Challenges And Opportunities of Technology Related Instruction For Children With Autism Spectrum Disorder: Parents Perspective

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The study investigates the parents' perspectives (mothers) of the challenges and opportunities posed by technology-related instruction for their wards with Autism Spectrum Disorder (ASD) towards training and therapy. It considers both facilitation and barriers towards an evidence-based exploration to understand the factors from a viable and sustainable therapeutic standpoint. A structured interview schedule was designed and constructed to obtain rich qualitative data for analysis. The findings indicate the dire need expressed by parents to shift from online to offline learning environments for better management of individualised educational and therapeutic service demands of their autistic wards. The findings further indicate that parents support using video modelling, YouTube, Google Meet and other similar technologies for building digital skills, concentration and digital literacy among children with Autism Spectrum Disorder.

KEYWORDS: Autism Spectrum Disorder, Challenges, Opportunities, Parents, Perspectives, Technology

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Introduction

Autism Spectrum Disorder is a developmental disorder which impacts a child's social, communicative, and behavioural aspects. It is seen that such individuals may also have impaired intellectual ability (Moss et al., 2012). According to Autism Society of America (2006) Autism refers to a complex developmental disability which typically manifests during the early years of life (up to 3 years). Using appropriate teaching and training methods, one can bring about positive changes in this group, however the nature of improvement is varied depending on the nature and need of the child with Autism (Magiati, 2011). Teaching Children with Autism Spectrum Disorder (CwASD) through remote or online mode through use of technology is associated with both negative and positive aspects, challenges and opportunities. On one hand such children tend to enjoy playing games and be engaged when interacting with digital devices, while their parents report of facing many challenges in accessing technology during online teaching. Online classes require increased screen time, more sitting time and attention which may be difficult for children with ASD, resulting in an increase in behavioural issues. Hence careful monitoring and use of specific child centred strategies to increase socialization and better management of problem behaviours is a dire need (Michalak, nd.).

A family is referred to as the 'first school' of the child and hence the role of the parent is to provide various opportunities for learning by doing, at the same time lending support and encouragement in all tasks. A family influences a child's learning and development especially during formative years in various areas such as physical, emotional, social, and cognitive. Thus, it is important to involve parents in all training and intervention tasks related to CwASD. In today's digital age, technology supports parental involvement in the child's recreation and learning thereby leading to empowerment through involvement. The use of technological tools can facilitate development of key skills among children. The families are highly and, in several cases, severely and adversely impacted on having a child with Autism. The areas like housekeeping, economic conditions, emotional and mental wellbeing of families, marital relationships among family, and their physical health are generally influenced resulting in isolation, frustration, denial, anger and needs being restricted to that of their children with special needs. Adverse impacts can also be manifested as poor form of sibling relationships, impaired relationships with extended family, friends and neighbours and poor involvement in socialization, recreation and leisure activities.

Parenting a child with ASD is viewed as a stressful and challenging experience (Shattnawi et al., 2013) . Children with Autism face numerous challenges that can significantly impact the functioning of parent and families of CwASD,

also taking a toll on their emotional, social and financial health (Kourkoutas, 2012). Caregivers of CwASD often experience poor quality of life and well-being, impaired mental health, high rate of anxiety and depression (Hayes & Watson, 2013; Hoffman et al., 2009; Lai et al., 2010). Previous studies have revealed that mothers of children with ASD reported highly elevated levels of psychological distress and caregiver's burden (Estes et al., 2013), health-related problems Fairthorne et al. (2015) , low levels of resilience (Ilia et al., 2019) , and issues in martial and sibling relationships and family socialization Meadan et al. (2010) . Fairthorne et al. (2015) conducted a study in Western Australia, including mothers of children with Autism and found that participants were vulnerable to severe medical conditions such as cancer and had an increased risk of early death, due to impaired mental well-being. Gobrial (2018) conducted a study on Egyptian mothers of CwASD. The findings of the qualitative research indicated that the diagnosis of Autism adversely affected the mother's social life and mental well-being; Increased need for caring for a child with Autism led to stress and negative societal attitudes which led to an increase in stigmatization for both mother and the children. High costs involved in education, training, and therapies coupled with treatment costs lead to financial burden and concerns, which contribute to increased parental fatigue, especially true and significant for low-income households.

