

Improving Conversation skills using Technology based intervention among children with Autism Spectrum Disorder

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Abstract

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Behavioral disturbances in children with Autism Spectrum Disorder (ASD) were addressed by many people but still these disabilities are increasing in vast number. Studies show that one in 88 children is found to have Autism. The major difficulties of these children are classified as difficulties in cognitive processing, decreased communication and social interaction, stereotypical behavior and fixated interests. Several apps (software) were developed to improve the communication skills of the children with ASD. In this study the researchers has developed a communication app called 'talk with me' where Picture Exchange Communication System (PECS) was utilized. Children were assessed for understanding their baseline communication skills before initiating the intervention. Children with Autism Spectrum Disorder (ASD), age range of 6- 13 were participated. After the intervention children were showed improvement in their communication skills.

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Autism spectrum disorders (ASD) is considered as a Neuro developmental disorder which is a lifelong developmental disabilities characterized by marked difficulties in social interaction and social communication, and restricted and repetitive interests and behaviours. The word 'spectrum' is used because the range and severity of the difficulties people with an ASD experience can vary widely. The prevalence of these disorders has increased drastically. In US the prevalence of ASD has increased to 1 in 68 (Centre of Disease control and Prevention, 2010). The major deficit is social reciprocity skills is the core difficulty of the autism spectrum disorders. Individuals with ASD will have deficit in cognitive function and language aspects. Along with that socialization deficits are major source of impairment (Carter, Davis, Klin, & Volkmar, 2005). In addition, social skill deficit do not remit with development. In reality, impairment and distress will increase when children approach adolescence because the social surrounding becomes more complex and the they become more aware about their social disability (Schopler & Mesibov, 1983; Tantam, 2003).

The social impairment in individuals with ASD is diverse and involve different aspects of problems like; speech, linguistic conversation and interpersonal interactions. Frequently seen problem in ASD individuals is difficulty in using social pragmatics. For example, turn taking in conversation and the ability to take listeners perspective. They lack speech prosody like, rising and falling of voice pitch and inflection that aids verbal communication. They show a tendency to stay on certain topics, difficulty understanding and expressing emotions and inability to interpret non literal languages such as sarcasm and metaphor (Krasny, Williams, Provencal & Ozonoff, 2003; Kerbel & Grunwell, 1998; Shaked & Yirmiya, 2003; Tager- Flusberg, 2003).

Research review shows that about 50% of children fail to develop functional speech; therefore it is a major requirement to provide alternative way of communication (Ganz, Earles-Vollarath, Heath, Parker, Rispoli & Duran, 2012). To aid people with complex communication difficulties Augmentative and Alternative Communication (AAC) system are commonly used. AAC method comprises an array of communication aids, like sign language, gestures, symbolic,

picture and speech generating devices. One of the most popularly used systems for communication is Picture Exchange Communication System (PECS). This PECS communication is an effective Aided AAC for children who have not developed functional speech. PECS is a pictorial system that uses basic behavioral principles like, differential reinforcement, shaping and transfer of stimulus control to teach communication form and functions (Charlop-Christy, Carpenter, Le, Leblanc, & Kellet, 2002). The core focus of PECS is functional communication responses of the individual. This promotes meaningful interaction between environment and individuals with ASD.

The arrival of technology has made drastic change in the interventional aspects of autism. Due to this newer technology, the AAC technologies have become portable and less expensive for this sector of individuals. In addition to that, these technologies are becoming more commonly used, through tablets, computer and smart phone app, such as speech generating devices (Ganz, Boles, Goodwyn & Flores, 2014; Kagohara, Van der Meer, Ramdoss, O'Reilly, Lancioni, Davis & Sigafoos, 2013; Murdock, Ganz & Crittenden, 2013). The advent of mobile devices has increased the usage of more AAC technologies (Gal, Bauminger, Goren-Bar, Pianesi, Stock, Zancanaro & Weiss, 2009). There are studies which revealed that the usage of application on table computers and smart phones as a speech generating devices (Flores, Musgrove, Renner, Hinton, Strozier, Franklin & Hil, 2012; Kagohara, Van der Meer, Ramdoss, O'Reilly, Lancioni, Davis & Sigafoos, 2013; Van der Meer, Sutherland, O'Reilly, Lancioni & Singafoos, 2012). There are numerous advantages to software applications for mobile technologies compared to traditional methods which were using earlier. Digital technologies are becoming more powerful and popular that those are light weight and can be used during various activities like, while sitting on at a table, while travelling etc (Sennott and Bowker, 2009). Most of the mobile and smart phones are visually appealing and make sounds, which is catchier for individuals with ASD. As most of the individuals with ASD are visual learners they will be benefitted with software application due to their visual aspects, this in turn improves their communications. The communication application in the smart phones and tablets are easy to use and family members can also help them to learn communication.

