ABSTRACT

Title of Dissertation:

ALUMNI PERSPECTIVES ON THEIR MEMBERSHIP IN AN INTERGENERATIONAL PARTICIPATORY DESIGN TEAM

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Dissertation Directed By:

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Participatory Design (PD) gives technology users an active role in the design of the technologies they are meant to use. PD methods have been adapted for research with children to facilitate the creation of technologies that better meet children's desires and expectations. While the benefits HCI practitioners receive from working with children in PD can include developing more child-centric interfaces and finding surprising new innovations, research is less clear on the participants' perceptions of their experience—such as how they perceive matters that affect them or what personal gains intergenerational PD team participants may receive from their participation.

Investigating the retrospective perspectives of adult and child members of intergenerational PD teams may enable researchers to improve or develop practices that are better aligned with participant expectations. Recent work has begun to look into the gains adults perceive from their participation on traditional PD projects, and has begun to observe

gains to children during their participation on PD teams. However, the retrospective perspectives of adult and child alumni who were members of intergenerational PD teams have yet to be investigated.

To understand how alumni of intergenerational PD teams perceive matters that affected their membership, I conducted anonymous, online surveys and follow-up interviews with three distinct participant groups from an intergenerational PD team: child design partner alumni, parents of child alumni, and adult design partner alumni. Outcomes include new understandings of 1) the perspectives of child design partner alumni with regard to the ethics of their previous participation, 2) the gains child design partners experience and attribute to their PD team participation from the perspectives of both child alumni and their parents, and 3) the gains that adult design partners experience and attribute to their PD team participation and their perspectives on membership. Throughout these findings participants describe how participation in intergenerational PD impacted their desire and perceived ability to pursue new goals and activities throughout their lives through the development of new skills, competencies, and mindsets. From these findings, I then synthesize ten recommendations toward the goal of making intergenerational PD better support the people who are involved in it.

ALUMNI PERSPECTIVES ON THEIR MEMBERSHIP
IN AN INTEGENERATIONAL PARTICIPATORY DESIGN TEAM

by

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Figure 1. Being a Design Partner. In a session investigating "the future of communication technology," I joined a child after she had begun designing a media robot that would automatically follow you around, projecting whatever screens you needed on nearby walls. When I asked her, "How did you start?" her response was, "I wanted to do a digital thing, and then I found a tennis ball." She then proceeded to add a display to the top of the robot so she could communicte with me, "B." Her reasoning being that, even in the future, talking with friends will be most important.

Chapter 1:
Introduction

Across all the hours and activities of the day, children's technologies can influence how children learn, play, socialize, and relax. Acknowledging that children have the right to be respected, and should have "the right to express [their] views freely in all matters affecting [them]" (Unicef, 1989, p.4), researchers and practitioners have sought out ways to meaningfully account for children's perspectives on the technologies they use in this digital age (Livingstone, 2016). The technology design process itself—that is, "the steps necessary to conceive, develop, and produce a technology" (Guha, 2010, p.8)—can impart the values, desires, and knowledge of participating stakeholders in the resultant technology (Friedman, 1996; Muller & Druin, 2010; Schuler & Namioka, 1993). Accordingly, including children in the technology design process to understand their points of view on the technologies that inundate their lives has become an increasingly common practice over the last 30 years (Hourcade, 2008; Yarosh, Radu, Hunter, & Rosenbaum, 2011).

One approach to including children in the design process is through Participatory Design (PD). While PD lacks an exact definition or strict set of protocols, it is most commonly considered "a set of theories, practices, and studies related to end-users as full participants in activities leading to software and hardware computer products and computer-based activities" (Muller & Druin, 2010). In this description of PD, the "full" participation of users is considered critical to providing technology designers with the guidance and recommendations they need to develop successful technologies and to promoting the values that underpin PD: mutual learning, co-realization, and users having a say (Bratteteig, 2013). The concept of PD, and its emphasis on the full participation of end-users in the technology design process, arose in the 1970s when technology was beginning to substantially impact the workplace and had the goal of giving workers influence on the technologies and systems that impacted them (Bødker & Kyng, 2018; Spinuzzi, 2005).

Since these beginnings, the field of work pertaining to PD has become exceedingly diverse, spanning numerous contexts (e.g., educational, commercial) and seeking the input of disempowered user-groups beyond workers, including children (Druin, 1999; Druin, 2002; Guha, Druin, & Fails, 2013; Large, Nesset, Beheshti, & Bowler, 2006; Scaife, Rogers, Aldrich, & Davies, 1997), older adults (Demirbilek & Demirkan, 2004; Ellis & Kurniawan, 2000; Lindsay, Nesset, Beheshti, & Bowler, 2012), and persons with special needs (Benton, Johnson, Ashwin, Brosnan, Grawemeyer, 2012; Foss et al., 2013; Guha, Druin, & Fails, 2008; Moffatt, McGrenere, Purves, & Klawe, 2004). It is because of PD's appreciation for diverse voices and its flexible definition that the development of design methods and techniques that specifically foster communication between these user-groups and other

stakeholders (e.g., designers, developers, domain experts) during PD activities have been successful. It has, for instance, become a valued approach within the child-computer interaction community (Yarosh et al., 2011), with numerous design techniques and methods having been developed that specifically take into account children's physical and cognitive developmental levels (Druin, 2002; Guha, 2013; Large et al., 2006; Scaife, 1997; Walsh, Foss, Yip, & Druin, 2013).

It has been the customary practice to motivate and endorse the use of PD with children as *giving children a voice in the design of technologies meant to affect them,* ultimately offering children a greater say in the shape of the world around them (O'Kane, 2008; Yarosh et al., 2011). The highly-researched benefits adult practitioners receive from working with children in such intergenerational approaches to PD can include creating more child-centric interfaces, spending less time on testing after a technology is developed, and finding surprising new innovations (Muller & Druin, 2010). In fact, much of the emphasis in recent years within intergenerational PD has been on the development of optimal technological outcomes (Bannon, Bardzell, & Bødker, 2018; Kensing & Blomberg, 1998). However, PD is meant to lead to more than a technological outcome. In the words of Carroll et al., "Participatory design is fundamentally a process of mutual learning, and thus of personal development for participants" (2000, p. 249).

Given the importance of participation and personal development to PD, the scarcity of work on participant perspectives on these issues represent a curious incongruity in the field. Though primarily focused on technological outcomes and evaluations, work in this area generally mentions interest or observations about participant development or

wellbeing—such as design skills (Garzotto, 2008; Robertson, 2002; Yarosh & Schueller, 2017) or collaboration (e.g., Diaz, Paredes, Alvarado, & Giaccardi, 2012; Druin & Fast, 2002; Garzotto, 2008). Studies that investigate these potential outcomes of participation from the perspectives of participants themselves are rare. Previous work has pointed to the potential for long-term gains for diverse stakeholders (e.g., administrators, teachers, project managers, teenagers) of long-term PD projects (Bossen, Dindler, & Iversen, 2010; Bossen, Dinder, & Iversen, 2012; Garde & Van Der Voort, 2014). Participants in these studies describe direct gains to technological competencies, professional networking, and interdisciplinary group collaboration (Bossen et al., 2010; Garde & Van Der Voort, 2014), how these benefits may be hampered through unclear project roles and outcome expectations (Bossen et al., 2012, Garde & Van Der Voort 2014), and, through retrospective interviews, what direct gains may persist (Bossen et al., 2010).

Other works have investigated the immediate impacts on child and teen members of PD projects throughout the design process. Within this domain, Guha's year-long case study and debrief interviews with child participants of a PD team is most pertinent (Guha, 2010), as it describes the development and improvement of social and cognitive skills. Taking a similar methodological approach, Hansen and Iversen (2013) investigated what motivates teenagers to participate in PD, including direct benefits, and described improvements to teen's skills such as communication and knowledge about the design process. However, while these works are critical to uncovering potential gains, what gains may persist in the long-term or what child participants themselves find to be most valuable remains unknown.

