



Queensland University of Technology
Brisbane Australia

This is the author's version of a work that was submitted/accepted for publication in the following source:

[Abdullah, Muhammad Haziq Lim & Brereton, Margot](#) (2012) A child led participatory approach for technology-based intervention. In Tunstall, Elizabeth & Clausen, Mads (Eds.) *2012 Participatory Innovation Conference Digital Proceedings*, Swinburne University, Swinburne Lilydale Conference Centre, Melbourne, VIC, pp. 1-5.

This file was downloaded from: <http://eprints.qut.edu.au/48155/>

© Copyright 2012 MUHAMMAD HAZIQ LIM ABDULLAH & MARGOT BRERETON

Copyright and all rights therein are maintained by the authors or by other copyright holders. It is understood that all persons copying this information will adhere to the terms and constraints invoked by each author's copyright. These works may not be reposted without the explicit permission of the copyright holder.

Notice: *Changes introduced as a result of publishing processes such as copy-editing and formatting may not be reflected in this document. For a definitive version of this work, please refer to the published source:*

A CHILD LED PARTICIPATORY APPROACH FOR TECHNOLOGY-BASED INTERVENTION

MUHAMMAD HAZIQ LIM ABDULLAH
QUEENSLAND UNIVERSITY OF TECHNOLOGY
MH.ABDULLAH@STUDENT.QUT.EDU.AU

MARGOT BRERETON
QUEENSLAND UNIVERSITY OF TECHNOLOGY
M.BRERETON@QUT.EDU.AU

ABSTRACT

There is significant interest in Human-computer interaction methods that assist in the design of applications for use by children. Many of these approaches draw upon standard HCI methods, such as personas, scenarios, and probes. However, often these techniques require communication and kinds of thinking skills that are designer centred, which prevents children with Autism Spectrum Disorders or other learning and communication disabilities from being able to participate.

This study investigates methods that might be used with children with ASD or other learning and communication disabilities to inspire the design of technology based intervention approaches to support their speech and language development. Similar to Iversen and Brodersen, we argue that children with ASD should not be treated as being in some way “cognitively incomplete”. Rather they are experts in their everyday lives and we cannot design future IT without involving them. However, how do we involve them?

Instead of beginning with HCI methods, we draw upon easy to use technologies and methods used in the therapy professions for child engagement, particularly utilizing the approaches of Hanen (2011) and Greenspan (1998). These approaches emphasize following the child’s lead and ensuring

that the child always has a legitimate turn at a detailed level of interaction.

In a pilot project, we have studied a child’s interactions with their parents about activities over which they have control – photos that they have taken at school on an iPad. The iPad was simple enough for this child with ASD to use and they enjoyed taking and reviewing photos. We use this small case study as an example of a child-led approach for a child with ASD.

We examine interactions from this study in order to assess the possibilities and limitations of the child-led approach for supporting the design of technology based interventions to support speech and language development.

INTRODUCTION

The use of technology-based intervention holds great promise for better support and service of children with learning disabilities. Technology-based approaches that can profile abilities and encourage and track development can potentially improve individualised intervention to support each child. Today, there are estimated to be about 650 million children with disabilities, which is about 10 per cent of the population for all ethnic groups, genders and cultures. Children with learning disabilities are categorised as living with Autistic Spectrum Disorder (ASD), Cerebral Palsy, Down Syndrome (DS), Dyslexia and Attention Deficit Hyperactivity Disorder (ADHD) (National Dissemination Center 2009). Autism is a disorder of lifelong neurobiological disabilities characterised by impaired socialisation, communication, restricted and repetitive behaviour and sensory abilities. The ratio of children diagnosed with ASD is about 1 in 110 and it is more prevalent in boys

than girls (Autism Spectrum Australia 2011). However, approaches to investigating how to elicit requirements for technology-based support from children with learning disabilities are very limited, particularly when looking at the speech and language impairments.

Provision of support to children with learning disabilities is challenged in many countries by poorly structured guidelines, non-integrated intervention support and services, and the shortage of speech therapists to sustain interventions and apply what is learned in the speech therapy setting. Moreover, parent participation and child led interaction play a significant role in enhancing communication and the development of language skills. As a result, this research seeks to support technology design for models of team-based care that support active participation of the child and their family in working with healthcare therapy and education professionals.