The major problem of ASDs is the difficulty in communication and reciprocal interactions. It is a laborious task to initiate communication in them using the traditional methods of communication training. There are a number of software applications are available to teach communication for individual with ASD. These applications are very helpful for individuals who are non verbal. In the current scenario, most of the apps intend to teach a need based communications. That is the preliminary requirement for person who does not have communication skills. Even then it is very important to understand that reciprocal interaction with others are also important and one should start working on that simultaneously. In the present study an attempt has initiated to improve the conversation skills of children with ASD even though the children were lacking basic communication skills. This will provide a light on the hidden skills of children to converse with others. This will help in giving more technology based intervention in the communication aspects of the children so that their basic communication as well as conversation skills can be improved.

Objective

1. To investigate the improvement in social interaction of children with autism spectrum disorder with the usage of technology based application.

Method

Participants

The present study consists of 10 children with autism spectrum disorder from a special education center from the state of Kerala. Their age ranges from 6- 10 years. The children were



selected from the center and they were full filling the diagnostic criteria of ASD. These children were with minimal need based communication and some of them were non verbal.

Materials

1. Tablet Software application: This application consists of symbol based images that participants were already familiar with through their usual use in the school setting. The application helps the children for a turn based conversation in each mode.
2. Behavioral Check list: The check list prepared by Uma (2016) to measure the absence of presence of basic communication related behavior. This check list consists of 17 item associated with different autism related behaviors. This has developed on the basis of theoretical aspects of different bahvioral check list related to autism.
3. Personal information Schedule: Personal information like sex, religion, family type, etc was collected through the personal data sheet from the consent teachers who were taking care of the children in the center.

Procedure

Investigators personally contacted the head of the institution and explained the purposes and objectives of the study. A written approval from the Head of the Institution and parents of the participants were collected before the study. Before starting the session children were made in pairs and given a trial session of the application. The session was facilitated by the investigators. During the session the investigators was guiding the children to understand the functioning of app through physical and verbal prompt. Each child was assessed using the behavioral check list to understand the baseline of their behavior before starting the data collection. Data collection took place in a quiet room. One teacher was aided to help investigators during the data collection. The children were seated in pair during the session. They were sitting side by side on chair and the tablet was placed in front of them. These children were given the session for a period of 20 minutes on a daily basis for a period of one month. The investigators were giving verbal and physical prompt to guide the children to understand the usage of the app.

Results and Discussion

To know the improvement in the communication and conversation aspect in children with autism spectrum disorders the percentage of the pre and post test were evaluated. The details are given in the table 1.

Table 1

Percentage of pre and post test performance of children with ASD.

Sl No	Variables	Pre Test (%)	Post Test (%)
1	Eye contact	80	100
2	Verbal Communication	50	60
3	Need Based Communication	50	80
4	Understanding non verbal communication	40	80
5	Comprehension of verbal language	50	90
6	Usage of assistive technology for communication	0	100
7	Conversing without prompt	0	20
8	Turn taking	0	80
9	Interest in conversing with others	0	30
10	Absence of Echolalia	50	50
11	Responds spontaneously	0	30
12	Express emotions	0	10
13	Initiates conversation	0	40
14	Sitting tolerance	10	50
15	Interest in social conversation	10	40
16	Responding appropriately to questions	0	10
17	Show interest in other person's side of conversation	0	10