Aside from investigations into direct participant gains, researchers examining matters that affect participants within intergenerational PD tend to investigate *practices with regard to the child participants*, such as ethical issues around ensuring children understand the nature of their participation (i.e., how their ideas will be used in the technologies they design (Guha et al., 2013; Read, Fitton, & Horton, 2014), addressing adult-child power structures within design sessions—as most adults in children's lives are authority figures and such a relationship may discourage honest design feedback (Druin 2002; Guha et al., 2013), and procedures around children's assent and dissent given these considerations and the long-term involvement that PD often entails (Dockett, Perry, & Kearney, 2013; Morrow & Richards, 1996; Read et al., 2013). While an essential body of work, this near-exclusive focus on issues pertaining to children's experiences within intergenerational PD practices overlooks the importance of broader practices that could impact the adult members of these teams as well as the value of both children's and adults' long-term, retrospective perspectives.

If personal development in the form of direct participant gains (e.g., new skillsets, mindsets, and empowerment) are going to be claimed as a lasting benefit of participation to all participants within intergenerational PD, and if researchers are going to claim to have responsibly accounted for participant perspectives on matters that affect their inclusion in PD, then there is a need for retrospective assessment of how participants perceive their participation long after their participation on the team has ended. Through such work on long-term gains and perspective changes, endorsements for PD with children could move beyond arguments for indirect personal benefits, such as having a say in the technologies they are meant to use, or technological outcomes. Moreover, within intergenerational PD we must

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move beyond a sole focus on child participants by also considering the perspectives of adult team members (Yip et al., 2017). Adults participate as full members in these intergenerational teams, and as such their perspectives on the team practices that may have impacted them and the potential for their membership to be personally meaningful should be investigated.

To address these needs, in this dissertation I investigate how former intergenerational PD team participants have been influenced by their membership in the long-term. I investigate retrospective participant perspectives—those of both adults and children—on not only the potential for personal development (e.g., direct gains), but also on broader issues surrounding their membership which may have influenced their mindsets and personal growth. My overarching research question is: *"How do alumni of intergenerational Participatory Design teams perceive their previous team participation?"*

To explore this question I conducted three studies, each focused on a different stakeholder group of an intergenerational PD team: (i) child alumni, (ii) parents of child alumni, and (iii) adult alumni (e.g., university researchers such as graduate assistants and long-term volunteers). The specific intergenerational PD team this work draws its participants from is the University of Maryland's Kidsteam. Since 1998, Kidsteam has met twice-weekly throughout the academic year, bringing together approximately eight children, ages 7-11, with adult researchers and technologists to design technologies that support children's learning and play. Children are invited to return to the team at their discretion, so long as they remain within the required age range, which has resulted in an average participation of two years. Adult researchers who are members of the team can include a variety of people, from

volunteers who work on a single project with the team to university employees who maintain continued involvement over the course of years. The 20-year duration of the Kidsteam program and the longevity of the participants' membership within the team mean that former participants offer a unique, retrospective perceptions of long-term membership on an intergenerational PD team: former child members may now be adults, former adult members have moved on to new careers, and all participants have had time to form reflections on whether their team membership was meaningful to their futures. I sought out the perspectives of the parents of child alumni as they could offer observations on changes in the behaviors and attitudes of their children.

Within each of the three studies, all participants were invited to complete an anonymous, online survey and then could volunteer to further discuss their experiences in a semi-structured interview. Through this approach—the triangulation of two methods across multiple perspectives—I strive to offer a comprehensive picture of alumni perspectives on their past participation on an intergenerational PD team.

Overall, through these long-term, retrospective perspectives of intergenerational PD team alumni, this dissertation demonstrates the lasting gains and personal development that such PD teams can have upon participants and offers new paths forward through ten recommendations to ensure our means of innovation fit participants' expectations.

Contributions

The contributions of this dissertation to the areas of Participatory Design, Child-Computer Interaction, and Human-Computer Interaction include:

1. A synthesis and comparison of potential participant gains to child and adult alumni from their participation on an intergenerational PD team.

2. Perspectives of child intergenerational PD team alumni on matters that have ethical implications and the personal gains they attribute to their team participation.

3. Perspectives of adult intergenerational PD team alumni on matters regarding their previous team participation and the personal gains they attribute to their participation.

4. Insights into the mindsets of parents of child alumni of an intergenerational PD team regarding their motivations for signing their children up to participate and their attitudes and observations regarding their children's past participation.

5. A set of 10 recommendations for aligning intergenerational PD practices with participant expectations on matters that affect them.

Chapter 2:
Structure and Approach

In This Chapter:
- Contents of this Dissertation
- The Background and Role of the Lead Researcher

Contents of this Dissertation

This dissertation is composed of three distinct but interrelated studies on the perceptions of populations who were involved with an intergenerational PD team (i.e., child alumni, parents of child alumni, and adult researcher alumni; Chapters 4-6, respectively) and as such they each have their own methods, findings, and discussion sections. My approach to data collection in each of the three studies was identical: I began with anonymous, online surveys with the population of interest—the anonymity being critical to encouraging honest feedback—which covered participants experiences and expectations and contained both short response and 5pt likert responses. After completing the surveys, respondents could volunteer to participate in follow-up, semi-structured interviews, which I conducted in person when possible, but most often via video conference as alumni have moved out of the DC area. Finally, I recorded these interviews and transcribed them for analysis.

Correspondingly, my approach to data analysis was the same across all three studies. The primary analysis of each study was the qualitative coding of the short response survey questions and the transcribed interview data; multiple-choice and likert survey data provide a complement to the themes generated through the primary qualitative analysis. Causal relationships are not derived from these analyses; the analyses are based upon the perceptions of participants and their assessments of attribution. I began each study's data analysis by open coding a sample of data and used the outcomes of that process to create or iterate a codebook for that study (See Appendix A). To promote comparability across all three studies, subsequent studies iterated on the previously established codebooks to allow for the discovery of emergent codes. Specifically, when I open coded the parents of alumni data in Chapter 5, I used that data to iterate the codebook established in Chapter 4 with child alumni, adding a 9th category of "Fiscal Considerations" to the codebook. Later, in Chapter 6's study with adult alumni, the category "Fun" (which was used to code any instance of "being or not being" enjoyable) was renamed "Sentiment on Membership" and two sub-codes were added to the category—Enjoyment and Displeasure—to aid later analysis, a new code for "Facilitation" was added, and the definition of "Material Considerations" was expanded (e.g., to include publications). After establishing IRR, I coded the remaining corpus of data.

Definitions of Terms

- Participatory Design: While PD lacks a formal definition or strict rules to adhere to, it is a field that emphasizes a concern for including representative users of a

technology in its design process. It is commonly described as, "a set of theories, practices, and studies related to end-users as full participants in activities leading to software and hardware computer products and computer-based activities" (Muller & Druin, 2003, p.3).

- Cooperative Inquiry: A design method "developed to support intergenerational design teams in developing new technologies for children, with children" (Druin, 2002, p.600).

- Personal Gain: Gains as referenced in this dissertation refer to personal gains, being "a benefit or advantage that relates to a particular person rather than to a business, group, or an organization" (TransLegal, 2017). Personal gains may be direct (e.g., new skills) or indirect (e.g., having influence).

Organization of this Research

The contents of this dissertation are organized in the following parts:

- This chapter continues by describing my personal background and my role as the primary researcher for this dissertation.

- Chapter 3 discusses related work surrounding PD with children, gains from participation on PD teams, and ethical concerns around the inclusion of children in PD research.

- Chapters 4 presents a study on how child design partner alumni perceive the ethics of and gains from their past participation.

- Chapter 5 presents a study on how parents perceive gains to their children from having been participants on an intergenerational PD team.

- Chapter 6 presents a study on how adult design partner alumni achieve new perspectives and perceive direct gains from their past participation on an intergenerational PD team.

- Finally, the discussions within Chapter 7 offer reflections across these three studies, synthesizing and comparing the long-term gains uncovered across participant groups, offering recommendations for aligning PD practices with participant expectations on matters that affect them, and discussing opportunities for future work in this area.

The Background and Role of the Lead Researcher

It is important to be introduced to the person who has conducted qualitative research at the outset of their research, as it is through their perspective that the data are collected, analyzed, and reported. I therefore begin this section by providing a background on myself and my participation in Kidsteam. I then discuss what my role has been in conducting this research across the three studies I conducted, including how my participation on Kidsteam may have influenced this research and the methods I used to mitigate possible response biases and improve internal reliability—each of which required me to train and receive assistance from additional researchers.