Today, technology is easily available in the form of Television, Computers, Internet, Smartphones, video games, classroom-based applications etc. Technology in the form of Information and Communication Devices have pervaded all the areas of our lives, impacting our lives in myriad ways. The goals of using technology differ based on the nature and type of population for whom it is meant. Technology usage for individuals with Autism is mostly aimed at improving communication, which is one of the key triad deficit areas associated with Autistic children. Such individuals enjoy the sense of interacting using computers, tablets, and smartphones as they provide a safe and trustworthy environment (Valencia et al., 2019). The use of technology driven applications can support development of social cues among the target population. Milne et al. (2018) investigated the use of virtual humans or bots to impart training to children having ASD towards emotional regulation and social skills display. The use of digital visual cue cards, schedules and other visual formats allow the Individual with ASD to develop vocational skills self-care skills, life skills, among other daily living skills (Rashedi et al., 2021). In this way technology lends support for Children with Autism through utilization of visual strategies for teaching skills various visual formats which includes video-modelling. The ease of technology usage due to user friendliness coupled with appropriate training can help to build self-advocacy, digital skills and vocational skill development among individuals with Autism. Parents and teachers are also increasingly using technological devices like

iPads, tablets and smartphones to provide immediate reinforcement and motivation ('How technology can help', autismspeaks.org). Thus, the context of technology usage, its importance and need are established. It is crucial for Individuals with Autism Spectrum Disorder to gain exposure to technology especially in the 21st century which is governed by technological usage. The literature reviewed for the present study also establishes the promise that technological intervention offers several opportunities to Children having Autism to gain desired skills, hence technology can act as a potential medium for intervention. However, technology can have diverse impact on the socialization of children leading to isolation, withdrawal, technology addiction etc (Odom et al., 2015). The needs of children with ASD may vary and some may require greater support in areas like socialization, self -regulation etc, thus it is essential to know and understand the parental perspectives towards technological instructions. Laurie, Warreyn, Uriarte, Boonen & Watson (2019) reported that despite technology usage among children and adults with Autism was linked to capacity and self-development, however parents and caregivers in the United Kingdom, Belgium and Spain were worried about the longer screen time, technology driven addiction, dependence, and isolation. Thus, this further establishes a strongly felt need to interview teachers, trainers, siblings, friends to understand the contextual circumstances leading to technological use, overuse, and misuse (Rashedi et al., 2021).

Today, everyone is dependent on smart-phones, computer and mobile applications, tablets, and other electronic devices. The mechanism, objectives and uses of technology differ based on age, level of education and ability. For individuals with special needs such as those with neuro-diversity conditions like Autism such tools can be very empowering and useful for training and up-skilling. Technology when used properly can promote development, skill improvement thereby promoting independence and improvement in quality of life. Such technology also helps in enhancement of strengths and removal of weaknesses. Families play a crucial role in contributing to the success of intervention, training, and management programs for CwASD. They go through several challenges and struggles during management of their children with disabilities especially Autism (Ilia et al., 2019) .

This study explores such challenges and opportunity in areas like parental routine, school instructions, linked to technology related instructions for children with Autism Spectrum Disorder from the perspectives of parents. Worldwide, advancements in technology have facilitated the sudden spike in modern ways of communication, education, commerce, and healthcare thereby impacting the social and educational scenario among humanity.

Review of Literature

According to Salters et al. (2021), very little research has been done to understand the impact of social and motor challenges on the participation and well-being of CWASD, compared to the typically developing individuals. The current research was based on the insights generated from the participants comprising of instructors (N = 9) working with autistic children. The research tools included a semi-structured qualitative interview which were conducted to capture a comprehensive and informative profile on the impact of social and motor functioning of children with ASD on their social and physical activities. The findings revealed that social challenges were perceived as the greatest barrier towards the participation of CWASD.

