hi, my name is Mudasir Zubair and I am a grad student with UWB, studying the Therapists' and Teachers' take on robot use for education of autistic children for my Master's in Policy Studies Thesis project. I am aiming to build recommendations on how to navigate robot-student-therapist relations. Out of your respect for your time, I will let you know if 30 minutes is up and ask if you would like to end the conversation.

Consent Reminder

Just to make sure, do you give me consent to record this interview for research purposes?

Questions and Probes

1. *These programmable robots that I will be talking about resemble 1.5 - 2ft humanoid dolls and toys. According to scholars and researchers, these robots have been found to help teach autistic kids how to read emotions, develop cognitive skills, play, and do other activities. Studies note these robots can be programmed to measure attention and be a medium for communication, but that a human therapist must always be necessary in the use of robots and education of autistic children (Thus the robot can't ever replace therapists). Knowing this, how do you feel about these robots being used to educate autistic children? would it have any effect on your work?*
 - What are barriers to using robots in your line of work?
 - How would you evaluate if a robot is fit to be used in your work?
2. *Right now, there isn't a globally strict protocol on how to use these robots specifically, but what existing ethics and policies need to be considered in using Robots to educate autistic children?*

- Would you be comfortable reaching out to developers of these robots, academic experts, or people outside of your organization to help implement and manage these robots?
3. *What do you think can be done to help Therapists and Teachers manage Robot-student-teacher relations in the education of autistic children?*
 4. *What do you think can be done to allow Therapists and Teachers to voice their views on this matter to both developers of robots and to the autistic community?*
 - What barriers are keeping teachers/therapists from voicing their views to others?
 5. *In your opinion, what is the best area/best practice/best use for these robots in the education of autistic children?*
 6. *Do you want to eventually use robots in the education of autistic children? Why/why not?*
 - Do you have any questions you wished I had asked, or do you have any closing statements?

(When 30 minutes is up but not all questions have been answered)

I have noticed it's now 30 minutes; out of respect for your time, would you be able to answer one more question? (If No). I understand. (After interview is over) May I reach out to you later for an additional interview if necessary? Who else would you recommend I speak with?

(At the end of interview after all questions have been answered)

Thank you for joining me (Interviewee name here), We have now reached the end of the interview. May I reach out to you later for an additional interview if necessary? Who else would you recommend I talk with?

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