Personal Background and Participation in Kidsteam

My background in design stems from my B.A. in Telecommunication- Digital Media, Art, and Technology from Michigan State University and from having founded a mobile application design company, Ubrii LLC, in 2010. My desire to shape mobile technology led me to a research group out of the University of Michigan, working with their team as a designer and later as a research collaborator to develop mobile learning applications for children (Cahill et al., 2011a; Cahill et al., 2011b; Kuhn et al., 2011; Kuhn et al., 2012). This experience introduced me to the field of Human-Computer Interaction (HCI) and led me to pursue a research career in HCI by obtaining a PhD. I now hold a M.S. in HCI from the University of Maryland (UMD), and in the course of earning my PhD at UMD I have broadened my knowledge of child-computer interaction and of the diversity of research within HCI.

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This year concludes my sixth as a UMD Kidsteam adult design partner. In my first year, also my first year as a Master's student, I volunteered my time with the team. I was subsequently employed as a full-time Graduate Research Assistant (GRA) for my second-fourth years with the team. For a year and a half, I lead the team as the Research Coordinator for Kidsteam before returning to a GRA role so I could focus on writing this dissertation. Throughout this time, many of my publications have focused on the use and outcomes of co-design with children across a variety of domains (e.g., online safety, education, live performance) and technology platforms (e.g., telepresence, mobile touchscreen devices, 3D printing, physical spaces) (Baumer et al., 2014; Golub, McNally, Lewittes, & Shorter, 2017; Kumar et al., 2018; McNally et al., 2014; McNally, Norooz, Shorter, & Golub, 2017; McNally et al., 2018; Rust et al., 2014; Striner & McNally, 2017; Yip et al., 2013).

Role in this Research

I initially conceptualized this work at the 2014 Interaction Design and Children Conference (IDC '14) during a talk that discussed a method to help adults clearly communicate with child designers: the method helps children understand the ways their ideas would be used and helps adults obtain informed consent (Read et al., 2014). I wondered: *What would the children think about having provided consent to use their ideas ten years from now? How can we* know *if we succeeded in adequately informing our child participants, no matter our efforts to do so?* Building upon and expanding these questions for my dissertation, I developed a series of studies to re-contact both the child and adult design partner alumni of Kidsteam to obtain their retrospective perspectives on questions of ethics and impact regarding participatory design with children.

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Over the past four and a half years, I have been the lead researcher for this dissertation research. I planned the approaches to and conducted participant recruitment. During each of the planning and preparation stages of this dissertation work, I iteratively developed the survey instruments and interview protocols, including conducting subject matter expert reviews and pilot tests. I also conducted all data collection activities, with the exception of the adult design partner interview data due to potential conflicts of interest (detailed below). Lastly, I performed the analyses of all survey and interview data—including the inductive coding, deductive coding, calculating of descriptive statistics, and codebook iteration phases. To support my work, I wrote and received a grant to support transcription of part of this dissertation's interview data.

Roles of Co-authors on Published Portions of this Dissertation

I have and will continue to first-author publications based off of this dissertation research (McNally, Guha, Mauriello, & Druin, 2016; McNally, Mauriello, Guha, & Druin, 2017). As described by the Collaborative Institutional Training Initiative (CITI), "No explicit, established, universally agreed upon authorship standards exist across all disciplines, nor within any particular discipline" (CITI Program, 2018), but authors must make a "significant contribution" to the work and are held accountable for the contents of the work. In the research I lead, I offer co-authorship to persons who 1) substantially contribute to the *conception and design of the work* and/or *the acquisition of data* and/or *the analysis and interpretation of data*, 2) critically review and, as they deem necessary, revise the manuscript, and 3) accept the accountability for the work that co-authorship entails. Throughout this work I have received feedback at key points in the research from my academic advisor,

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Allison Druin, and my mentor, Mona Leigh Guha, particularly during the early phases of the work. Additionally, as expanded upon below, two other graduate research assistants have assisted me with 1) acquiring interview data during one of the studies to address possible issues of response bias and 2) with calculating IRR during data analysis in all three studies to establish reliability. Having therefore met the first authorship criteria, these persons were subsequently asked to review and revise the manuscripts I produced and accept responsibility for the contents of the publications (McNally et al., 2016; McNally et al., 2017a), and therefore were eligible for co-authorship having met all authorship criteria. The same process will be followed on any future publications.

Methods Employed to Address Possible Response Bias

Personal and otherwise established relationships with researchers can cause participants to offer desirable instead of honest feedback, a form of response bias (Randall & Fernandes, 1991). My first studies with Kidsteam child alumni and their parents were conducted while I was as a Graduate Research Assistant on the team, and my relative newness to the team therefore meant that few potential participants who personally knew me would have qualified for participation, as there were very few recent alumni. However, the data collection for my final study on perspectives of Kidsteam adult design partner alumni began while I was the Research Coordinator for Kidsteam, and therefore I had an established relationship with those alumni who had also been part of the team within the previous ~5 years. Potential participants included co-authors, mentors, mentees, students I had hired, and peers—relationships that could, and likely would, each introduce response bias. To help mitigate this issue, I therefore recruited and trained a graduate student researcher to conduct

the interview protocol I had developed. This student was asked to, and did, attend a Kidsteam session, read the foundational literature on Cooperative Inquiry (Druin, 2002; Guha et al., 2013), and read the two studies that had already been published from this dissertation at that time (McNally et al., 2016; McNally et al., 2017a) to familiarize themself with the method, techniques, and subjects that participants might discuss during the interviews. After I reviewed a pilot interview conducted by the researcher, they then completed the participant interviews.

Methods Employed to Address Reliability

I also recruited and trained an additional researcher so that I could appropriately complete my planned research methods by computing Inter-Rater Reliability (IRR) on the short-response survey data and the interview data for each study. In addition to the benefits of IRR such as refining codebooks and other research instruments, this step was enacted to mitigate unavoidable personal biases regarding my perspectives on PD with children and promote balanced research. The researcher recruited to complete IRR was required to have attended Kidsteam sessions so that they would be familiar with the processes discussed in the survey and interview responses but not to have been deeply involved with or employed by the team (e.g., as a regular volunteer or research assistant), so as to provide a knowledgeable but more neutral perspective.

Chapter 3:
Related Work

A Background on Participatory Design with Children

An Overview of Participatory Design

While Participatory Design lacks a formal definition or strict rules to adhere to, it is, as its most common denominator, a field that emphasizes a concern for including representative users of a technology in its design process. It is commonly described as, "a set of theories, practices, and studies related to end-users as full participants in activities leading to software and hardware computer products and computer-based activities" (Muller & Druin, 2003, p.3). Its aim is to establish a partnership that encourages mutual learning between end-users and stakeholders with decision-making power—such as the managers,

engineers, and designers who are part of the design process—and sharing the responsibility of decision-making between these stakeholders and end-users.

What sets PD apart from other value-driven design philosophies, such as Value-Sensitive Design (Friedman, 1996; Friedman, Kahn & Borning, 2002) or Reflective Design (Sengers, 2005), is its emphasis on a user's *active* participation in the design process. Each of these values-led design approaches emphasizes the point that those who shape technology embed their personal values in it. However, in contrast to other approaches, PD does not require these values to be first identified and then employed or addressed. The values emerge and are discussed and negotiated among stakeholders as the design process transpires, making it a highly contextual, dialogic process.

PD was originally conceived in the context of a social democratic movement in northern Europe to enable Scandinavian factory workers to have a role in designing technology they would eventually use in their workplace (Bjerknes, Ehn, Kyng, & Nygaard, 1987; Gregory, 2003; Muller & Kuhn, 1993). This "right to participate in decisions that are likely to affect their work" (Gregory, 2003, p.63) is part of what makes PD unique: it places emphasis not only technological outcomes but on outcomes that encourage personal and organizational development. "PD questions major assumptions about technologies in workplaces, communities, homes, and social institutions" (Muller & Kuhn, 1993). Its success can be seen through projects such as the iconic UTOPIA project (Bødker & Kyng, 2018; Muller & Kuhn, 1993; Spinuzzi 2005), which revolutionized newspaper production and offered methodological influences that maintain relevance today. While views even within Scandinavian PD are diverse, themes that were central to the establishment of PD included

democracy, emancipation, and quality of work (Gregory, 2003; Muller, 1993). More recent discussions of PD also explicitly call out values such as attention and care for users (Bossen et al., 2012), and mutual learning (Barendregt et al., 2016; Bossen et al., 2010; Hansen & Iversen, 2013), and helping people influence matters that effect their lives in light of modern challenges around corporations control of personal data (Bødker & Kyng, 2018). The values-led approach to technology development and simultaneous personal empowerment has made this work valuable not only to communities such as the Participatory Design Conference (PDC), but to ACM communities including Computer Supported Cooperative Work (CSCW), Human Factors in Computing Systems (CHI), and Interaction Design and Children (IDC).