Mosia and Mahlape (2021) conducted research on gathering the experiences of parents towards nurturing a child with Autism Spectrum Disorder. The findings reveal that such empirical research is limited in the country. The method used for data collection was a qualitative case study to understand the parenting experiences of parents having CWDs. The study used purposive and snowball techniques to recruit participants. The semi-structured interviews were used to generate data from six participants.

Rashedi et al. (2021) conducted a study involving 18 parents of CwASD and using an iterative inductive-deductive approach to qualitative analysis. Major RQ: The observation of parent's observations about their adolescent's preferences in types of technology services and digital content. The study also highlighted the positive and negative effects of technology use on mood and behaviour were studied.

Min and Wah (2020) carried out case study investigation in which the participants comprised of a mother with two children with different severity levels of ASD. In a semi-structured interview, the mother described her experiences and aspirations of education arrangements for both her children. The findings reveal that mothers feel the need for advocating for inclusive education for their children.

Round et al. (2017) studied the use of exploring the potential of Art among children with Autism Spectrum Disorder (ASD). A variety of data collection tools were used for collecting data and it included: questionnaires, interviews, video-recordings, observation notes and participant Art works. The study findings show that use of art therapy helps in supporting the expression of emotions and feelings by the child. The study design used was a qualitative descriptive case study and the participants comprised of 2 boys, aged seven and ten years, who participated in 5-6 visual Art based therapy sessions.

Ntalindwa et al. (2019) mentioned that parents had both positive and negative perception about technology usage by CWASD. Data was collected

through interviews with parents, and the design used was inductive-deductive approach to qualitative analysis and explored uses of technology for social skills development among adolescents with ASD. Our findings include parents' observations about their adolescent's preferences in types of technology devices and digital content, as well as both positive and negative effects of technology use on mood and behaviour. Parents highlighted several avenues of technological preferences and risks that may inform intervention design, enhance user engagement, and capitalize on users' strengths while buttressing areas for growth.

Objectives of the Study

Following are the Objectives and sub-objectives of the study:

1. To explore the challenges faced by parents of CwASD in areas of schooling and technology usage.

Sub Objectives:

1A. To explore the challenges faced by parents of CwASD in area of schooling.

1B. To explore the challenges faced by parents of CwASD in area of technology usage.

1C. To explore the parental perspectives related to the opportunities linked to technology-based instructions for CWASD.

2. To explore the parental perspectives related to the opportunities linked to technology-based instructions for CWASD specific to the area of Academic Achievement and Non-Academic Achievement.

3. To explore the changes in the daily routine and lifestyle of parents of CwASD.

Sub Objectives:

3A. To explore the changes in the Daily routine of parents of CwASD.

3B. To explore the mental health of parents of CwASD.

3C. To explore the support systems available to parents of CwASD.

Research Methodology

To gain insight into the major and sub-objectives framed for this study, the researchers, employed a qualitative method of research involving the use of structured interview technique. This was followed by qualitative analysis of

the narratives obtained from the respondents. The usage of interview method gave the mothers an opportunity to express and share details of the personal experience on the challenges and opportunities faced by them while imparting technology related instructions to their wards having Autism. The interviews protocol was specially designed to elicit in-depth parental perspective such as their innate thoughts, feelings, and experiences. A detailed, critical, and in-depth qualitative analysis of the interview transcripts was carried out by the researchers to uncover the unique perspectives of the mother with regards to challenges and opportunities of usage of technology-based instruction through personal perception and lived experiences. Transcript were coded and analysed following a step-by-step transcript analysis including coding and interpreting the data. To maintain the objectivity and non-biasness of the collected data, it was coded by the authors and senior professionals.

SAMPLE FOR THE STUDY

Convenience sampling procedure was used to recruit the desired sample (N= 5) comprising of mothers of CWASD residing in Delhi-NCR, having children aged between 6 -13 years old. All children had received a diagnosis of ASD according to Government of India certification rules. Table 1 describes the characteristics and nature of the selected participants:

Table 1

Participant Characteristics.

