

AN EXPLORATORY STUDY TRACING THE IMPACT OF ICT ENABLED EDUCATION AMONG STUDENTS WITH AUTISM SPECTRUM DISORDER IN BANGALORE

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Abstract

Rapid growth in technology has led to a substantial change in our lives. We take the help of technology for the smallest of things. Teaching in schools also has shifted from manually writing on boards to putting content on projectors, something commonly called as E Education. Teaching students with Autism Spectrum Disorder has also changed with the advance in technology. Various applications help understanding an autistic child's capabilities better. It takes a lot of effort and patience to teach a child with Autism Spectrum Disorder, but sometimes despite all the hard work the teacher fails to get the message across to the child. The aim is to explore if teaching an Autistic child with the help of technology-based applications helps the child in understanding better.

Keywords: *Autism, pedagogy, Development, technology, teaching, ICTs.*

CHAPTER1

INTRODUCTION

1.1 Autism Spectrum Disorder

Autism spectrum disorders are a diverse group of neurodevelopmental conditions, characterised by difficulties in social skills, non-verbal and verbal communication, and repetitive patterns of behaviour (American psychiatric Association, 2000). 'ASD' as a term refers to a particular group of Pervasive developmental disorder (PDD), Asperger Syndrome (AS) and Autistic Disorder (AD), Childhood Disintegrative Disorder and Rett's Disorder. Although Rett's disorder and childhood disintegrative disorder fall under Pervasive Developmental disorder. The subtypes are differentiated by either age and severity of the respective symptoms. ASDs are found in all societies, age groups are ethnicities. (Knutson, 2013)(Meylinda Maria,

Ibrahim Ahmad, Faaizah Shahbodin, 2018). It can differ from person to person and hence, the challenges faced by every individual with Autism Spectrum Disorder can be varied. (Autism.Org, 2013)

Considering the ambiguity of ASDs, it would be a very difficult task to decide what sort of structure would work best for a given child within the educational setting. The extent to which children exhibit symptoms of an ASD not only varies between the disorders, but also varies within each disorder. Each child will have an extremely unique profile. Hence, developing a specific set of guidelines for a teacher to follow when a child with an ASD is placed in their classrooms is an extremely uphill task. Modifications and accommodations are recommended in a few general areas like: classroom setup, instructional methods, lesson planning etc. However, the manner and extent in which each area is addressed will differ greatly from one child to another. Therefore, it is extremely important that schools have a sufficient amount of resources available so that each individual case may be thoroughly evaluated. (Gillian Hayes, Patrice Lynne Weiss, Gregory Abowd, 2007)

1.2 Autism in the Indian Scenario

A lot similar to the western scenario, there has been a substantial increase in the prevalence of Autism in India over the years. ASD was once considered a rare developmental disorder but in the current world it is one of the most common brain development disorder. The detection of Autism happens at a much earlier stage considering the fact that there have been interventions and increased number of told for the screen of Autism spectrum disorder. Besides, the age at which a mother conceives her baby play an important role. A very early pregnancy or a late pregnancy can be one of the reasons a baby is born with a brain developmental disorder. Premature babies also face the risk of being slow with development. In India one in 68 children have ASD. A minimum of 70 million individuals have ASD across the globe out of which about 10 million are from India. (Ani, 2017) Due to poor interventions in India, children with autism suffer being left at some childcare centre. There is no effort that goes into helping them or teaching them. The recent researches of the prevalence of ASD in India ranges from 0.15% to 1.01% of which 0.90% are in rural areas, 0.6% in hilly regions, 0.1% amongst tribes, 0.61% in coastal areas and urban areas being the highest with 1.01%. Severe financial pressure and the attitude of the society towards disability in not a very friendly approach. In India the gap between individuals with autism and people still needs to shrink. In India it is believed that disability is due to the 'Karmas' from the past or the past life. India being a developing country, raising a normal child itself is a herculean task for a middle class to lower class family. When a child with autism is born into these families the expenditure increases substantially because special education is expensive and the added medical expenses and therapies seem like a burden almost impossible to carry in the Indian Scenario. To get used to the child's behaviour the parents tend to spend more for training themselves so that it gets easier to take care of the child. India being a country that mostly believes in joint families which makes it easier for the parents to take care of their child with ASD as the other family members, mostly grandparents tend to be extremely supportive. At the same time, nuclear families face difficulties in handling their child. Most Parents in India lean towards religious beliefs and prayers as they believe that it can work as a tool to help their child but autism is a developmental disorder that

stays through out the individual's entire lifespan. Parents tend have marital problems and depression when they have a child with autism spectrum disorder. (Smitha Sairam, Monica Juneja, 2018)