Approaches to designing technology support for children with disabilities can be found in literature in various fields ranging from Human-computer interaction (HCI) to design by the health professions. However there appears to be little crossover, and, in particular, our own discipline of human-computer interaction and design does not draw significantly on the literature and practices from experienced therapy professions. While the HCI literature urges a more child-centred approach, the Hanen approach used in the therapy professions has for many years focussed on showing parents how to let their child lead in the development of their speech in a profound manner.

Research in the Human-Computer Interaction field has tended to focus on standalone applications to support specific skill development, such as the development of social skills. In some cases, this research engages with sophisticated technologies such as tabletop computing in order to engage group play among children with autism.

While this research generates insights into how to support skill development, expensive or bulky technologies or complex applications constrain their use to specific times and particular classroom or social settings. Instead, our research focuses on more mundane technologies that can work across the contexts of home, school and the therapist office, so that they might encourage participatory innovation and communication within the support network (parents, teachers, therapists, etc.) of the child, centred on content created by the child. This is a less studied but critical aspect of research, because much living takes place and many learning opportunities arise away from specialist technologies and settings.

A number of methods have been used by researchers and practitioners for working with children and children with disabilities to elicit requirements. The prominent methods draw upon co-operative inquiry, participatory design and contextual inquiry approaches. Moreover these approaches draw upon tangible materials in order to facilitate the child's expression based upon their own experience, because, as Druin

pointed out, children may have a difficult time in abstractly describing what their technology needs and wants may be. Druin (1999) developed co-operative activities between children and researchers to explore design requirements and adapting strategies to facilitate child involvement. However, Iversen and Brodersen (2008) argued that in order to elicit requirements from the children's perspective it is important to gather user requirements in the geographical and social context of the children in an open-ended study. The lack of an artificially created context will tend to lead to more natural adult-child communication that is part of the social practice, whatever it may be.

When children have communication difficulties it is important to ensure engagement at the level of each interactional turn, rather than at the much broader levels of who makes decisions, or how participants dress. The Hanen (2011) and Greenspan (1998) approaches address this by ensuring that children get a legitimate turn in interactions as one might see in any typical conversation analysis.

In the case of children with communication disabilities, a lot of attention must be paid to ensuring the child is given the opportunity to take turns and to lead. Even though the child may not be able to conduct a meta-level or reflective narrative to discuss an activity that they have undertaken, the child, by their actions in the moment fully contributes to the interaction, and it is these actions themselves in the context, that guide therapeutic or design interventions. It is the child doing what they do in that situation.

With children with autism, a lot of concentration must be given by a child to process the information from questions, so care must be taken when asking questions in conversation. At early stages of communication, it is important to use short sentences and only one question at a time in order to simplify the amount of information that needs processing. Therefore appropriate sentences asking by adult will spur the communication skills among children with autism.

HANEN APPROACH

The Hanen Approach (HA) is an early intervention approach by parents to facilitate development of their disabled child's abilities. This approach highlights the child's unique needs through natural environments, which will lead to a better outcome with the support of the important people in their lives (Hanen Parent Approach 2011). Baxendale and Hesketh (2003) conceded emphasize the importance of parent participation in the early intervention in speech and language therapy to maximize the remediation outcome.

The Hanen approach is appropriate for implementation among children with disabilities because the programme empowers interaction between parents and their children. Therefore, the extensive style of the parents can enrich the speech and language development among children with disabilities. The Hanen approach emphasises the child's lead to

establish and develop a topic with joint attention being crucial. However, an appropriate approach for certain families, interaction strategies and style requires a deep understanding of intervention (Baxendale and Hesketh 2003). The most prominent way to encourage the child to communicate is to follow his or her natural interest in an ordinary setting. That is, joining in and playing on the same level as the child, looking into their eyes and waiting for the child to take their turn is an essential strategy to empower child-led interaction (Hanan Parent Approach 2011). Although a parent cannot interpret the child's mind, the parent can ensure a continuous flow of communication by observing their child's body language and noticing where they are looking, reaching or pointing. The parent's role is to elicit interaction. Some typical roles adopted by parents tend to stifle interaction. Being too enthusiastic, the parent may become an entertainer or director and unintentionally limit the child's ability to participate. The Hanan method identifies roles that stifle interaction as a means of generating awareness of them and discouraging them. The Hanan and Greenspan Floortime therapy approaches are part of a social practice of developing speech and language in children with communication difficulties, which focuses upon the children's competences, whatever they may be in order to enable them to take a turn.