This wide interest is, in part, because PD is continually evolving, and its success has led to extensions beyond its original sociopolitical context. PD is now used to design technologies with other user populations as active participants in the process, such the elderly (Demirbilek & Demirkan, 2004; Ellis & Kurniawan, 2000; Lindsay et al., 2012) persons with special needs (Benton et al., 2012; Foss et al., 2013; Guha, et al., 2008; Moffatt et al., 2004), and children (Derr & Kovács, 2017; Druin, 1999; Druin, 2002; Guha et al., 2013; Large et al., 2006; Read et al., 2002; Scaife et al., 1997). The following sections review methods and techniques developed for conducting PD sessions with children, followed by a description of the PD team discussed in this work.

A full history of the 50 years of Participatory Design is beyond the scope of this chapter, as it will be more advantageous to focus on those aspects which are highly related to this dissertation with regard to children's inclusion in PD practices. For further information,

I suggest such foundational books and summative articles as Kensing and Blomberg (1998), Muller & Druin (2010), Muller & Kuhn (1993), or Schuler & Namioka (1993) as well as current reflections such as Bannon et al. (2018) and Bodker & Kyng (2018).

Participation of Children in Participatory Design

In her seminal work, Druin (Druin, 2002) identified four roles children can have when participating in the design of children's technologies (Figure 2). These roles range, each with their own strengths and weakness, along an expanding and encompassing continuum, from least to most involved in the design process. The less-involved roles of children include Users or Testers of a technology, and occur at the end of a product life cycle. Perhaps most common is researching a child's use of a completed technology; while limits the utility of feedback to the design of the technology, it is useful in assessing the impact of a technology, particularly in educational spheres. Next in the expanding continuum is including children as Testers of a technology. Having created a prototype, adults may seek out the perspectives of children to help shape the technology before a final release toward goals of assessing whether features are liked, what may be confusing, and where bugs may exist. Neither of these roles of children in the technology design process constitute the "active" role in designing that Participatory Design requires of its participants.

Between the roles of Tester and Informant is a shift in the degree and duration
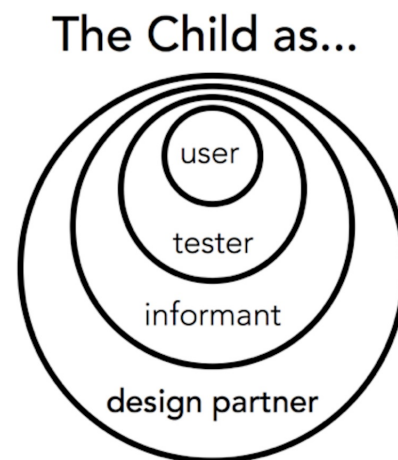
Figure 2. The relationships between the roles children can have in the design of technologies for children (Druin, 2002).

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of child participation in the technology design process. As Informants, children play a part in the design process itself—beyond testing an existing prototype, instead informing the development of prototypes. Child Informants may have the opportunity to be part of the design process at various stages of the iterative design process, based upon when stakeholders of the technology believe feedback will be most pertinent. This role was formalized by Scaife et al. (Scaife et al., 1997; Scaife & Rogers, 1999) in a method called Informant Design, which has been successful in industry and academic settings for providing design guidance for new technologies for children. Informants act somewhat similarly to consultants (Hourcade, 2008). As with the role of Informant, the last of Druin's four roles, the Design Partner, also emphasizes children's impact on the design process itself.

The Design Partner role is the most involved of Druin's continuum, with children being equitable stakeholders throughout the technology design process—ideally having a say in the technology from conceptualization to completion. It also requires the strongest degree of participation by incorporating each of the other roles, as Druin described: "While each of these roles has clear differences, each role includes aspects of those roles that historically have come before it and therefore can be graphically represented as embedded ovals" (Druin, 2002). As Informant Design offered a formalized method for including children as Informants, so has Cooperative Inquiry (CI) offered a formalized approach to including children as Design Partners. In CI, children and adults work together on a team to design new and improve upon current technologies with a goal of becoming design partners with children throughout this process, giving children a strong voice in the design of technologies (Druin, 1999; Druin, 2002; Guha et al., 2013). These teams meet regularly over the course

of a year and oftentimes participants choose to participate for multiple years (Guha et al., 2013; McNally et al., 2017a; Walsh et al., 2013). Situated between the methods of Informant Design and Cooperative Inquiry in terms of degree and duration of children's participation is Bonded Design (Large et al., 2006). This intergenerational partnership between adults and children is similarly built on the belief that children should be included throughout a technology's entire design process, as Design Partners, but will work on a single project over the course of weeks or months, much like Informant Design (Large et al., 2006).

It is in these later roles (e.g., Informant, Design Partner) and methods (e.g., Informant Design, Bonded Design, Cooperative Inquiry) that children have the active participation in the design process that Participatory Design demands. The goal of including children in PD is to achieve "…results in technologies that better address [children's] needs, interests, and abilities" (Hourcade 2008, p.313). Cooperative Inquiry—the method which this dissertation is concerned with—most closely follows the co-design subset of PD. While the term "co-design" is sometimes used synonymously with PD, the co-design subset of PD differs in that it does not assume any one stakeholder's views or input are more important than another's (Bonsignore et al., 2016). In CI, children are able to participate on numerous projects throughout their design cycles, as participation entails an entire academic year, and children can choose to participate on the team for multiple years (Guha et al., 2013).

Expanding the Methods and Roles of Children in the Design of Technology

While not a method that is solely focused on including children in the technology design process, in investigating a shift in focus from including children in the design of technology to the contextual factors around children's technology experiences, Garzotto

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developed Experience Design (2008). This distinct but relevant method emphasizes the educational context design sessions may take place within and encourages practices of reflection. This is achieved, for instance, by including children in the experience of using a technology and co-designing a beneficial workflow of activities around technology use, as opposed to re-designing the technology itself.

The roles children can take on in the technology design process have also seen recent expansion. Through a renewed commitment to the political roots of Participatory Design, new roles envision the child in the role of a Protagonist, which sees children as the main agents in the design process (Iversen, Smith, & Dindler, 2017). This role emphasizes children's processes of reflection, and as a main outcome of participation encourages children to develop new insights into the process of technology design. Specifically, the role of a Protagonist is one in which "...children develop skills in designing and reflecting on technology, which empower them to make more informed decisions about technology in their lives" (Iversen et al., 2017, p.29).

The Protagonist role is both promising and timely, as it is highly relevant to modern initiatives that seek to teach children self-empowerment through design thinking. Support for the Protagonist role can be seen even in the Cooperative Inquiry method, which includes children in the role of Design Partners. Within CI, previous work has found that children experience empowerment and long-term design understanding (Guha et al., 2013; McNally et al., 2017a) and adeptly plan and execute their own design sessions (Yip et al., 2013), taking on the role of the Protagonist of their own accord, despite this not being part of the goal of the CI method.

Design Techniques for PD with Children

In addition to child-focused methods of PD and the roles children can have within each of those methods, new design techniques that support the inclusion of children in these design methods have also been developed and adapted (Fails, Guha, & Druin, 2013; Walsh et al., 2013). With regard to the distinction between a method and a technique, Walsh et al. (2013, p.2893) describe:

> *"We define a technique as a creative endeavor that is meant to communicate design ideas and system requirements to a larger group. Researchers have also developed different methods for working with children in the design of new technologies. We define a method as a collection of techniques used in conjunction with a larger design philosophy."*

Design techniques, therefore, are processes by which designs themselves are created (e.g., paper prototyping), and can be applied within multiple methods, which offer a philosophy that guides the application and use of results from those techniques (e.g., Cooperative Inquiry, Informant Design). It is therefore these techniques that PD team participants experience on a day-to-day basis, and the techniques are part of the motivation for people to learn about PD.