1.3 Assistive Technology

The Individuals with Disabilities Education Act Amendments of 1997 (IDEA) has defined the assistive technology device as “any piece of equipment, or product system. . . that is used to increase, maintain, or improve functional capabilities of individuals with disabilities”. Assistive technology serves two major purposes: the 1st one is to augment an individual's strengths, which counter balances the effects of the disability, and the 2nd one is to provide an alternative mood of performing a task. Therefore, it can be said that the use of technology allows students to compensate for their disability or circumvent it entirely. Technology could act as an assistive tool which can replace an ability that is either missing or impaired for students with learning disabilities (LD), thereby providing the support needed to accomplish a task. Some of the basic objectives of inclusive education is supported by assistive technology: a sense of belonging to group, shared activities with individual outcomes, and a balanced educational experience. Increased use of assistive technology devices during cooperative learning activities could enhance the participation of students with LD circumventing specific disability-related barriers. For instance, students who endurance for fine motor difficulties are not usually targeted for the role of recorder in cooperative learning activities.

A very important role is played by technology in supporting competency and skills development among disabled learners. Assistive and instructional technology should be made an integral and compulsory part of all subjects and the use of these tools should be built into the regular student curriculum. Kurzweil 3000, is a text-to speech software. The use of this helps to read out loud the digital or printed text. Text-to-speech can have a positive effect on decoding and word recognition. It also stimulates the reading fluency and reading comprehension. According to certain researchers, programs such as Kurzweil 3000 may decrease the negative emotions students associate with reading and provide students with a more complete comprehension of the text. (Meylinda Maria, Ibrahim Ahmad, Faaizah Shahbodin, 2018)

High technology devices are devices that require a power source such as electricity or battery in order to function. A few examples of high technology devices are iPad, computers, Laptops, Smartphones, smart pens, wheelchairs. Pen top computers may be a useful tool for children who have difficulties in reading or reading disabilities. Math drill programs are a good way for students to leave how to solve math mentally. (Meylinda Maria, Ibrahim Ahmad, Faaizah Shahbodin, 2018)

Mobiles are the fastest advancing technology. The use of mobile phones in teaching children suffering with autism is on of the most recent ways of teaching with the help of technology. Mobile as a medium of teaching and technology is so popular as it can be easily accessed at any given point of time. Considering how small the device is it can be carried around and accessed from anywhere. Smartphones allow you to download applications. There are mobile applications that can be used to improve functional skills. (Meylinda Maria, Ibrahim Ahmad, Faaizah Shahbodin, 2018)

CHAPTER2

REVIEW OF LITERATURE

Technology is used by humans as a medium to adapt to their natural environments through various techniques and knowledge of instrumentations. Use of technology is making a permanent mark in the research and clinical practice related to Autism Spectrum Disorder. (Sven Bolte, Mathew. S Goodwin, Ofer Golan, Lonnie Zwaingenbaum, 2010) Technology with regards to Autism is being used as a tool for treating children or individuals in general with Autism Spectrum Disorder. (Grynszpan et al.) showed that technology-based teaching has been successful in teaching children with autism news skills. There are various forms of technology, and they can all be used in teaching children. The two main types of technology are high tech and low tech, Robotics, virtual reality, smart phones, applications, computers etc fall the two broad categories of technology. (Rasmussen, Technology As A Tool In Autism Spectrum Disorder (ASD): An Overview)

Technology may motivate students to follow schedules more consistently and is also highly rewarding for students with ASD. Many researchers have noted that students with ASD generally prefer to spend their leisure time engaging in activities centered on electronic media screens (Shane & Albert, 2008). In order to motivate students to increase appropriate behaviours, technology devices might also be used. For example, when a student has completed a certain task, such as completing an academic activity or engaging in an appropriate interaction with others, then the student would be able to access additional content through an application on their device. The additional content can be customized to fit each student's interests and could also allow them to play a game, listen to a preferred song, or watch a brief video. In this way, newer technology devices can be used in two ways: to serve as prompters, by cueing the child to engage in appropriate school behaviours and also serving as the child's reward system. Self-management students with ASD and other developmental disabilities may sometimes demonstrate difficulties to manage themselves during scheduled activities. For example, individuals on the autism spectrum often have difficulties when required to adjust to different environments like directing, controlling, inhibiting, maintaining, and generalizing behaviours. (Adreon& Stella, 2001).