Table 1 gives the percentage of changes in the behavioral variable in pre and post test performance. Before the initiation of the application 80% of them were having eye contact after the intervention there was presence of eye contact in all the children (100%). The verbal communication and need based communication were only 50% which was increased to 80% after the intervention with the application. The ability to understand the non verbal language from others was 40% which was increased 80% after the intervention. Before the test 50% of the children were able to comprehend the verbal input and that has increased to 90% after the intervention. None of the children were familiar with tablet application (0%) before the programme, but all of them could do the tablet application pretty faster (100%) after the post test session. All the children were needed verbal or physical prompt (0%) to do the task. After the intervention there was 20% of improvement shown in children. The children not able to take turns (0%) before the test, but after the test 80% of them were learnt to take turns. The ability to show interest in talking to others was nil (0%) before the test but there is a 30% of improvement after the test. Echolalia among children was same as pre and post test session (50%). Ability to respond spontaneously was nil (0%) before the test and there is a 30% improvement after the test session. Pre and post test sessions in expressing emotion, responding to the questions appropriately and showing interest in other person's side of conversation was 0% and 10% respectively. The interest in initiating conversation was 0% but after the test shows improvement about 40%. The sitting tolerance of the children was 10% which was increased to 40%. The percentage for interest for social conversation was 10% before the test but children showed improvement about 40%. The table shows that there is an overall improvement in the post test performance among children.

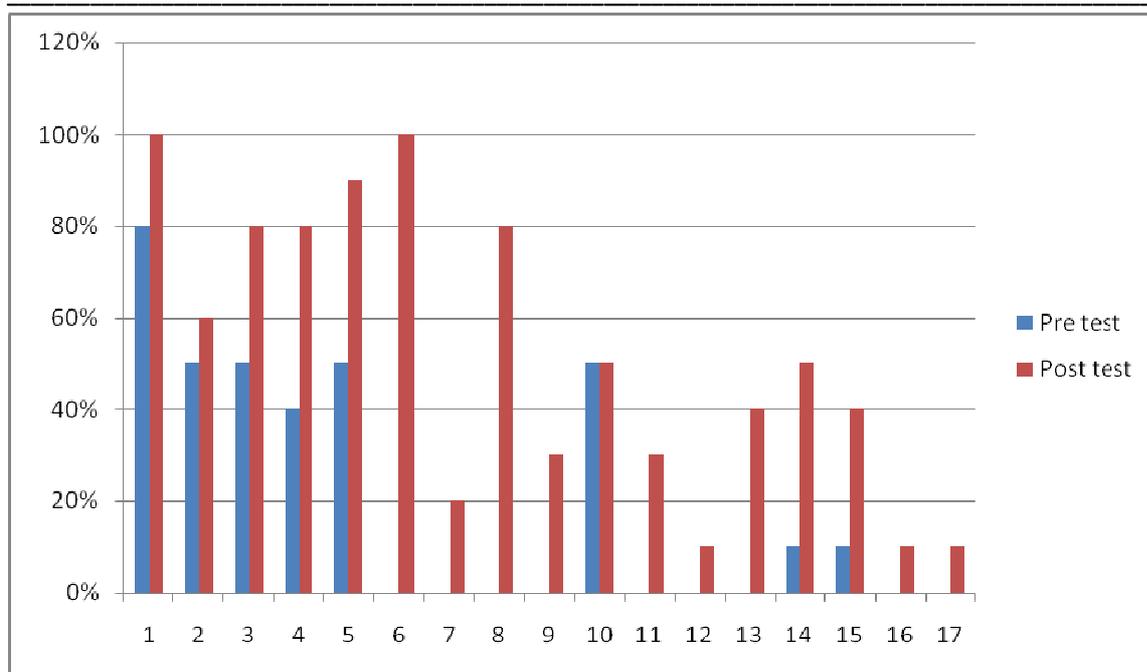


Figure 1: Graphical representation of pre and post test performance

The graphical representation shows that there is a difference in the post test and pre test performance. Children were showing improvement in the conversation aspect and in turn taking during the session. The application was giving more of visual and auditory input in which children were showing more interest in communication. This is supported by the study by Ronski and Sevick (1997) that technology based AAC is potential alternative for children who are not able to communicate effectively. It is known that children with autism spectrum disorders will have the difficulty in verbal communication (Boucher, 2003; Koegel, 2003), but they have a vast range of conventional or unconventional patterns of communication, which is not observed or interpreted by others (Keen, Sigafos, & woodyatt, 2005; Wetherby, Prizant, & Schuler, 2000). An interesting aspect of the study was that even though the children were not the frequent users of android tablets, they could show some amount of improvement in all the areas of communication in the checklist. This study shows that, in the areas like usage of assistive technology, turn taking behavior, responding spontaneously, initiating conversation and showing interest in social conversation have been improved drastically. This indicates that children with visual animated cues will be able to incorporate information and able to communicate better. Researchers reported that the technology based communication mobilizes multiple methods of communication among children with autism spectrum disorders (Virpi, Eija, & Marjo, 2012).

