

Designing collaborative virtual environments for children on the Autism Spectrum

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1. Overview

This paper outlines the examination of a Collaborative Virtual Environment (CVE) as a computer aided learning tool for children with symptoms typically associated with a diagnosis at the moderate to severe side of the autism spectrum. A CVE was co-designed with children with autism, their parents, teachers and other caregivers.

2. Background

Autism Spectrum Disorder (ASD) is not a single disorder, but a spectrum of closely related disorders with a shared core of symptoms around social interaction and communication skills, and the presence of fixed or repetitive behaviours [7].

There is a general perception that people with autism demonstrate an affinity to computers and the use of technology and the success of computer based learning and training has been well documented in the literature [6]. However, many of the recent developments reported, have been focussed on finding solutions for children considered to have High Functioning Autism. Over the course of the past decade an increasing corpus of research has pointed towards the potential of virtual reality (VR) technology or "virtual environments" for education of children with learning, social or physical impairments. Virtual reality has been defined as a type of computer-based technology that offers three-dimensional, real-time virtual environments (VE) that can be used to simulate real or imaginary environments. Studies have examined the use of collaborative virtual environments by children on the autism spectrum to support learning and development in domains such as, life skills [5], eye-gaze, turn taking, joint attention [2], role play and empathy [1].

3. Methods

3.1 Participatory Design

A participatory design (PD) approach was adapted for use by a group of children with ASD and their carers to evaluate three prototype collaborative virtual environments. PD is a design approach that actively involves multiple stakeholders (children, parents,

teachers, therapists and others) as participants throughout the design process. To this end, Frauenberger et al.[3] highlight the importance of employing design approaches that facilitate the active inclusion of end users.

3.2 Participants

A convenience sample of 5 children with a confirmed diagnosis of ASD and 8 adults (3 teachers, 1 Speech and Language Therapist and 4 carers) from a Special Education Centre were selected to participate in two design workshops.

3.3 Workshops

Based on the work of Guha and her colleagues [4] the ORIP (*Observe, Record, Interpret, Propose*) methodology was designed to provide researchers with a structure by which to engage children with the prototype technology in question, record their experiences and make proposals for further design iterations. All proposals were passed then to a team of designers and were evaluated in terms of their design applicability.

3.4 Ethical statement

In preparation for this study all ethical approval procedures were complied with.

4. Results

Table 1, below outlines the proposals per child and the cumulative proposals. These are categorized as 1) discarded, 2) for immediate action and 3) for future work.

5. Discussion

The results above suggest that although a large proportion of design proposals generated by participants were discarded, there were however up to 29% of proposals that were included in the first prototype revision and a further 23% were scheduled for inclusion in the final revision cycle.

6. Conclusion

This study was concerned with the inclusion of children with ASD as evaluators of presented prototypes. The methodology developed to facilitate their inclusion did

provide a structure to assist designers in the translation of user feedback to new design iterations. It must be stressed however that this study was focussed on providing a structure to only one particular phase of the design process, namely that of prototype evaluation. Further development of similar methodologies facilitating inclusion in other phases of design will form the basis of future work.

7. References

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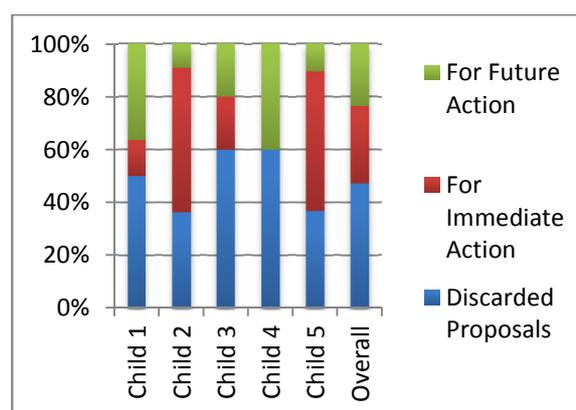


Table 1 : Designer Evaluation of Participant Contributions