Design techniques are often best suited to different points of the design process and result in feedback that answer different types of questions. As with techniques designed for adults, early in a design process a low-fidelity design technique can provide a rapid, low-cost method of iterating on technology designs, and later in a design process a higher-fidelity design technique offers refinements and evaluation. However, much as PD methods have to be modified to work with children to consider their physical, social, and cognitive stages of

development, so to have design techniques been modified. With 3D prototyping, for example, children may not feel "adult" materials are approachable and may be concerned about making their designs "perfect"; therefore, as described below in Bags of Stuff, colorful, low-cost, approachable materials should be used with children.

Below, I offer a partial list of the ever-evolving design techniques that have been developed for children in PD:

Bags of Stuff: A technique that enables the creation of physical prototypes using low cost art supplies (Figure 3d) (Druin, 1999). By offering intergenerational designers a bag filled with supplies such as yarn, foam, fabric, toilet paper rolls, wood blocks, scissors, and tape, teams are encouraged to work together to build a physical artifact that describes their ideas. The pressure to make an exact replica is set aside, as stickers become buttons and toilet paper rolls become anything from benches to robots, enabling rapid ideation.

Big Paper: A paper-prototyping or storyboarding technique, depending on the session goals, where designers create rough drawings of an interface together, on a single easel-sized sheet of paper (Figure 3a) (Walsh et al., 2013). The size of the paper encourages the team to draw together, discussing, iterating and elaborating upon each other's designs.

Big Props: A modification of the Bags of Stuff technique, Big Props emphasizes low-cost prototyping of systems that depend upon movement (Walsh et al., 2013). It includes offering team members large, physical objects (e.g., balls, blankets) which can be representative of any idea, and rotating the objects between team members as they rapidly ideate new design scenarios and technological interactions.

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Clear Panels: This design technique mixes high- and low- fidelity materials to enable rapid prototyping (Brown et al., 2010). Created for mobile interface design, it enables designers to draw directly "onto" an interface by placing a transparency over the screen and developing a series of prototypes.

Comicboarding: A storyboarding technique that emphasizes removing the barriers of writing mechanics and children's hesitation to draw. Researcher ask children to come up with a story about a technology they are designing, and an artist creates a series of drawings based on this description (Moraveji, Li, Ding, O'Kelley, & Woolf, 2007).

Embodied Narratives: A design technique that emphasizes not only the design of a technology itself, but the interactions children have with and around the technology, such as a way of playing (Giaccardi, Paredes, Díaz, & Alvarado, 2012). Children brainstorm and perform narratives in this co-design process much like improv, while photographing and reflecting upon their designs as they progress.

Journaling: A technique that is most commonly applied as a means of reflection after having completed a design session using a different technique (Figure 3c). Children are given prompts to write about in personal journals, or offered the opportunity to create wireframes of a technology independently.

KidReporter: This technique minimizes the necessity of writing mechanics and instead emphasizes documentation of a session (Bekker, Beusmans, Keyson, & Lloyd, 2003). Supplied with video cameras and notepads, children record personal evaluations of a system or technology and personally elicit information in many ways.
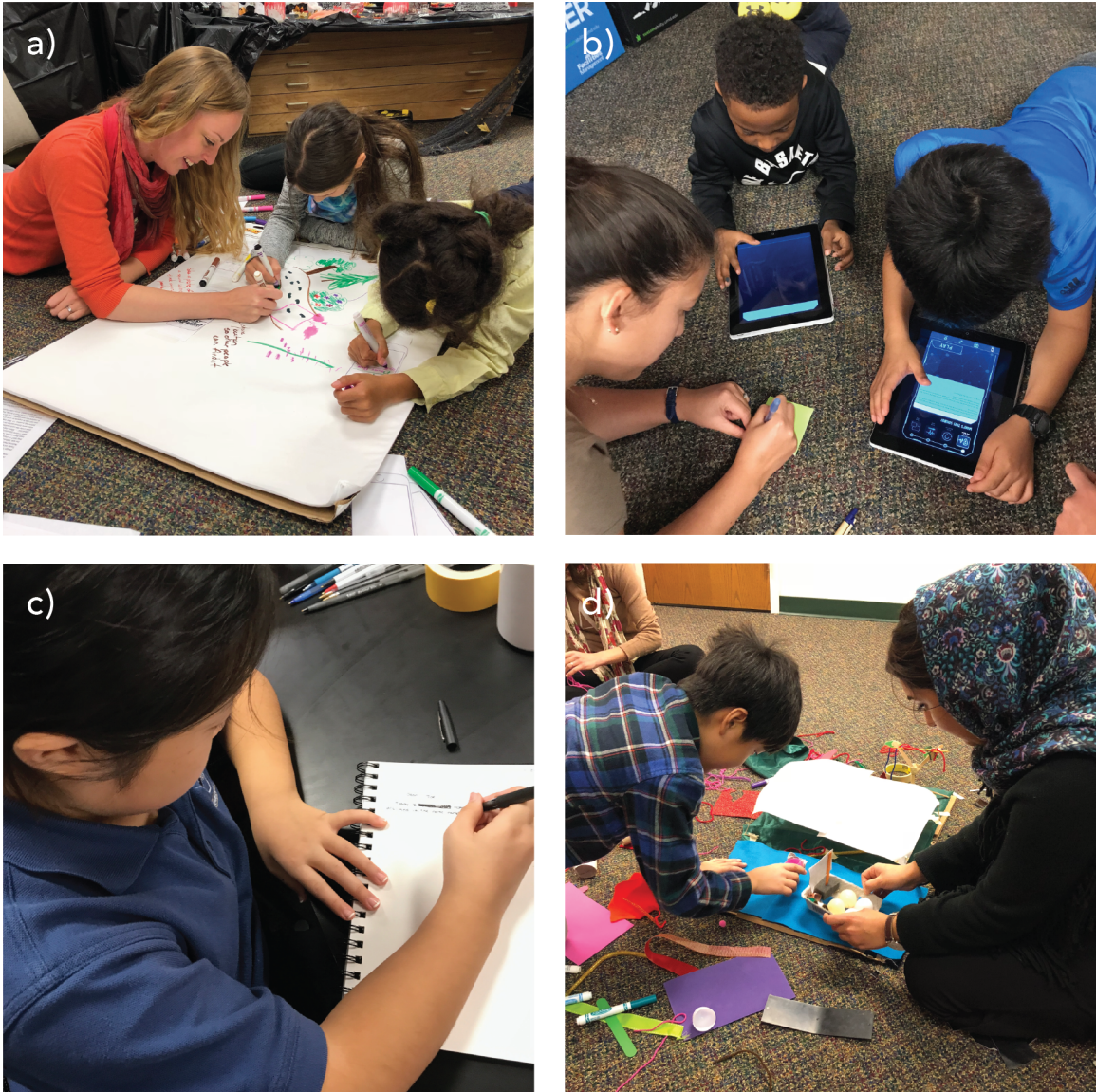
Figure 3. Using Design Techniques. (a) Adults and children work together to design a mobile interface with Big Paper (Walsh et al., 2013), (b) children offer likes, dislikes, and design ideas while an adult transcribes them during Sticky Noting (Guha et al., 2013), (c) a child journals their reflections about using a technology earlier in a design session, and (d) adult and child use Bags of Stuff to prototype an outdoor performance experience (Walsh et al., 2013).

Layered Elaboration: Based on paper prototyping, this technique encourages iteration of a mockup by multiple team members through adding layers of transparencies atop a printed wireframe or screenshot (Walsh et al., 2010). A new sheet is added every time the design is rotated among the team, thereby enabling them to add to the design in a way that does not cause destruction to others' ideas—a concern among children.

Line Judging: This technique creates an engaging voting experience for design teams. Rather than raising hands or filling out paper surveys, a room-sized likert scale is created with tape across the floor of a room, identifying 3-5 points on the tape ranging from "strongly disagree" to "strongly agree"- or any appropriate scale (Walsh et al., 2013). Teams are then read questions and asked to stand at the mark that indicates their agreement. Participants then have the opportunity to describe why they made the decision they did.

Mission from Mars: Considered a supplement to other design techniques, this approach—which notably works with children as young as 5 years old—enables the questioning of specific user requirements through describing how a technology or system works to Martians, who are unable to make it to Earth (Dindler, Eriksson, Iversen, Lykke-Olesen, & Ludvigsen, 2005).