Self-management is designed to help individuals change or maintain their own behaviour. Students are instructed to observe certain aspects of their own behaviour and provide an objective recording of its occurrence or non-occurrence. Often students with ASD may have fine motor skill problems. An individual's ability to participate in activities such as writing and drawing is affected if there is a deficit of fine motor skills. Since their control for writing tasks are limited, it is unlikely that paper and pencil systems would prove effective for these students.

To improve outcomes in using self-management for those at varying levels on the autism spectrum, technology might be used. For example, students can be taught to swipe or place a mark in a check box on a screen. For a child with fine motor deficiencies these tasks might be difficult if the child is required to use a pencil. However if they are allowed to use iPads or other similar devices, these tasks can be quite easy, as well as motivating, for students.

Each student has a different need. Hence, icons on media screens require little pressure and can be tailored to the size that would be beneficial to each student. Since fine motor skills are deficit in certain kids, technology based self-management systems that use iPads or tablets provide a medium to complete management checklists.

Tablet and iPad based self-management systems also allow for an interactive process. When students record an occurrence, immediate action can be taken by reinforcement being administered such as giving them access to a preferred activity on the device, such as a video game or a short video.

Self-management systems can be made more effective and enticing for students in numerous ways by the employment of technology. Schools receive several benefits from the use of technology with their students. By using current technologies they may demonstrate to federal and private supporters that schools are attempting to provide their students with best practice programs. This shows their commitment to invest in each student's future, and also helps to prepare students with skills that will benefit them outside of the school setting.

With the increase in popularity of iPads, tablets, and smart phones, additional research would be needed and is sure to come in the near future. However, the current research in this field is encouraging adding to the existing literature with studies dealing specifically with students with ASD would help to strengthen findings. Also, research demonstrating specifically what these technologies can do to aid individuals in schools and community life would help practitioners to implement better technological supports. Continued research in this area will ensure that as technological advances continue, these supports will become even more efficient and refined to meet the needs of students on the autism spectrum.(Anoyiannakis, 2013)

Technology is said to have the power that allows for adaptability and motivation. Rather than the monotonous classroom teaching which is mostly done verbally, students find it easier to pay attention to technology teaching. It is a fact that students with autism spectrum disorder are visual thinkers, and technology helps students access information in a simpler manner. Hence seeing pictures and listening to various noises and sounds help them in understanding. Sometimes various sounds are used to get a reaction out of the students because they react differently to different sounds (Lofland, 2018).

Given the fact that computer-based technology usually has either videos, pictures or sounds involved, there is no doubt about the fact that computer or technology-based teaching attracts students with autism spectrum disorder. Study has shown that computer-based technology has a positive impact on students. Students also prefer engaging in technology-based teaching more frequently than sitting in a classroom as their attention span is very limited considering their pattern of growth. Five technologies used in the particular study were tactile and auditory prompting devices, video-based instruction and feedback, computer aided instruction, Virtual reality and robotics (K goldsmith & A Le Blanc, 2004).

CHAPTER3

METHODOLOGY

3.1 Research Questions

This research paper gave rise to four major questions which the researcher intends to find during the course of this research. The questions are:

- How have technological advancements changed the techniques of teaching?
- How have smart phones, iPad and smart tablets enhanced instructions delivery in classroom teaching for children with ASD?
- Has technology teaching helped children with autism become more independent?
- Can ITCs be used as a main tool for educational fulfilment for children with autism spectrum disorder?