Mothers	P (1)	P (2)	P (3)	P (4)	P (5)
Age (in years)	34	34	39	36	32
Marital Status	Married	Married	Married	Divorced	Married
Educational Level	Post-graduate	Graduate	Post-graduate	Post-graduate	Graduate
Employment Status	Working	Home-maker	Working	Working	Home-maker
Number of Children	One	Two	One	One	One
CwASD					
Age / Gender	7y/ Male	6y/ Male	8y/ Female	7y/ Male	9y/ Female

Table 1 continued

Childs' Grade Level	2nd Grade	5th Grade	7th Grade	2nd Grade	4th Grade

Data in Table 1 highlights the participant details and characteristics of the sample comprising of mothers of CWASD (age, marital status, educational level and employment level). It also provides details about their wards with Autism (age and grade level) mentioning their age and grade level.
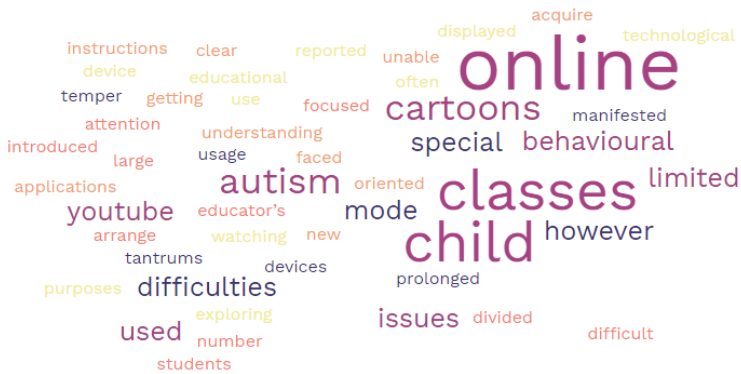
Results of the Study

Figure 1. Word Cloud Depicting Challenges Associatedwith Technology Usage Among CwASD.

The detailed qualitative analysis using the NVivo software enabled the researchers to identify the core challenges associated with technology usage among CwASD. These issues and challenges are highlighted in the Figure 1 such as online classes and associated difficulties such as application, time taking process and difficulties faced.

Findings for Objective 1: To explore the challenges faced by parents of CwASD in areas of schooling and technology usage.

Table 2

Parent's Perspective on Challenges Faced by Them.

THEME	PARENTS RESPONSES
Challenges faced by Parents of CWASD in technology usage	-Mothers were familiar in using the technological devices (laptop and mobile phone). -They gradually developed a greater sense of comfort and familiarity towards the use of technology devices such as smartphone. -Limited interaction with the special educator (thrice in a week) compared to daily classes with the general educator.
Challenges faced by CAWSD in technology usage from Parents perspective	-Behavioural issues such as prolonged usage of online devices during online classes manifested in temper tantrums displayed by the child having Autism. -Technological device was often being used for exploring YouTube for watching cartoons while its use for educational purposes was reported to be limited. -The child with Autism was unable to acquire a clear understanding of the instructions. Faced Difficulties in getting oriented when new applications were introduced for online classes.
	-The special educator's attention was divided and not focused on large number of students. -Difficult to arrange therapeutics services in an online mode due to lack of availability of trained therapists -Not able to attend the classes online as he is having communication and language difficulties. -However, the child used YouTube to watch their favourite cartoons.

Table 2 continued

	-As the child has weak eyesight so he was not given access to small screen technology, however a Smart TV was arranged for him.
	-Mother spent extra time in preparing and providing worksheets as the child was not attending online classes.
	-Observed increase in behavioural issues among children having Autism owing to imitation of the cartoons.
	-A special educator was appointed for conducting classes in online mode as one-to-one interaction was highly limited or absent.

The data in Table 2 shows clearly the perspectives of mothers towards challenges faced in technology usage which range from fear and hesitation to use of advanced digital technologies, rise in behavioural issues among their wards with Autism to spending of extra time in attending and monitoring their child's behaviour and performance in online classes.

Findings for Objective 2: To explore the parental perspectives related to the opportunities linked to technology-based instructions for CWASD.

Table 3

Parents Perspectives on Opportunities as Seen by Parents in Technology-Based Instructions.