Mixing Ideas: This technique was developed in part as an exercise to aid young children (e.g., as young as 5 years old) in working together on design projects (Guha et al., 2004). In this technique, individuals begin by creating their own designs, then are asked to disassemble their design and re-assemble it in combination with the design of a peer—utilizing as much or as little of both designs as they deem necessary and most important.

Sticky Noting: Based on affinity diagraming, the design team is asked to write individual likes, dislikes, and design ideas on separate sticky notes (Figure 3b) (Guha et al., 2013). These notes are then clustered into themes. This clustering can be done to determine early requirements by using it with existing technologies related to a proposed technology, with regard to an existing prototype, or a technology being iterated later in the design process.

Analysis of Children's PD Outcomes

The diverse array of techniques used to include children in design-focused roles such as Informant or Design Partner lead to a variety of data (e.g., session video, photos of the session and artifacts, adult observations, etc). Within intergenerational PD, determining whether children's ideas were adequately considered in a final technological design is a matter of concern (Mazzone, Iivari, Tikkanen, Read, & Beale, 2010; Read et al., 2014). Depending on the needs of the session, sometimes the data are analyzed using qualitative methods such as standard coding or affinity diagraming (McNally et al., 2018, Woodward et al., 2018). The Grounding, Listing, Interpreting, Distilling (GLID) method was designed to increase the rigor of analyzing children's artifacts from co-design activities (Van Mechelen et al., 2017) emphasizing a process of uncovering children's values.

Kidsteam: A Cooperative Inquiry Design Team

This dissertation focuses on alumni of a Cooperative Inquiry design team called Kidsteam, which consequently will be discussed at length. Kidsteam has met twice a week throughout the academic year at the University of Maryland for the past 20 years. It is the

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first and longest running intergenerational PD team in the United States. The team also meets for 1-2 weeks each summer to facilitate team building, meet new members, and learn design techniques. In Kidsteam, adults and children take on the roles of Design Partners to design technologies for children's learning and play. The focus of this Kidsteam is to use Idea Elaboration to build upon each other's ideas and leverage every team member's diverse knowledge and backgrounds, ending in an artifact that is no one person's ideas (see Figure 4) (Guha et al., 2013). Technologies can be worked on throughout their entire iterative design cycle or during a specific point, with session purposes ranging from pure ideation, to prototyping, to critiquing.

Participants

Approximately eight child design partners ages 7-11 participate on the team at a time, and can return each year so long as they still desire to and begin the year within the acknowledged age range (i.e., even if they would turn 12 during the upcoming school year). On average, children participate on the design team for 1.8 years (*SD*=1.0, *median*=2.0). The child design partner alumni of *Kidsteam* number more than 60, and many of the former participants are now adults (i.e., age 18+).

Adults who participate on the team come from diverse professional backgrounds and have different degrees and durations of involvement. Most common are the "core" members—those who are hired to assist with the running of the team, which can include students, staff, and faculty. Long-term volunteers and visiting researchers are also encouraged to participate to either regularly bring their own technologies to the team or to learn the method itself.

a)

b)

c)

d)

e)

f)

g)
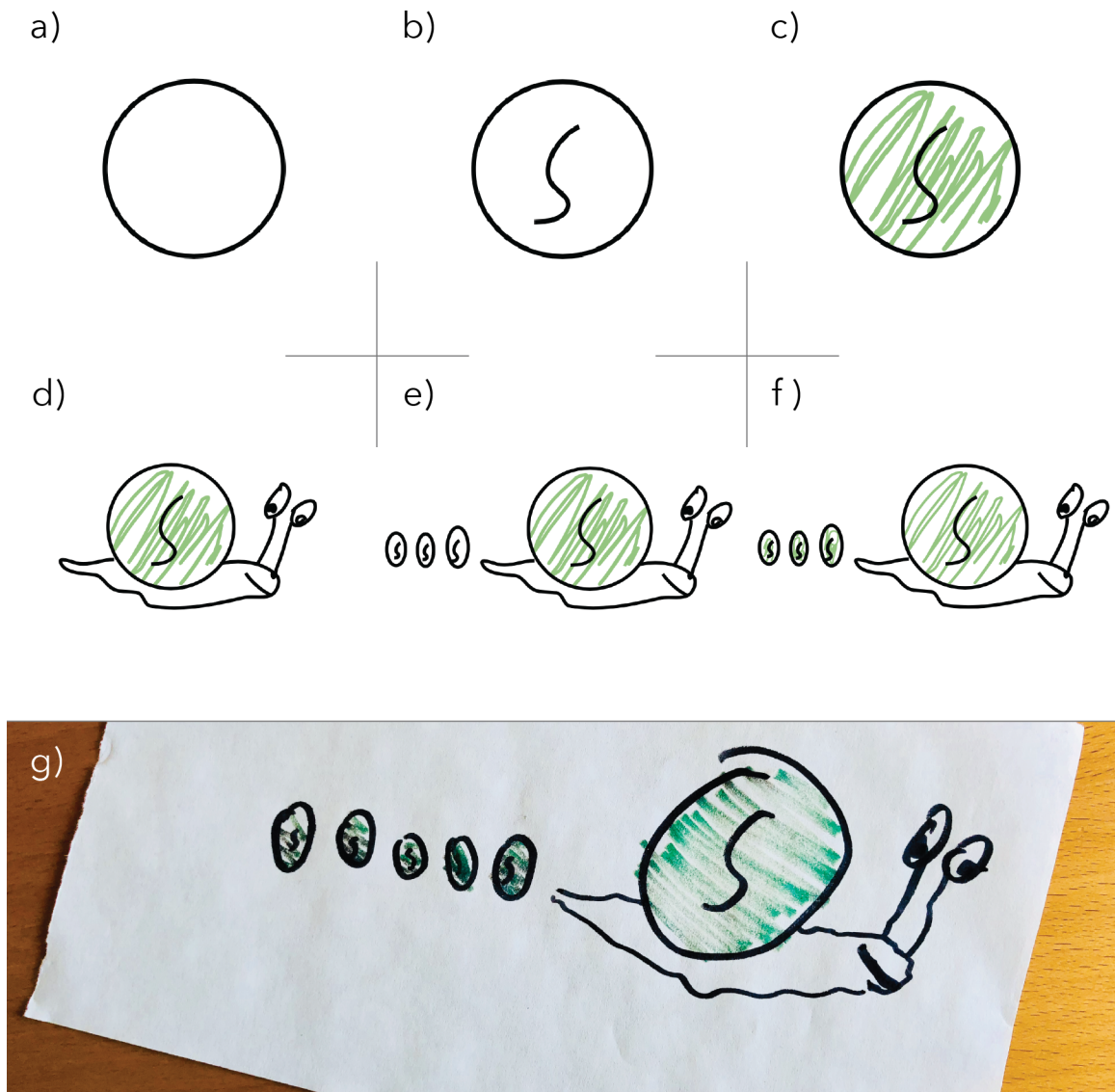
Figure 4. Illustrating Idea Elaboration. During a Big Paper session, after one child drew a circle (a) another child decided that it would be a Skittle (b). This was fine with the first child, so long as the Skittle was green (c). To incorporate the session goals, an adult turned the Skittle into a snail (d). The second child decided that Skittle Snails should leave a trail of Skittles for other characters to eat (e), and the first child decided that green Skittle Snails should only leave behind green Skittles (f). The final design was no one child or adult designer's creation (g).

Short-term volunteers may include those who wish to participate in a single session or bring their technology to the team for 1-2 sessions. Finally, there are affiliated partners. These partners can range from long-term to short-term, but are identified by their external affiliation outside the University of Maryland, such as outside industry, government, and non-profit partners. Over the past 20 years, these partners have included the National Park Service, The White House, Sesame Workshop, Hex Bug, Google, Pearson, National Geographic, Carnegie Hall, and Discovery Communication, among others.

Current Team Practices

Consent is obtained from the parents of each child participant at the beginning of each year of participation, regardless of whether the child had participated on the team in the previous year. Snowball sampling, via chain referrals, is used to recruit child design partners and, as a result, it is common for children to have relationships with university faculty or to have pre-existing relationships with other children on the team. The team maintains a running waitlist of children that any child within the age range can be added to.