3.2 Research Objectives

- To understand whether technological advancements have changed the ways and techniques of teaching.
- To understand if smart phones, iPads and smart tablets has enhanced instruction delivery in classrooms teaching children with Autism Spectrum disorder.
- To understand if the using technology in teaching children with ASD has helped them in becoming independent.
- To explore how ICTs can be used as a tool for enhancing the educational fulfilment and general development of children inflicted with Autism spectrum disorder

3.3 Population of the Study

The target population of this study are men and women who either teach children with Autism spectrum disorder or are their relatives. In addition to this the researcher will also be observing both male and female children with Autism Spectrum Disorder between the ages 5-14 living in Bangalore, India on the basis of how they react when they are being taught with the help of technology.

3.4 Sample of Population

In India alone, the number of individuals with ASD is close 10 million. Every city in India will have a few 1000 people with ASD (Smitha Sairam, Monica Juneja, 2018). It is impossible to study all people with ASD in Bangalore. Hence, this study involves the researcher studying a sample. A sample refers to a small set of a larger population. For this study, the sample of the study consist of 10 individuals who are either related to or teach children with ASD.

3.5 Instrument for Data Collection

Qualitative data collection methods such as interviews and content analysis and quantitative analysis method such as a questionnaire are the most suitable data collection methods. The researcher can ask questions about exactly what she wants to know this way understanding the sample becomes easier. Open ended questions mostly tend to get the opinions of the participant in depth with details while close ended questions always have a yes or a no as an answer and not much information can be gathered from close ended questions.

3.6 Theoretical Framework

For this study, the theory that is relevant to the topic is Technology Acceptance model. By definition this theory is simply about how people come to accept technology and use it eventually. Technology advancements keep happening, as and when they progress people across the globe start accepting it and slowly start using it on a regular basis. Today, most of us feel incomplete without our electronic gadgets. Similarly, Technology is becoming an integral part of teaching children with Autism Spectrum Disorder. Advanced and innovative technology is bringing about a huge change in the way a person with a disability lives when compared how they used to live. They now have assistive technology which makes their lives simpler. The primary objective of Technology is to help people with ASD become more independent and self-sufficient and help them come out of their social awkwardness and isolation.

CHAPTER 4

DATA ANALYSIS

4. Interview analysis

4.1 Coding

A code in qualitative inquiry is most often a word or short phrase that symbolically assigns a summative, salient, essence-capturing, and/or evocative attribute for a portion of language-based data. The data can consist of interview transcripts, participant observation field notes. The portion of data to be coded during First Cycle coding processes can range in magnitude from a single word to a full sentence to an entire page of text. In Second Cycle coding processes, the portions coded can be the exact same units, longer passages of text, and even a reconfiguration of the codes themselves manually developed thus far.

4.1.1 Personal attention

Children with Autism spectrum disorder often require personal attention. If they use only technology, they will get so used to avoiding contact or conversation with humans. They will completely withdraw themselves and not talk at all if personal attention is not given to them. Personal attention, human touch and manual teaching is preferred by most parents when compared to technology teaching. Even if a Child with ASD is learning with the help of technology, both parents and teachers prefer someone supervises what the child is viewing or listening.

4.1.2 Socializing skills

Technology can help in improving a child's communication skills to a large extent. Technology helps in reinforcing whatever a child has learnt. When something is played constantly the child tends to gradually pick up vocabulary from what they keep hearing or listening to. These children usually shy away from social situations because of bullying and the fact that they aren't like other children. But as they start using technology a sense of pride and confidence builds inside them as they think they can also do what children without special needs can do. Smartboards or interactive boards should be able to build a lot of social skills as they are mainly being used to teach and engage with various aspects of the society. Aspects such as good touch and bad touch, behavior, responding with simple words such as yes and no can be taught using technology and this helps the child's social skills.

4.1.3 Differently abled

Children with Autism spectrum disorder are all made differently. Hence, there is no way that all the children will react in the exact same manner when they are taught with technology. Some might be very enthusiastic about it while a few of them might not want to even touch it. Some children just want one teacher to talk to them constantly. The capabilities vary from child to child, at the same time it also depends on what stage of mental disability they are on and where do they fall on the spectrum. There is no one particular way of teaching children with Autism. There is a different method to teach every child depending on how the child reciprocates.

4.1.4 Attention span

Using technology to teach children with can increase the concentration of children with ASD. Grabbing the attention of these children can be a daunting task. Children on the autism spectrum get bored within five to ten minutes no matter which subject one is trying to teach them. The moment they see lights, listen to sounds or music or see something moving on a screen they tend to pay attention for a longer duration. The concentration is stronger when using technology, they are also a little less restless and they find it easier to sit in one place for longer hours. Technology can not only get the attention of a child with ASD it can also help retain the attention of the child thereby increasing the child's concentration.