THEME	PARENTS RESPONSES
Opportunities as seen by parents in technology-based instructions in: 1.Academic Achievement 2.Non-Academic Achievement	-Online classes made use of multimedia resources like PowerPoint, videos, and other online tools which increased understanding among students. -Some CWASD were observed to be losing interest in curricular activities however found more active in co-curricular activities in the online environment.

Table 3 continued

Challenges as seen by parents in technology-based instructions in: 1. Academic Achievement 2. Non-Academic Achievement	-Mothers reported that their wards were receiving motivation from teachers in the online classes, but individual focus was absent. -New teachers were unaware of specific needs of the CWASD. Hence the individualized focus was often lost during online classes. -Enhancement and lack of support for IEP during online classes. Less enhancement of skills was observed during online classes Lack of support for IEP during online classes. -Behavioural issues reported such as not sitting in the chair during an online class. -Understanding of the child improved due to multimedia use and it saved time for the teachers, but this created challenges for parents who could not take out time for simple activities such as kitchen work due to online support needed by the child. -One mother reported that her child had not received any academic support before the pandemic as he had not joined any school. Recently the parents got him admitted to a Delhi school and it was observed that the child was trying to finish every work in a hurry thereby causing mistakes and errors. Also, it was seen that the child was spending excessive time watching TV and other digital media. The parent felt that the use of digital technologies helps teachers have communication deficits.

Table 3 continued

	-It's also seen that the child uses technology for benefit of self-satisfaction for example recreational usage and fun activities but does not use it for educational purposes (except watching rhymes and poems related to skill taught in class such as counting, numbering alphabets, etc.). -Online classes were of short duration and happened generally twice a week which was hindering their child's progress in skill development. The child received worksheets from teachers through online mode (WhatsApp, email) however, was not doing it by herself.

Results in Table 3 show that parents (mothers) perceived both opportunities and challenges of technology-based instruction on the academic and non-academic (co-curricular) areas among CwASD. It was seen that mothers considered the use of multimedia resources as beneficial for the child in online learning environment, as such resource utilization helped in supporting the development of greater understanding and requisite digital skills among them. The challenges were reported as display of problem behaviour such as non-sitting behaviour during online classes, lack of interest and focus on tasks received during online classes. Lack of focus in Individualized Educational programming during remote classes was reported as a key issue along with short duration of online classes.

Findings for Objective 3: To explore the changes in the daily routine and lifestyle of parents of CwASD.

From data in Table 4 it can be seen that there was a significant change in the daily routine and lifestyle for mothers of children having Autism as the work life balance disappeared with the onset of online classes and Work from Home (WFH). The mother felt greater burden due to their innate need to support and guide the child during online classes in the physical assistance received from educator sand trainers. However, most mothers liked the concept of remote classes as it reduced the chances of infection for their children who are more susceptible to such diseases compared with non-disabled peers.

Table 4

Parents Perspectives on Lifestyle Change.

THEME	MOTHERS' RESPONSE
Parents lifestyle 1. Daily routine 2. Mental Health Support system	● Massive impact on the mother's lifestyle was reported. ● They experienced changes in daily routine such as shifting of lunch time, relaxation, recreation due to online classes of her ward which resulted disharmony in the family. ● The mother also felt that increased interference from her side negatively affected the child's behaviour and learning which resulted in behavioural issues. ● However, the mother supported online classes as they protected her child from exposure to the virus. ● Lifestyle changes have adversely affected ● Work-life balance which was not seen during face-to-face classes. ● parents wished for shifting to the traditional mode of teaching ● Child stayed at home and did not attend any online classes due to which there was no change in his behaviour or parental lifestyle. ● Grandparents were requested to provide support when the parents engaged in work from home. ● Therapeutics services were also absent for the child during the pandemic ● Grandparental support was sought when the mother went for work outside the home. ● It was also seen that the child had the wish to attend regular classes. So that he can interact with his friends and be a part of social groups which is lacking in online classes.

Table 4 continued

	• Parents' lifestyle got affected and the balance was lost the child was lacking individualized support in online classes which impacted her lifestyle learning and Behaviour.
	• Reported the presence of support from cousins during online classes which protected her from catching the virus.

