Exploring Roles of Technology in Co-Design Activities

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Introduction

Within the Social Play Technologies project[1], we co-design interactive playthings with two groups of neurodiverse and neurotypically developing children, aged 7 to 9 years. We investigate how technology can support social play activities in those groups by applying participatory design (PD) methods. In this paper we present preliminary design results of two case-studies in which we elaborate on challenges and moments of success during our co-design workshops with the two different participating groups of children. We will give a brief overview on the roles of technology in relation to communication and discuss which methods we apply to negotiate design decisions between researchers and children.

Roles of Technology in Social Play and Communication

During our workshops we aim to explore different roles technology can have in the social play of children with mixed abilities. In this section we sketch the role of technology as facilitator and supporter for communication.

Technology as communication channel
During the workshops we learned that one group likes to build caves from blankets which they use for pretend play. Based on that, we started co-designing smart textiles that

[1] http://socialplay.at./en

Figure 1: A cave from textiles built by the children.

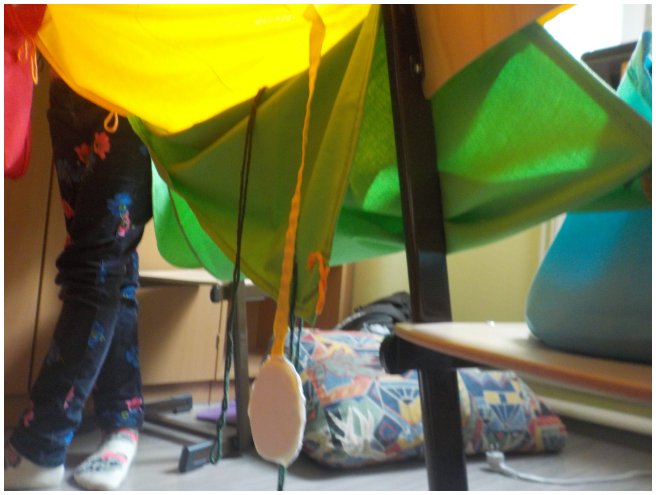

Figure 2: A switch sensor that activates an LED, both integrated in the textiles.

support the children in using their ‘textile-caves’ for social play and communicating with each other. Figure 1 shows the textiles they use to build the caves.

Building the caves in cooperation with others has been challenging for some of the children. Typical issues that occur during the workshops are a lack of joint attention or children shutting themselves out of the collaborative activities and playing on their own. Children also leave the group due to frustration or anger because their classmates refuse to collaborate, act differently than expected or children teasing each other. Hence, communication between the children is full of disruptions for several times during a workshop. As the children have difficulties in recognising and expressing emotions, those situations often end in a melt down that they often cannot overcome in the remainder of the workshop. However, as the children started to build caves, we observed them individually taking up different sections of the resulting architectural construct. They started creating their own ‘safe places’, in which they were separated by the other children’s blankets and created an opportunity space in which they could calm themselves down.

It is still challenging for the children to rejoin the collaborative group activity and communicating with the rest of the group again. To support the children in this, we have integrated communication channels in the textiles. Figure 2 shows a switch the children can squeeze to turn on an LED at the other end of the cave. With one end of the channel connected with the group cave and the other end connected to a cave that is used as hiding place, children can start communicating with the others without immediately

stepping into the action again. Moreover, other children can contact the hidden child without intruding the safe space. By enabling communication with safe channels for interaction, we might be able to kick-start communication or even collaboration among children. Via the safe channels, children can express thoughts or feelings they are unaware of or which are to complex to communicate with words, but by using the lights they can simplify those thoughts.

Communicating with music
In another group, we co-design pressure pads the children can step on to control music that is played via an external speaker. The Wizard of Oz prototype is shown in figure 3. By stepping on the pressure pads the children can manipulate the music in different ways, for example by changing the speed. Other plates activate or stop instruments. When the children started playing with the first working prototype, they discussed whether or not they should find out the function of each plate in a structured way and write it down for future use, so that they can change the music deliberately. We also observed their joy by exploring the functions of each plate. Future designs will have the option to tag each plate and to randomise their functions, allowing the children to choose between both scenarios.

While the children struggled to play together as a group in the first place and find it difficult to use language to exchange their ideas, the technology offers the children an opportunity to interact with each other via music. The pressure pads are intuitive in use, empowering children who are otherwise socially excluded from the group also because they struggle with verbal communication. Our observations indicate that this collaboration is circumventing the need for words or voices by facilitating shared experiences beyond direct communication.

Figure 3: A wizard of oz prototype of the music playing pressure plates.

Methods to communicate design decisions

Another challenge for us as designers is to create co-design activities in which we can negotiate design decisions with the children. We apply a set of methods (cf. [3, 4]) that help us to give the children an active role in every phase of the design process. A fundamental method that forms the basis set-up for all workshops is the design of adult roles along the axes Active Observer and Play Partner. Based on the work of Druin, Feuser, Iversen and Yip et al. [1, 2, 5, 7], we are assigning one researcher the role of an Active Observer, the other the role as Play Partner of the children. The Active Observer organises the workshops and gives the children and Play Partner design tasks. The Play Partner supports the children to participate in the design activities, assisting them with additional knowledge or skills and supports the Active Observer by discussing design decisions with the children. In collaboration with the Play Partner, the children are enabled to communicate their ideas to the Active

Observer, who implements them in the artefact.

A second method that we have applied successfully is the concept of Handlungsspielraum [6]. When working with children with diverse needs and abilities, for example autistic children, upholding the delicate balance between structured activities and offering freedom for the children to generate ideas is necessary. We provide social, physical and mental structures to scaffold design activities, adjusted to the individual needs of each child. The Active Observer makes ad-hoc adjustments to the planned activities when the children need more structure to participate, or freedom to utilize their full creative potential.

We currently face the challenge how to involve the children in the co-design process of technical parts and giving them a feeling of ownership for the co-designed artefacts. At this stage, the children show only little interest in the technology that we implement. Our first attempt to give the children a more active role in the prototyping phase has been a workshop during which we build and redesigned two pressure plates.

Discussion & Conclusion

Through our two case studies we have shown roles of technology to support communication and collaboration in co-design activities with children with mixed abilities. We have developed two concepts for interactive playthings by giving the children an active role in the design process, supporting them to negotiate design decisions among each other and with the researchers, and discussed the methods we already apply to facilitate the participation. However, we are still facing challenges in terms of communicating design decisions, for example in the context of technical implementations. Hence, we are looking for new possibilities to provide a participation space that supports children with social and communication difficulties. This workshop would give us the opportunity to discuss this matter with colleagues interested in the topic.

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