Conclusion

In the present study, the investigators has attempted to understand the effectiveness of technology based intervention in communication related issues in children with autism spectrum disorders. There are different Augmentative and Alternative Communication (AAC) method which was traditionally used for children with autism to speech and other communication related issues (Hart & Banda, 2010). In recent years there is an advent of technological aspect of intervention. There are different types of educational apps and some apps which are helping for need based communications. This study has put an effort to understand the importance of improving conversation skills along with basic communication. If the children were given early intervention with a proper technology based aid which is more of



visual aid the children will show improvements. In this study, instead of concentrating on need based communications, the investigator has put an effort to improve the conversation skills among the children, which will cater to their socialization aspect. The finding brought out that children were able to show improvement in the conversation aspects using apps. It should be considered that the traditional way of teaching these children has its own way of limitations. To benefit these children technological aspects needs to be brought up. This will improve the communication profile of the child (Stiegler, 2007; Robins, Dautenhahn, Bockhorst, & Billard, 2005).

There are many apps for educational purpose and for basic communications like tap to talk, bol, abc phonics etc. These apps help the children to learn new things and also help for the need based communication. Through this study it has been implied to spread awareness that the technology based interventions can be benefitted with children with ASD. The major concern with the technology based intervention is that it has to reach to society and identifying the people. There are many number of marginalized people in the society who need the interventions. Technology is always helpful for the advantage group. The need for technology in the needy group has to be understood by the technocrats through the awareness. Many aspects can be addressed through technology. Through the effective usage of technology based intervention we can uplift the special needs individuals skills needed for effective functioning as human being. For the same, there should be more research is needed to investigate expanding the therapeutic systems in to natural settings as the technology based intervention has the freedom to use in any context. This in turn improves the communication skills of the children in real life situations.

References

- Boucher, J. (2003). *Language development in autism*. *International Journal of Pediatric Otorhinolaryngology* 67(1), 159- 163
- Carter, A. S., Davis, N. O., Klin, A., & Volkmar, F. R. (2005). *Handbook of autism and pervasive developmental disorders: Diagnosis, development, neurobiology, and behavior*. Hoboken, NJ: John Wiley & Sons.
- Centre for Disease Control and Prevention (2010). Prevalence of Autism Spectrum Disorder Among Children Aged 8 Years – *Autism and Developmental Disabilities Monitoring Network, 11 Sites, United States, 2010*. *Surveillance Summaries* 63(SS02):1-21. <http://www.cdc.gov/mmwr/pdf/ss/ss6302.pdf>
- Charlop-Christy, M. H., Carpenter, M., Le, L., LeBlanc, L. A., & Kellet, K. (2002). Using the picture exchange communication system (PECS) with children with autism: Assessment of PECS acquisition, speech, social-communicative behavior, and problem behavior. *Journal of Applied Behavior Analysis*, 35, 213–231.
- Flores, M., Musgrove, K., Renner, S., Hinton, V., Strozier, S., Franklin, S., & Hil, D. (2012). A comparison of communication using the Apple iPad and a picture-based system. *Augmentative and Alternative Communication*, 28, 74–84. doi:10.3109/07434618.2011.644579
- Gal, E., Bauminger, N., Goren-Bar, D., Pianesi, F., Stock, O., Zancanaro, M., & Weiss, P. L. T. (2009). Enhancing social communication of children with high-functioning autism through a co-located interface. *AI & Society*, 24, 75–84. doi: 10.1007/s00146-009-0199-0.
- Ganz J., Earles-Vollrath, T., Heath, A., Parker, R., Rispoli, M., & Duran, J. (2012) A meta-analysis of single case research studies on aided augmentative and alternative communication systems with individuals with autism spectrum disorders. *Journal of Autism and Developmental Disorders* 42(1): 60-74. doi 10.1007/s10803-011-1212-2
- Ganz, J. B., Boles, M. B., Goodwyn, F. D., & Flores, M. M. (2014). Efficiency of handheld electronic visual supports to enhance vocabulary in children with ASD. *Focus on Autism and Other Developmental Disabilities*, 29, 3–12. doi: 10.1177/108835761350491 .

