Co-Designing with Adolescents

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Abstract
For many years, researchers at the Human-Computer Interaction Lab (HCIL) have partnered with children ages 7-11 in designing technology through Cooperative Inquiry. In this paper, we present two cases in which we have worked with adolescents as designers using both a modified form of Cooperative Inquiry and design-focused interview techniques. We find that adolescents can participate as design partners given modifications to Cooperative Inquiry design techniques. However, designing with adolescents can present challenges in terms of logistics, communications, relationships, and power structures.

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Cooperative Inquiry; design; adolescents

ACM Classification Keywords
D2.2. Design Tools and Techniques: Evolutionary Prototyping

Introduction
At the Human-Computer Interaction Lab (HCIL) at the University of Maryland, we have worked for nearly 15 years with child design partners ages 7-11 co-designing technologies. We do this on an intergenerational design team – named *Kidsteam* - using the Cooperative Inquiry design method [1]. Traditionally, when the child partners reach the age of 11, they "age out of Kidsteam". We have recently begun to explore the possibility of participatory technology co-design with an adolescent team. In addition, we have conducted new field studies in the area of Internet searching with adolescents [2]. In both the child and adolescent search interviews, we ask for opinions and suggestions for how to design new search tools.

The aim of this paper is to present the common challenges and successes we have encountered while working with adolescents as design partners. In the first case, we describe the process of working adolescents using Cooperative Inquiry. In the second case, we present the findings of our study on child and adolescent searchers. In both cases, we compare the similarities and differences between working with children and adolescent designers.

Case #1 – Connected Chemistry Curriculum and FieldScope

Case #1 consists of Cooperative Inquiry design sessions in which adolescents participated. These co-design sessions focus on two projects. First, the *Connected Chemistry Curriculum* (CCC) is a technology-based inquiry curriculum that emphasizes the utilization of simulations to allow high school chemistry students opportunities to make observations of visual representations of submicroscopic interactions between molecules [3]. Second, *FieldScope* (FS) (www.fieldscope.org) is an online mapping tool for citizen science investigations intended for middle school through adult users. In both projects, as adolescents are a part of the intended end user population, our team's contribution was to recruit adolescents to participate in the design of the technology, as well as to coordinate, plan, and lead these design sessions.

In all, five design sessions (two CCC, three FS) were conducted, each lasting two hours and spread apart by months. In the CCC co-design session, we recruited five former Kidsteam members and two new designers (three males, four females) ranging in age from 13 - 18. For the three FS design sessions, we had a total of 12 adolescent designers (nine girls, three boys), ranging in age from 11 - 18 years of age. In all sessions, the design techniques of Cooperative Inquiry were slightly modified. Modifications included combining aspects of techniques together, allowing more autonomy for adolescents, and using two techniques in a single, longer session. For the CCC adolescents we used versions of Layered Elaboration and Sticky Notes [4] and for FS adolescents we used Big Paper, Sticky Notes, and Layered Elaboration [4]. During this time, researchers took field notes, photographs of artifacts, and audio and video recorded parts of the sessions.

Case #2 - Adolescent Searching Study

We recently conducted in-home interviews of 83 children about how they searched on the Internet as they used their computer to search. As a follow-up to this research, we conducted a study of 38 adolescents ages 14 - 17 using a very similar interview protocol. As part of the interviews, we asked the children and adolescents, "If you could design a magic tool for searching, what would it be and how would it work?" This matched protocol across different age groups has allowed us to have insight into the differing design perspectives of children and adolescents.

Discussion

In this section, we offer six general themes that were pervasive throughout the two cases. Through these cases, we have learned that working with adolescents as design partners presents unique challenges in initial setup, and relationships, and idea generation that are very distinct for this population. As such, modifications for Cooperative Inquiry need to be made to accommodate adolescents.

1. Challenges to setup

We found in both cases that adolescents were much busier and therefore harder to schedule with than children. For instance, in Case #1 the scheduling of each of the meetings for CCC and FS took nearly two months prior. We discovered that due to adolescents' commitment to jobs, sports, and other weekly commitments, Saturday morning was the most mutually agreeable time for adolescents to meet. As for Case #2, finding adolescent participants to interview

about Internet searching was more challenging than with the child participants

2. Relationships
We found that parents and guardians would often prefer that researchers directly contact the adolescents. In our work with children, researchers are in contact exclusively with parents and guardians to schedule design meetings. However, when we transitioned towards adolescent designers, parents acted less as middlemen and asked researchers in both cases to make direct contact with the adolescents. We had to now consider more of the ethical implications of directly contacting the adolescents. To comply with institution regulations, we still maintained full contact with parents and guardians, however this made scheduling tasks much more difficult.