4.1.5 Indian context

Some of the technologies used to teach children with ASD aren't available In India and it can be very expensive to import them from other countries. Not all schools that teach child with ASD can afford to spend so much as most of these schools run with the help of charitable funding. A major of the Indian population is Middle class or lower middle class and hence not all parents can afford to buy their child technologies such as laptops or tabs. They are already spending a lot of money on therapies and treatments for their child with Autism. Although technology can be helpful for a child affordability becomes an issue because even the most basic technology is expensive. Only one out of ten parents know what pet therapy means. The rest of them don't

even know that such a therapy exists because this has not been popularized in India as most Indian households have inhibitions about bring a dog near a child. Parents don't even know the various ways

4.1.6 Addiction

As much as technology can be a very helpful tool to teach children with ASD, parents are equally scared of the fact that their child might get addicted to technology and might completely withdraw themselves from socializing. If they get very comfortable with technology, they might never speak to anyone again. These children are usually shy and timid without proper supervision and personal attention technology can become an addiction to most children which can further lead to other issues such as lack of exercise due to sitting in only one place while using technology and can also add a lot of stress on the eye. Parents also believe that using too much technology can deteriorate the brain function of their child hence they don't encourage extensive use of technology while teaching children with ASD.

4.1.7 Channelize

Each child with ASD is different from one another. No two children with ASD are exactly the same. Similarly, their interests might also differ from each other. Some might be interested in music and hence might use technology to listen to music where as a child who is interested in dancing, might use technology to see programs in the genre. Children with Autism Spectrum Disorder are creative in their own way. A child might use technology to play educational games or video games. All these children are using technology but in different ways. It is important to channelize the child according to his or her interests.

4.1.8 Independence

Children are more independent after using technology. Some children can even start a conversation by themselves now leaving aside their insecurities and fear of socializing as technology helps them with improving their communication. There have been cases where a child has improved with the help of technology to the extent where he can go to the shop by himself, calculate the bill amount and the change too be brought back using a calculator on the phone. While teaching a child with technology sometime the teacher doesn't have to constantly be around because technology is self sufficient in retaining the child's attention. But there have also been cases where the child has been using technology for a while but still hasn't shown any sign of independence or improvement.

4.1.9 Technology

Parents prefer their children using technology to learn but not at the cost of their children getting addicted to technology. There are so many technologies out there, different schools use different technologies and the technology that children use at home also vary from parent to parent and their affordability. Using technology to teach a child with autism is a step by step process because they have to get used to it. First, they have to learn how to use the keyboard and get used to where the alphabets are then, slowly they can start using mobile phones and understand the difference between keyboards and keypads after which they can start using

technology on a regular basis say to call people or send them texts in cases of emergencies. With the help of technology one can break down concepts and show it in a pictorial way as a story to children which helps in better understanding. Interactive technologies such as smartboards are extremely helpful. When there is student engagement in class and most of the students participate it at least helps the child to come out of their bubble. For example, while teaching a child about the upper jaw and the lower jaw, it's easier when the concept is broken down and taught to them. If the same concept has to be taught to them manually a teacher will have to touch their jaws and explain to them and most of these children don't like to be touched. Technology works as a boon in such situations.

4.1.10 ICTs

Information communication technologies work wonders only because it eliminates touch. Touch is the one thing that students with ASD hate the most. They are not comfortable with anyone touching them. ICTs can be introduced at any given age to teach a child with autism spectrum disorder but what has to be kept in mind is the content they are exposed to. There is no particular age or mental stage where ICTs can be introduced to children with ASD. ICTs can be used to teach small things such as behavior, colors and shapes. If school for special child used smart boards for teaching children, they can also play rhymes or other videos during breaks from studies which helps learning become more fun. Children autism are visual thinkers and ICTs help in building their curiosity as they are watching something on a smart board. The more questions they ask they more is the effect of the technology on them.

4.2 Field observation

The researcher observed two classrooms over two days. The researcher was given permission to be in the class only for ten minutes to observe how children with autism react when they are being taught with the help of technology. The two classrooms that the researcher observed were in two different schools both of which are in Bangalore and use technology to teach children with autism.