One of the potential approaches for eliciting requirements for the design of new technologies is through involving the child as an active partner rather than as a tester or informant (Lathan et al. 2001). Guha et al. (2008) argued that involving children with disabilities in the design process requires considerations, such as the level of involvement, level of severity and support intensity. However, from the perspective of child-led approaches, the appropriate interactional turn is guided by the child's interaction, whatever interaction they are capable of.

Our study explores a child led activity across the home and school contexts (and in future, therapy settings) in order to elicit requirements for technology supported interventions from children, parents, carers, therapists and teachers, which support the child to move between these relationships and settings.

AN EARLY EXPERIMENT IN CHILD LED INTERACTION USING PHOTOS PROBE

The authors have experience in interacting with children with disabilities. Building upon this, we conducted a 90 minutes interview with two teachers and a parent at a special education unit in order to explore how we might support a child communicating across the settings of home and school and the relationships of parent and teachers. The teachers discussed how photos were used a lot in class and were popular with children, and suggested that an interesting activity for the child might be to discuss photos that they took both at home and a school with people in each setting.

A small study was conducted in which a child with ASD used an iPad to take photos at both the school and

home and to show and discuss them in each setting. When the child discussed the photos of school at home, one parent used an iPhone to record the interactions around the photos. The idea was not to have a formal recording setup but just occasionally to record snippets of video that might be useful to reflect upon. The activity had been ongoing for four weeks at the time of reporting in this paper. Each week approximately 5 minutes of parent-child interaction about photos was recorded. The transcript below was taken from the first week of activity. Below we analyse the interactions that occurred in the sharing and discussion of the photos in the home setting, and see how the photos are used to engage discussion across settings and across child, teachers, classmates, and parents, as shown in Table 1. We emphasize that this analysis is preliminary.

RAW DATA				DATA ANALYSIS
Video	Time	Whose Turn Taking	Activities	Interpreting the Turn
1	00:16	Child	Utterance	Use the same utterance "erm...erm" to grab attention
	00:21	Child	Flicking	Flicks photos repeatedly to attract attention
2	03:30	Child	Same Sentence	Uses same sentence "tow truck pass go pardon me" repeatedly to attract attention.
	03:35	Child	Repetition	Picks the same photo that he is interested in.
	05:11	Parent	Pointing	Points to a picture to enhance and engage in interaction and communication
3	01:05	Parent	Choosing	Directs the interaction based on the parent interest and not child's
	01:55	Child	Body Language	Protesting is a sign of the child's disinterest
	02:37	Child	Cues	Use same cues to match child's interest in communication
	03:45	Child	Running Off	Child disengages

Table 1: Interpreting the turn taking between parent-child communications.

From analysing the video we found that when the parent did not focus on the topic of interest to the child, the child had a pattern of uttering 'erm erm' to grab the parent's attention. The child used the same sentence repeatedly, apparently waiting for the parent to respond to engage in communication.

When the parents did not join in the interaction, the child kept flicking the photos repeatedly, possibly to grab the attention of the parent for his interest in the photos activity. When the parents selected pictures based on their own interest, the child showed signs of protest. When the child picked the same photos continually in the interaction, it seemed to show that he has an interest on that particular subject to communicate with his parent; however, curiously this behaviour caused the parent to try to engage the child with a different photo. Finally, when the child could not sustain the interaction the child discontinued participation in communication by moving away from the setting and starting a preferred activity, running around the room.

We examined this behaviour from both the Hanen perspective and the parents' perspective by discussing with one of the parents.

From the perspective of the Hanen method, the child's repetitive pattern of activity during the interaction suggests that the parent should seek to engage with the child guided by this interaction (with the child's preferred photo). In the Hanen method parents are taught to observe, wait and listen to the child's interest as expressed by their turn in order to engage in and enhance the interaction.