Discussion

Certain Behavioural issues shown by the children difficulty in Instruction as they get it from their teachers as the teacher will not be able to focus on a bunch of students in online class. They do not understand, or we can say not following the instruction because they understood they are going to school in a very short time no notebooks making for the subjects, no work completion, lazy to do work as they know in last, they will get the PDF for the work given by teacher.

Parents reported no observable difficulty was felt in children with ASD using technology such as online platform Google Meet, YouTube, Google voice command. CwASD already display deficits in socialization which is one of the core areas in the triad. Also, it was seen that during the beginning of Covid-19, such solitary experiences for the children increased due to covid-19 appropriate behaviour protocol in-place such as maintenance of social distancing, closure of schools, playgrounds. As the situation has improved now the social isolation has seen a reduction among CwASD.

Technology was seen to negatively impact socializing skills among CwASD. It was noticed that children spent more time browsing for interesting videos on YouTube and even could use advanced technologies like Google voice assistant. Hence, the children could spend less time with family members. CwASD are showing increased attention towards physical activities like games instead of paying attention to academic activities like reading, writing, and other school related tasks. One advantage of technology usage by CwASD as reported by parents was that the students are now learning concepts faster, grasping information better due to usage of multimedia. Also, it was noticed that the teacher's motivated the children in online classroom through usage of multimedia tools like animation, graphics, audio, videos, which resulted in increasing concentration of the learners with Autism. The students also felt motivated to learn new skills through video modelling mode which saved time and energy for educators and parents. No significant change was observed by

the parents regarding the verbal communication of CwASD during the online classes however, a significant change was observed regarding technology usage due to increased dependence on smart devices. Parents reported absence of support from school in critical aspects such as IEP, counselling and guidance for the parents and lack of individualized support in the online classes being provided to the students. These online activities also adversely impacted the lifestyles of parents of CwASD in terms of changes in daily schedule, eating habits and timings, relaxation, and unwinding time. The work life balance of the parents of CwASD also took a hit as employed mothers had to rely on grand parental support for fulfilling care giving needs for the child. Parents felt that they were interfering with the needs of the students in daily life due to overprotection and constant nagging which resulted in increased problem behaviour among CwASD. All the parents interviewed indicated their desired to shift from online to offline mode due to the adverse impact on the child's behaviours, lifestyle, increased dependence on the technology, poor social skills. Parental experiences and perspectives form the core of this study, and it is essential to explore and understand their outlook towards the challenges faced: Like reduction in socialization due to extensive usage of technology resulting in solitary experiences. Negative impact was seen on the lifestyle of parents as they lost work-life balance. Most parents blamed it on non-availability of individualized support in online classes. The support of grandparents was also sought to overcome the deficit and meet the demands. Therapeutic support services were also needed to support the individuals with ASD. There was a sudden and increased change in the behaviour of the child due to the shift in intervention techniques from offline to online medium. These changes make it challenging for the parents to handle their autistic child in such environment and this creates a need to shift away from the traditional outlook to changing perspectives of technological solutions for the disabled.

Conclusions

The study clearly shows that it is critical to study the challenges of technology-based interventions for Individuals with Autism Spectrum Disorder (ASD). The reviewed literature indicates that use of technological interventions for CwASD is on the rise, however it is important to study and explore the associated challenges to design effective intervention for such children taking into consideration the perspectives and avenues of technology usage as felt by parents of Children with ASD. The current study reveals that most parents preferred offline mode of intervention as compared to online mode. The study points out participating parents were concerned with issues like poor and impaired socialization of their children, increased screen time, lack of individualized support in intervention and the rehabilitation, which further

had a negative impact on the lifestyle of the parents and caregivers. These findings are also in alignment with the reflections of parents shared and expressed by Panicker (2022) which clearly points out the critical lack of infrastructure for supporting parents to cross such challenging crisis, where there was sudden closure of schools and educational institutions, therapy services and rehabilitation centres. There is scope for further improvement and infrastructure building to meet digital technology needs during the pandemic and other such situations. This study clearly establishes the challenges and opportunities felt by parents which can guide policy makers and curriculum developers along with other stakeholders.

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