- Kagohara, D. M., van der Meer, L., Ramdoss, S., O'Reilly, M. F., Lancioni, G. E., Davis, T. N., & Sigafos, J. (2013). Using iPods® and iPads® in teaching programs for individuals with developmental disabilities: A systematic review. *Research in Developmental Disabilities, 34*, 147–156. doi:10.1016/j.ridd.2012.07.027
- Keen, D., Sigafos, J., & Woodyatt, G. (2005). Teacher responses to the communicative attempts of children with autism. *Journal of Developmental and Physical Disabilities, 17*(1), 19–33.
- Kerbel, D., & Grunwell, P. (1998). A study of idiom comprehension in children with semantic-pragmatic difficulties. Part II: Between-groups results and discussion. *International Journal of Language and Communication Disorders, 33*, 23–44.
- Koegel, L. K. (2003). Communication and language intervention. In R. L. Koegel, & L. K. Koegel (Eds.) *Teaching children with autism. Strategies for initiating positive interactions and improving learning opportunities* (pp. 17–32). Baltimore: Paul H. Brookes Publishing.
- Krasny, L., Williams, B. J., Provencal, S., & Ozonoff, S. (2003). Social skills interventions for the autism spectrum: Essential ingredients and a model curriculum. *Child & Adolescent Psychiatric Clinics of North America, 12*, 107–122.
- Murdock, L. C., Ganz, J. B., & Crittenden, J. (2013). Use of an iPad play story to increase play dialog of preschoolers with autism spectrum disorders. *Journal of Autism and Developmental Disorders, 43*, 2174–2189. doi: 10.1007/s10803-013-1770-6 .
- Robins, B., Dautenhahn, K., Te Boekhorst, R., & Billard, A. (2005). Robotic assistants in therapy and education of children with autism: can a small humanoid robot help encourage social interaction skills? *Universal Access in the Information Society, 4*(2), 105–120.
- Romski, M. A., & Sevcik, R. A. (1997). Augmentative and alternative communication for children with developmental disabilities. *Mental Retardation and Developmental Disabilities Research Reviews, 3*, 363–368.
- Schopler, E., & Mesibov, G. (1983). *Autism in adolescents and adults*. New York: Plenum Press.
- Sennott, S., & Bowker, A. (2009). Autism, AAC, and Proloquo2Go. *Perspectives on Augmentative and Alternative Communication, 18*, 137–145. doi: 10.1044/aac18.4.137 .
- Shaked, M., & Yirmiya, N. (2003). Understanding social difficulties. In M. Prior (Eds.), *Learning and behavior problems in asperger syndrome* (pp.126–147). New York: Guilford Press.
- Stiegler, L. N. (2007). Discovering communicative competencies in a non speaking child with autism. *Language and Hearing in Schools, 38*, 400–413.
- Tager-Flusberg, H. (2003). Effects of language and communicative deficits on learning and behavior. In M. Prior (Eds.), *Learning and behavior problems in Asperger syndrome* New York: Guilford Press, 85–103.
- Tantam, D. (2003). The challenge of adolescents and adults with asperger syndrome. *Child Adolescence and Psychiatric Clinics of North America, 12*, 143–163.
- van der Meer, L., Sutherland, D., O'Reilly, M. F., Lancioni, G. E., & Sigafos, J. (2012). A further comparison of manual signing, picture exchange, and speech-generating devices as communication modes for children with autism spectrum disorders. *Research in Autism Spectrum Disorders, 6*, 1247–1257.
- Virpi, V., Eija, K., & Marjo, V. (2012). Communication of children with autism in a technology-enhanced learning environment. *Procedia- Social and Behavioral Sciences, 69*, 1208–1217.
- Wetherby, A., Prizant, B., & Schuler, A. (2000). Understanding the nature of communication and language impairments. In A. Wetherby, & B. Prizant (Eds), *Autism spectrum disorders: A transactional development perspective* (pp. 109–141). Baltimore: Brookes.