By observing interactions closely parents can notice when the child starts to engage his body gestures, such as pulling and protesting, giving cues to follow his interest. It is encouraging if the parent can tune-in based on the child's interest, needs and abilities. Having a balance of interaction will maintain the communication pace longer and match the child's interest. Girolametto et al. (1994) conceded that adults could have difficulty in empowering and retaining the interaction through balanced turn taking with children.

When the interactions were discussed with the parent, the parent, having taken a Hanen course, acknowledged that they probably were not attending well to the child at that time, but also pointed out that they had seen many, many of the child's preferred photo, the truck photo, and had really wanted to see the photos from the cooking class at school. The parent expressed that it was helpful to discuss the video and that it reminded them that they probably should have acknowledged and discussed the truck photo more before exploring a shift to the cooking photo.

We hasten to add that this is a discussion of one video snippet of one child and one parent. The only conclusion that we can draw is that there seems to be some potential in using video of interactions to promote reflection and discussion between parents, teachers and therapists.

Even the small activity of taking photos in each setting for discussion requires significant coordination work. Parent, teacher and child have to remember to pack the iPad for school on some days, to make notes for each other in the notes application, to remember to check the notes section for notes left by others, to discuss photos with the child, to occasionally video those discussions

and then to find a way to discuss them and keep track of everything. We are considering exploring design of an application to support this kind of activity, however we will first undertake an exploration with a few more families to further understand potential benefits and drawbacks.

This small study has helped us to gain a better understanding of how a small design probe led by a child's interests can help to reach across stakeholders and contexts to elicit requirements for supporting children with learning disabilities. The child's photo activity followed the child's interests and was used to engage preliminary discussion across settings and across child, teachers, classmates and parents. The video showed some potential for helping to understand and support development of interaction between parent, teacher and child although further investigation is needed.

CONCLUSION

In summary, participatory approaches involving parent and teachers introduce complexities of coordination, control, privacy and ethical treatment of data. However, these approaches are in many respects more likely to support building applications that can be integrated into the child's lives, than other approaches that limit the activity and context. For situations between and beyond the classroom, these approaches may be particularly useful in eliciting requirements for design.

ACKNOWLEDGMENTS

The authors of this paper would like to thank the parents and teachers involved. Without their support and commitment this study would not have been possible. As with small design probes of this nature it took trust and good will from the stakeholders. We appreciate the readiness shown to trial and test the abovementioned design probe in their settings. The first author would also like to acknowledge QUT and UTeM for the scholarship to pursue this research.

REFERENCES

- Autism Spectrum Australia 2011. Retrieved September 10, 2011, from <http://www.autismspectrum.org.au>
- Druin, A. 1999. 'Cooperative Inquiry: Developing New Technologies for Children with Children', *Proceedings of the ACM CHI 1999*, pp. 592-599
- Baxendale, J. and Hesketh, A. 2003. 'Comparison of the Effectiveness of the Hanen Parent Programme and traditional clinic therapy', *Int. Journal of Language and Communication Disorder*, vol. 38, no. 4, pp. 397-415
- Girolametto, L., Verbey, M, and Tannock, R. 1994. 'Improving Joint Engagement in Parent-Child Interaction: An Intervention Study', *Journal of Early Intervention*, vol. 18, no. 2, pp. 155-167.
- Greenspan, S.I., Wieder. S. and Simons. R. 1998. 'The Child with Special Needs: Encouraging Intellectual and

Emotional Growth' US: Addison-Wesley/Addison Wesley Longman.

Guha, M.L., Druin, A. and Fails, J.A. 2008. 'Designing with and for children with special needs: An inclusionary model', *Proceedings of 7th International Conference on Interaction Design and Children 2008*

Hanen Parent Approach 2011. Retrieve on April 1, 2011, from www.hanen.org/Home.aspx

Iversen, O.S. and Brodersen, C. 2008. 'Building a Bridge between children and users: a socio-cultural

approach to child-computer interaction', *Cognition, Technology & Work*, vol. 10, pp. 83-93

Lathan, C., Vice, J.M., Tracey, M., Plaisant, C., Druin, A., Edward, K. and Montemayor, J. 2001. 'Therapeutic Play with a Storytelling Robot', *Proceedings of the ACM CHI 2001 Human Factors in Computing Systems Conference*

National Dissemination Center for Children with Disabilities 2009. Retrieve on February 20, 2010, from <http://www.nichcy.org>