A Survey on Techniques used for the Therapy of the Autistic Children

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Abstract: *Autism spectrum disorder (ASD) has become one of the most prevalent mental disorders over the last few years and its prevalence is still growing every year. It is a serious developmental disorder that afflicts children and that is more common than childhood cancer. The disorder is characterized by a wide variety of possible symptoms such as developmental disabilities, extreme withdrawal, lack of social behaviour, severe language and attention deficits, and repetitive behaviours. The symptoms intensity ranges from almost unnoticeable to very severe. Because of this wide variety of symptoms and intensity, therapy needs to be individualized for every person. On the other hand, the most recent application of virtual reality is the interface to e-learning applications, which is also known as virtual reality based e-learning tool. The potential of virtual reality tool is demonstrated by its ability to facilitate learning processes while avoiding many problems characterizing traditional or conventional teaching learning methods.*

Keywords: *AUTISM spectrum disorder, virtual reality, e-learning tool*

I. INTRODUCTION

Therapeutic interventions that leverage information technology (IT) are still in their infancy in this area. The researcher's a like point to the need for more research and applications to help integrate autistic persons in society and help them and their families achieve a higher quality of life. They argue that it would be most beneficial if computer-aided learning software would focus on three main impairments: social and interpersonal skills, communication difficulties, and rigidity of thinking. The research can be classified into these three groups. Social and interpersonal skill training refers to helping people with autism understand why other people behave as they do. Others focus on the second impairment: communication. The use of information technology varies from approaches that use low complexity technology, from the therapist's point of view, to high complexity. Others trained autistic people to point to pictures to aid communication. Even more technology-intensive are simulations used to teach verbal communication or social robots for diagnosis and treatment. Finally, there are also attempts to address the third major impairment: rigidity of thinking. However, compared to fields such as biology or commerce, information technology is much less used to capture and analyze the impact of interventions on a large scale, i.e. the impact of therapy on behaviours. Thus, the research uses advanced data mining approach to study systematic differences, or the lack thereof, in therapy outcome for autistic children.

Virtual reality enables e-learners to visualise the learning process, manipulate findings with relative complex sets of data and interact with current technologies (Kadir & Xu, 2011). The visualization process refers to visual representation in computers, auditory components or any other forms of sensory outputs displayed in a virtual world. According to Abdul-Kader (2008), the virtual reality can be classified into three categories; desktop virtual reality, fish tank virtual reality and immersive virtual reality. Additionally, he concluded that applications of virtual reality have the potential of developing into a wider spectrum, which can diverge from entertainment purposes to educational purposes.

A multitude of e-learning educational systems that were developed recently incorporates virtual environments. Most of the medical and scientific subjects are the leading e-learning applications that use virtual reality technology (Dimitropoulos et al., 2007; Huang et al., 2010; Albeanu, 2008). With this in mind, many virtual classrooms are set up to facilitate virtual learning in educational institutions and training centres. It is also noted that over the years, advancement in the virtual reality technology has opened up numerous application possibilities such as providing guidance for disabled children (Albeanu, 2008; Reid, 2011; Kandalaft et al., 2013). Therefore, in a hope of broadening the studies that have already been done, this research focused on enhancing and facilitating the learning process of the specified target group of autistic children.

Several countries abroad have been implementing caretaking service centres and nurseries to assimilate an education for these children with special needs. Therapy to assist autistic children's parents and caretakers to educate the autistic children effectively. Most of the children in these facilities suffer from poor social interaction, lack of communication skills, and portray unusual and distinguishing behaviours similar to the scenario elaborated by Zander (2004). On account of such issues, some specifically designed teaching methods

have been made available to allow autistic children to learn better, for example; applied behavioural analysis (ABA), treatment and education of autism and related communication handicapped children (TEACCH), floortime, social story, and picture exchange communication system (PECS) etc. (Selpa & Marin, 2001).

Despite of all the possible advantages of implementing virtual reality based tools the teaching methods stated above still possess various disadvantages. These disadvantages could include any of the following: requiring special guidance, skills domination, imagination problems, equipment storage and deterioration of storage medium (Selpa & Marin, 2001). However, most researchers have considered virtual reality based learning tool to be an effective tool for autistic children to facilitate the teaching learning process (Albeanu, 2008; Reid, 2011; Kandalaft et al., 2013). To add on, VE provides great potential for people with autism because users can play a role in an environment designed to imitate definite social situations. The increasing sophistication of VEs means that skills and tasks can be practiced in realistic settings. This has been identified as an approach that gives encouraging support to enhance the children's social skills (Strickland et al., 1996).