Classroom A

There were ten computers placed on computer tables with individual chair for each of them. In the center of the classroom there was an overhead projector and screen right in front of it. In a corner next to the screen was a chair and a desk for the teacher. There were ten students between the age groups 10 and 15 out of which 8 were boys and 2 were girls Students were being taught shapes. As and when the teacher showed a particular shape and said what it was called, students were supposed to find the same on a lesson plan opened on all of their systems. (for example; This is a triangle, can you all stop the triangle on your screens?)

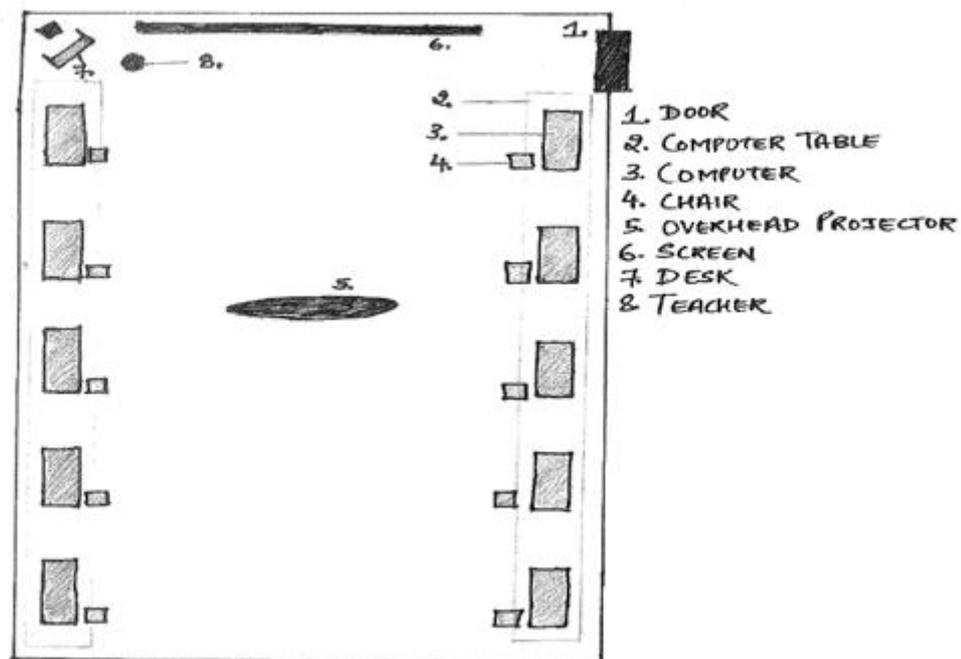
The researcher found that the teacher was finding it extremely difficult to handle the classroom as the not all children were understanding what she said and some children got very restless and started walking around the class and disturbing even other students.