Usually adult design partners will initially join Kidsteam as volunteers to see if it is a good fit for them before taking on a more substantial role within the team. Adult design partners attempt to provide an environment where all team members have an equal voice in the design process while still maintaining some traditional aspects of control (e.g., timing activities, planning sessions, maintaining physical safety). Design session outcomes include in recommendations for the design of technologies, which may be incorporated into publically released products and/or presented in academic research papers. These materials may

contain photos of the participants. Finally, attribution for ideas, when it exists, is given to the Kidsteam design team as a whole.

At the end of each year, children are directly asked to consider whether they want to return to the team the following year. This determines the number of available places for new members, as the maximum number of children on the team has been eight or nine. As a thank you for participation, child participants are able to choose a technology gift valued up to $100 at the end of each year; their choice is subject to parent approval.

Typical Design Process

Kidsteam co-design sessions take place after school on Tuesdays and Thursdays (Figure 5). Sessions last for 90 minutes and follow a similar schedule. Starting with snack time, team members transition from their normal routine into a design mindset, establish rapport, and children reorient their perceptions of adults as authority figures to adults as design partners. All team members are then sit in a circle on the floor where the day's relevant domain knowledge, design prompt, and technique are discussed.

The team then splits up into small-groups consisting of 2-3 children and 1-3 adults. These small groups work independently of each other to address the day's design prompt. At the end of that time, each small group presents their ideas to the entire team. During this time, an adult design partner writes down all of the ideas that come from each group on a large white board and perform a rapid thematic analysis. The team has the opportunity to ask clarifying questions before the session is over. After the child partners have left, the adult design partners may discuss and iterate the themes that were presented in the session and will record all of the data (e.g., transcription of the white board, photographing artifacts).

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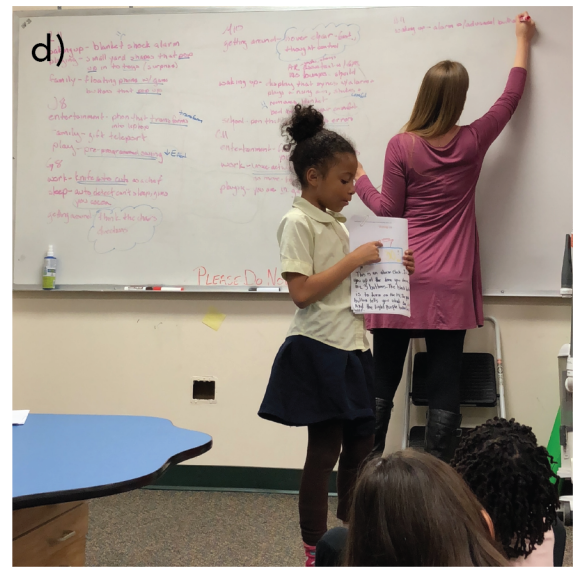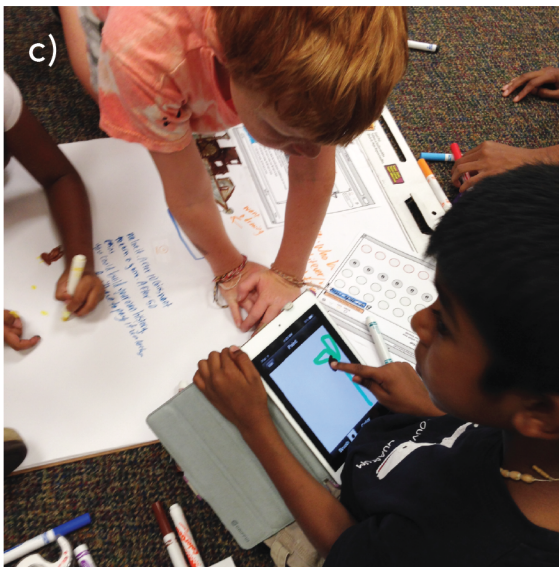
Figure 5. Parts of a Kidsteam Session. (a) Children and adults share a snack together and establish rapport, (b) the entire team discusses the day's design goals and topic, (c) smaller groups of adults and children complete the design activitiy, and (d) small groups present their ideas to the team while an adult transcribes and rapidly thematically analyzes them on a white board. The entire team then discusses the day's themes.

Project Types

Kidsteam alumni have been involved in the design of numerous children's technologies spanning industry and academia (Chipman et al., 2006; Hutchinson, Bederson, & Druin, 2006; Kolko & Druin, 2017; Norooz, Mauriello, Jorgensen, McNally, & Froehlich, 2015; US Department of the Interior, 2015). When initially founded, Kidsteam worked on a few grant-based projects; since then the scope of projects and partners at each session has widely expanded, including diverse cross-disciplinary researchers, cross-institutional academic researchers, non-profit organizations, government agencies, and industry partners. Researchers in the Human-Computer Interaction (HCI) and Interaction Design and Children (IDC) fields have provided recommendations for the design and development of technologies through their work with Kidsteam, particularly in the areas of storytelling (Hutchinson et al., 2006; Bonsignore, Quinn, Druin, & Bederson, 2013) and STEM education (Yip et al., 2014; Lee, Mauriello, Ahn, & Bederson, 2014; McNally et al., 2014).

Gains from Participatory Design Team Participation

Working with children in PD can encourage a number of benefits, including insights into what today's children want and expect of their technologies as well as inspiration for new directions for technologies. However, research is less clear on the gains to PD participants. Usually indirect benefits are discussed in response to this implied question; for instance, that a user's voice has been heard in the design of a technology that they are meant to use, being a member of the user group. Yet the direct gains to participants—those gains that relate to an individual's personal skills, competencies, and opportunities—are a similarly important potential outcome of PD.

Gains of Child PD Team Members

Despite seldom being the focus of research studies, direct gains to children can nonetheless be found throughout discussions and observations made by researchers in their descriptions of PD studies (Large et al., 2008; Mazzone, Read, & Beale, 2008; Pitt & Davis, 2017). Among the most commonly observed gains of child participants of PD teams are the related dimensions of collaboration and communication. Collaboration skills are a foreseeable benefit due to the nature of working on a design team, where the development of designs and prototypes requires collaborative efforts between team members (Druin, 2002; Garzotto, 2008). Similarly, researchers describe how increases in communication skills, which generally emphasize children's ability to share their ideas during a collaborative design process, occur both between children (Baytak & Land, 2010) and between children

and adults (Hourcade, 2008; Pitt & Davis, 2017). Another observed gain is content knowledge, as child designers are introduced to content knowledge that is relevant to design challenges. For instance, children designing a mobile application that incorporates thermography may gain
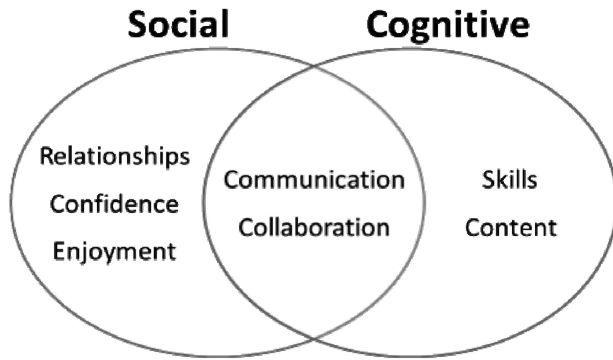
Figure 6. The social and cognitive experiences of child design partners (Guha, 2010).

content knowledge about heat transfer. Researchers acknowledge this fairly often, both in regard to broad content learning (Druin, 1999; Montemayor et al., 2002) and learning curricular units in schools (Baytak & Land, 2010). Additionally, as design is largely about solving problems, being part of a PD team may also help develop children's problem-solving abilities (Kafai, 2003). Finally, a less specific gain to participants that researchers have noted is an increased understanding of technology through increased exposure to it (Druin, 1999; Garzotto 2008; Montemayor et al., 2002). While fewer researchers describe other participant gains from involvement in design processes, it is important to identify all areas that may be significant from the perspective of child participants. These less frequently cited benefits include designerly-ways-of-knowing (e.g., tackling ill-defined problems) (Cross, 2006), creativity (Kafai, 2003), and fun (Large et al., 2006; Schepers, Dreessen, & Zaman, 2018).