3. Modifying techniques
We found that design techniques that work with younger children can be easily modified for adolescents. For instance, in Sticky Notes [4] for children's Kidsteam, adults often wrote the child's ideas down because children could not write their ideas down quick enough. However, because adolescents have more developed motor and cognitive skills, the adolescent Kidsteam preferred to write the ideas down themselves. In Case #1, for CCC and FS we used our Layered Elaboration and Sticky Notes [4] design techniques. However, because the adolescents were more autonomous, they could take greater control of the design techniques. For instance, adolescents often wanted to take more of a leadership role. Adolescents could also be more focused in longer sessions. For the FS sessions, adolescents were designing using two design techniques in a single session.

In contrast, for Case #2 we did not initially modify the design question, "If you could design a magic tool for searching, what would it be and how would it work?" for adolescents. We found that when we asked younger children this question, they would leap quickly into the design of whimsical tools. However, when we gave the same question to adolescents, the term "magic" was more of a creative leap for them. In the interviews, we found that researchers often had to restate the question using the phrase "design a new tool."

4. Intrinsic and Extrinsic Rewards
Although we mentioned that adolescents are extremely busy, many of the former Kidsteam members in Case #1 wanted to come back. Some of these former Kidsteam members in the study said they "missed" the design process and the friendships they had built. In order to attend these weekend design sessions, the adolescents had to give up their personal free time. Only those design partners that were not former Kidsteam members asked for any extrinsic rewards (i.e., gifts) in return for their participation. We argue that intrinsic rewards were strong motivators for participation. In contrast, in Case #2, both t-shirts of our own design and gift cards to iTunes™ and Amazon.com™ were used as rewards. However, as we mentioned before, these extrinsic rewards were unable to persuade a large amount of busy adolescents to participate.

5. Content Knowledge and Usability
We found in both cases that adolescents come with varying levels of content knowledge and would express this. We observed that adolescents' use of content knowledge of a particular domain was more prevalent and advanced than for children. For instance, in Case

#1 how much content knowledge the adolescents had about a particular discipline influenced what design aspects they would focus on. This changed what some of them observed, what they had to say about the design, and what audience they designed for. In Case #2, during the searching studies, the adolescents were able to design a new tool around features they were familiar with from elsewhere on the web. Younger interviewees did not have this prior comparative knowledge.

6. Opinions

We found that adolescents tended to be more vocal about their opinions than children. In Case #1, the adolescent designers were more meta-cognitive about themselves and their relationship to the design process than children. For example, the adolescents in the CCC co-design team openly expressed what their strengths and weaknesses were in science and school. The adolescents were not just focused on designing the technology alone, but began to want to change the contexts in which the simulations would be situated.

For Case #2, the searching study showed that adolescents were very vocal about how they felt about brands of search tools they used, the advertisements that would constantly pop up, and the kinds of results they retrieved when searching. For children in the searching study, they were unable to articulate all the specifics about what they liked or disliked.

Conclusions

We contend that designing technologies with adolescents is worthwhile, but does come with challenges, both expected and unexpected. Adolescent designers, while more mature than children, are still not adults. Many challenges exist, ranging from logistical tasks (e.g., communication, scheduling meetings) to issues of power and authority.

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References

[1] Druin, A. (2002). The role of children in the design of new technology. *Behavior and Information Technology, 21*(1), 1-25.

[2] Foss, E., Druin, A. Brewer, R., Lo, P., Sanchez, L., Golub, E., & Hutchinson, H. (2012). Children's search roles at home: Implications for designers, researchers, educators, and parents. *Journal of the American Society for information Science and Technology*, 63(3), 558-573.

[3] Stieff, M., & McCombs, M. (2006). Increasing representational fluency with visualization tools. Proceedings of the Seventh Annual International Conference of the Learning Sciences (Vol. 1., pp. 730-736). Mahwah, NJ: Erlbaum.

[4] Walsh, G., Druin, A., Guha, M.L., Foss, E., Golub, E., Hatley, L., …Franckel, S. (2009). Layered elaboration: A new technique for co-design with children. Proceedings of CHI 2009. Boston, Massachusetts, USA: ACM Press.