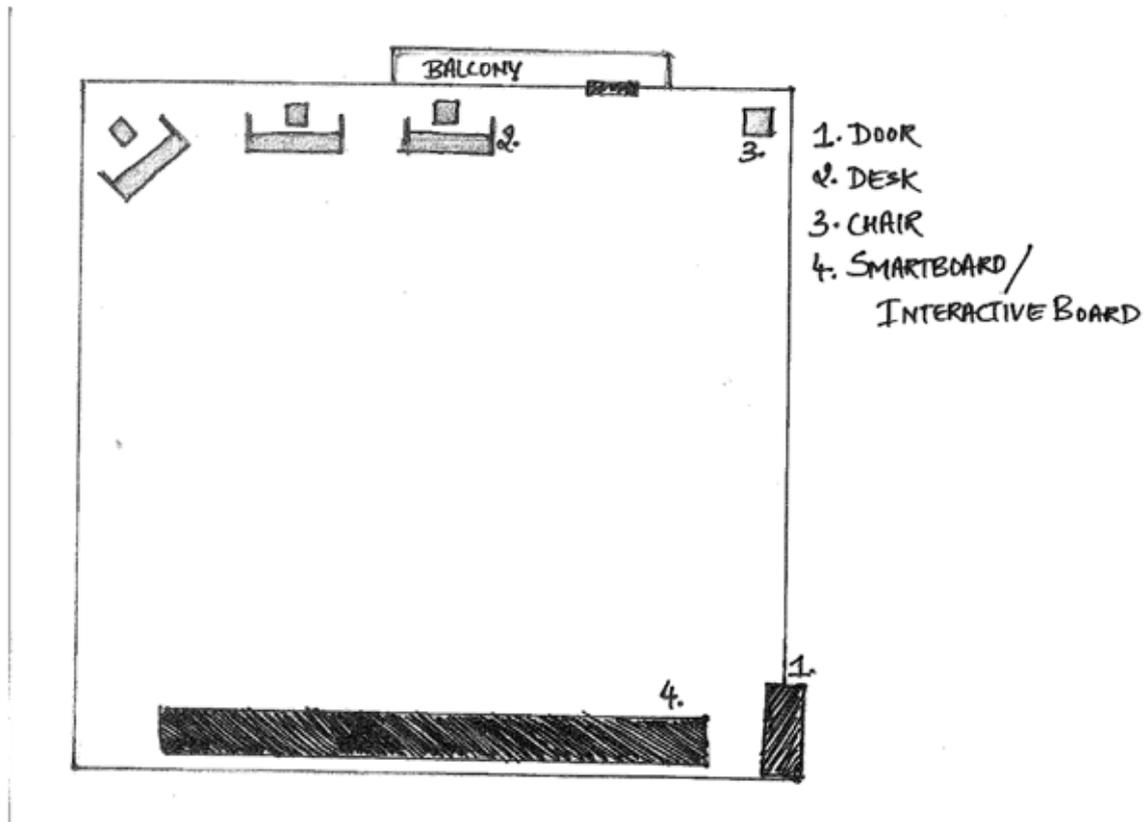
Classroom B

A classroom was slightly smaller but spacious with minimal furniture and only three students, all of which were girls and one faculty. Students were between the age groups 10-14. The teacher used a interactive board or a smartboard to teach children here. The board was touch enabled and a stylus was used on it. One of the students was asked to walk to the board which had an image of a tooth on it. Prior to this she was taught a lesson on the same tooth. She was asked to identify the crown and the root of the tooth and highlight the two parts of the tooth in two different colors with the help of the stylus. The researcher observed that at first the student was hesitant to walk up to the board and complete the task assigned to her but eventually she did go up to the board and complete the task assigned to her and finished it correctly.

After this field study the researcher found that even with the use of technology to teach students with autism, it is important that these students get a little bit of personal attention as well while teaching. Children with ASD have very low attention spans and if they don't have someone checking on them constantly, they will get distracted very easily. The first classroom that was observed had ten students and just one faculty which is why the teacher was finding it extremely difficult to control the classroom and teach them at the same time. Where as on the other hand, in the second classroom that was observed there were only three students and one teacher so the teach was finding it comparatively easy to handle the students. The researcher observed all students do not understand the information that is given to them immediately. The content has to be reinforced constantly into the mind of these children with special needs.

4.2.1 Representation of classroom A





4.2.2 Representation of classroom B

CHAPTER5

CONCLUSION

The knowledge people have about the autism spectrum in Bangalore is very limited. People are unaware of the fact that there are online portals that offer treatments and therapies online. Parents who are aware of it as well avoid taking treatments and therapies online as they are hesitant to give out a lot of personal information online as they fear fraud. Parents in Bangalore are aware of only speech therapy, touch therapy and occupational therapy. The fact that something called pet therapy exists came as a shock to most parents again pointing out the fact that parents in Bangalore are unaware of most of the treatments and therapies that are out there which may prove to be really helpful for a child with autism.

ICT enabled education can be considered both a boon and a bane depending on the context of its use. When it comes to teaching children with autism any method of teaching isn't considered a definite method of teaching because each child is different from one another. ICT enabled education can prove to be helpful if it is used only for a limited amount of time and only to teach certain things. Everything cannot be taught using technology. Some aspects such as how to shake hands with another person, how to eat without spilling, how to

eat using a spoon etc. have to be taught manually giving them the privilege of special attention. Concluding the study, ‘An exploratory study tracing the impact of ICT enabled education among students with autism in Bangalore’, ICT enabled education can be helpful for a student with Autism while teaching them concepts keeping in mind that the child should have access to technology only for a limited period of time.

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