Autism is a spectrum of closely-related disorders with a shared core of symptoms. Every individual on the autism spectrum has problems to some degree with social skills, empathy, communication, and flexible behaviour (Mesibov et al., 2000; Happé & Frith, 1996). Due to this, to educate autistic children on social skills, a flexible and interactive teaching method or technique should be established. This learning style must be an enjoyable learning process that allows them to gain more and experience the real scenario via the implemented system. However, the majority of the prevalent methods of teaching aids available to autistic children have certain drawbacks in terms of enhancing social skills. Alternatively, there are many applications available online to serve this purpose, but it might be time-consuming due to the time required to download such applications. Additionally, it might also require more digital storage space depending on the size of an application in certain mobile devices. In Malaysia, mobile technology is an emerging technology and is gaining wide popularity. However, this technology is not owned by the majority and therefore there is some limitation to the access of smart phone applications that cater to needs of autistic children. It has been observed that many parents do not own smart phone technology to provide behavioural training to their autistic children via virtual reality based behavioural training and learning resources due to the high cost.

Several online applications also demand the user to spend more time in constructing a social story, whereby, the user is required to create a virtual environment for a specific behavioural training. Apart from that, it is not an easy task to obtain a suitable graphic to be used as a teaching and learning material for autistic children. However, it is important to use effective graphics in the virtual environment as it is a more appealing tool for teaching these children. Hence, pictures used should be realistic and cater to educational needs (Simon et al., 1986).The research aimed to create a virtual environment for autistic children that includes a virtual agent which can role play to educate autistic children on 'how to behave' at specific places or scenarios. Aligned with this, the derived objectives of this research are as follows:

• To identify the virtual environment (VE) needed for the behavioural learning process of autistic children;
• To ascertain the virtual environment (VE) requirements to educate autistic children; and
• To evaluate the prototype for virtual reality based learning application which includes virtual agents.

II. RELATED WORKS

Bishop, (2003)[1] investigated on Social and interpersonal skill training refers to helping people with autism understand why other people behave as they do. He is working on a tool that can help an autistic person better understand social situations by using a mobile phone to provides translations for phrases such as "cat's got your tongue?" This phrase does not make sense when taken literally, which many autistic persons would do. In a small study they evaluated how the system would be received and found that people with autism would find it useful.

Dauphin et al (2004)[2] & Miller et al (2006)[3] Dauphin et al focused on Communication and the use of information technology vary from approaches that use low complexity technology, from the therapist's point of view, to high complexity. For example, Dauphin et al used PowerPoint slides with video segments to teach sociodramatic play. Others trained autistic people to point to pictures to aid communication. This approach has been taken a step further by Miller et al who developed a communication system for use with personal digital assistants. Even more technology-intensive are simulations used to teach verbal communication or social robots for diagnosis and treatment.

Rajendran & Mitchell (2000)[4] tried to improve interpersonal understanding and understanding of mental states of others with the Bubble Dialogue program. They trained children with sperger's syndrome, i.e., high-functioning individuals with autism. A virtual reality based learning tool that includes a virtual environment (VE) and virtual agents is an effective method to support the social communication skills of children with autism. In such conditions, where social skills can be practiced repeatedly, the result possess a less threatening, less social challenging, more controllable and comfortable process when compared to a face-to-face

communication scenario .Besides this, it also allows the user to truly see on the screen rather than how the environment is actually encountered in real life.

Happé & Frith, 1996; Wing & Gould, 1979; Wing, 1998 in their paper Autism is comprised of severe enveloping impairments in several important areas of development in a person. These impairments could be any of the following examples; social interactions, communication, behavioural, and imaginative.

Sallows & Graupner, 2005; Pinker, 1999 in their paper The majority of autistic children encounter learning difficulties, even though some might have been equipped with an average intelligence .The disability of these children can also fall under the categories of epilepsy, visual and auditory problems.

Mesibov et al., 2000 in this paper Autism is related to the behaviour of a person as an effect of unknown biological dysfunctions of the brain that has consequence on the development or reaction of the brain while handling information. This dysfunction can range from issues that lie between any of the received information, processed information or even interpreted information.

Zander, 2004 ., In his article entitled "Introduktion om autism", asserted that social interaction is a main issue encountered by autistic children, whereby the children have difficulties in conducting eye contact, body language, facial expression, and modulation.

Besides this, he also concluded that the level of seriousness in autistic children varies from one individual to another in terms of intelligence and learning ability. This might be due to several causes such as depression, the nature of the autism disorder, epilepsy, genetic symptoms, etc. Hence, the need to develop an attractive and an effective method to teach these children arises. There are several effective teaching methods identified to be used while educating these autistic children.

III. FUTURE ENHANCEMENT

Some research topics trained children with sperger's syndrome, i.e., high-functioning individuals with autism. A virtual reality based learning tool that includes a virtual environment (VE) and virtual agents is an effective method to support the social communication skills of children with autism. More teaching methods related to communication brings out development for the autistic children.

IV. CONCLUSION

In this survey we had projected various feature on, VE provides great potential for people with autism because users can play a role in an environment designed to imitate definite social situations. The increasing sophistication of VEs means that skills and tasks can be practiced in realistic settings. This has been identified as an approach that gives encouraging support to enhance the children's social skills

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