In contrast to the previously discussed research, whose primary concerns were outside the gains of their participants, two studies have discussed gains to child participants more directly. A study by Hansen & Iversen discussed the motivating factors of teenagers

that participated in a PD project, and found motivations that included direct gains, such as *encouragements* (e.g., awards, lunch) and *being endorsed as experts* (e.g., respect, recognition) (Hansen & Iversen, 2013). Most pertinently, work by Guha investigated the impacts that participating on a PD team had on children over the course of a year of participation (Guha, 2010). Through observations of the children, artifact analysis, and interviews with the children and their parents, Guha uncovered impacts on child design partners that occurred during participation in the areas of social and cognitive skill development (Figure 6) (Guha, 2010). The next challenge—and one of the purposes of this dissertation—is to return to former child PD team participants and their parents and discover what, if any, impacts of participation are perceived as gains after participation has ended and what of these gains may be impactful to participant's futures.

Gains of Adult PD Team Members

With the origins of PD being in workplace democracy, many of the teams and projects involving PD and describing its outcomes have been, unsurprisingly, adult-centric. Only in recent years have we seen an increased interest in what personal, direct gains the diverse adult stakeholders on PD teams may incur. In addition to potential process improvements, developing an understanding of participant gains would advance our community's ethical ambition to go beyond "preventing harm" to participants, as promoting direct gains builds upon themes that are central to PD including attention and care for users (Bossen et al., 2012) and mutual learning (Barendregt et al., 2016; Bossen et al., 2010; Hansen & Iversen, 2013).

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Most notably, two studies by Bossen et al., (2010, 2012) and a third by Garde and van der Voort (2014) specifically investigate the gains of participants on PD teams. In each of these studies, perspectives in gains from participation are discussed across different stakeholder groups who participated in multi-year PD projects. Through retrospective interviews investigating the long-term gains that four distinct participant populations—teachers, administrators, students in their teens, and a politician—Bossen et al. reported that: "In this case, interdisciplinary communicative skills, knowledge, and experience with new technology, linked to their professional practices, were amongst the gains" (2010, p.149). The authors also described ways that gains were more pronounced amongst different stakeholder groups, and how not every member of the PD project experienced gains from participation. Similarly, Garde and van der Voort discussed how most of their adult PD participants exhibited gains in the areas of technology learning, insights into work practices, feeling heard, and having a generally positive experience (2014). While gains of adult members of PD projects have begun to receive attention, with encouraging outcomes, the gains of adults on PD teams that address multiple projects over a long duration of time and the gains of adults who work with children on PD teams has received no attention that I have been able to uncover, which is an area this work begins to address.

Frustrations Impeding Gains

While participatory environments may foster gains from PD activities, conversely an environment that is rife with frustrations may obstruct gains. In looking at impediments to user gains during a 5-year PD project with interdisciplinary adult stakeholders, Bossen et al. (2012) identified three frustrations that seemed to impede gains: unresolved differences

between aims, absence of a clear set-up for collaboration, and different conceptions of technology. Despite these frustrations on the project, participant gains included technology access and cross-professional networking. Similarly, in a multi-year intergenerational PD project with teenagers, misunderstandings and miscommunications among participant groups with different practices and vocabularies were challenges that may have obscured teens' feelings of ownership over the project (Pitt & Davis, 2017). Frustrations have also been discussed with regard to PD sessions with children, with adults and children alike describing difficulties including time commitment and becoming aggravated with other individuals on the team (Guha, 2010; McNally et al., 2016; Van Mechelen, Zaman, Laenen, & Abeele, 2015). As a child PD participant in Guha et al. (2013) described:

> "'You just have to be patient with [adults], since they only know what adults know.' [...] This young design partner has taken an issue that concerns many researchers and turned it on its head – instead of adults having to patiently listen to children, he saw it as his job to allow the adults their shortcomings, and to work with the adults despite the challenges."

In work specifically investigating challenging PD group dynamics between children, Van Mechelen et al., uncovered six types of challenges that occur: groupthink (i.e., emphasizing consensus over discussing alternative choices), laughing out loud (i.e., not taking a design challenge seriously, potentially causing disruption), free riding (i.e., lowering effort due to lack of accountability), dysfunctional conflict (e.g., disagreements and inflexibility leading to contempt and polarization), unequal power (i.e., forceful opinions being heard more dominantly), and apart together (i.e., working individually and rushing to combine ideas before presentations) (Van Mechelen et al., 2015).

Accountability in Participatory Design Research with Children

The United Nation's Convention on the Rights of the Child (UNCRC) set out an international agreement that is symbiotic with the values that underpin PD, with Article 12 describing that "the child's views must be considered and taken into account in all matters affecting him or her" (UNICEF, 1989). Specific measures that protect the rights of human subjects within research is frequently discussed in regard to three foundational principles set out in the Belmont Report: adhering to beneficence though measures that address risks and benefits, adhering to justice through ensuring procedural fairness, and maintaining respect for persons through measures that promote informed consent to participation (US Department of Health and Human Services, 1979). The issues cover procedural ethics, which address issues related to regulations, as well as situated ethics, or those dilemmas that may arise while in the midst of conducting research. In this section, I discuss issues related to these principles as well as other issues of ethical import that are salient to conducting PD research with children, including: Consent, Anonymity, Adult-Child Power Structures, Participant Experience, and Use of Ideas.

Consent

As part of commitments to respect for persons, researchers working with human subjects are required to obtain informed consent (Bankert & Madur, 2006). Children cannot legally sign a consent form, and parents must and should be properly informed to give consent for their child's participation (Bourke & Loveridge, 2014). In line with the philosophy that children have the right to be respected (UNICEF, 1989), children are

typically asked to provide their assent to participation in research, which is a non-contractual, usually verbal, agreement to participate that is specifically delivered in language children can understand (Dockett et al., 2013). Existing social research theory argues that obtaining assent must be an ongoing process (Bourke & Loveridge, 2014; Morrow & Richards, 1996), a point that has increased relevance with respect to PD research methods where involvement can span multiple years. The variety of possible outcomes of design partnerships (e.g., published papers, new technologies) adds a layer of additional complexity in obtaining assent from children, as descriptions of these outcomes must be explained to children in addition to the design processes and activities that they will be undertaking (Read et al., 2013).

Dissent

As with consent, allowing dissent during the research process is vital to researchers' responsibilities (Bourke & Loveridge, 2014). As noted by Kellet (2005, p.20), "some parents might put pressure on their children to participate because they decide the experience 'will be good for them' or there will be 'educational benefits' when the children themselves have no real interest in or motivation for research activity." Issues of dissent have increased relevance in long-standing relationships, such as Cooperative Inquiry. In long-term research partnerships researchers need to be attuned to forms of verbal and non-verbal dissent, as well as it is a part of a design session that a participant may be dissenting to (e.g., particular projects, techniques).

Anonymity

A common strategy used in adhering to the principle of beneficence is to maintain the anonymity of individual participants to protect them from harm (Martin, 2007). Issues of consent and assent with children can have implications for anonymity. When researchers find it necessary to use a participant name in the reporting of their research, it is common practice to substitute pseudonyms for actual participant names. While consent to use an image may have been obtained from a parent or adult research participant, assent from children when using their likenesses may not be required to publish an image that may reveal their identity. In efforts to address this issue, when using images to illustrate research that is being done many researchers will photograph participants from the back or may instead photograph the design artifact. Such practices may reduce the usefulness of the image if pictures from behind do not fully express an experience.

Adult-Child Power Structures

When working with children in participatory research, Morrow and Richards assert that overcoming unequal power structures between children and adults is the biggest ethical challenge researchers face (1996). Thomas expounds on the importance of this issue, discussing the importance of facilitating ways to, "allow children to participate on their own terms" (Thomas & O'Kane, 1998, p.338). This concern echoes values inherent in Scandinavian PD processes, which require a balance of power structures so that all participants have a legitimate voice in the design process (Iversen & Smith, 2012). However, in most aspects of a child's life adults are authority figures (*i.e*, parents, teachers, etc.) who

possess the decision-making power. Due to these relationships, some researchers contend that balance of power between children and adults is not possible (Large et al., 2006). In previous work on CI, Guha et al. have qualified how the change in adult-child power structures apply specifically to this method, stating that, "we do not try to change all pre-existing adult/child relationships, merely the ones that exist in the context of the design process" (2004, p.18). The goal is to uphold children's right to participate on their own terms and have a legitimate voice in the design process, while adult researchers maintain aspects of authority outside the design activities during of each session, such as planning the design activities and maintaining a safe environment for all team members.

Domain Knowledge

Another potential contributor to unequal adult/child power structures, and therefore a barrier to giving all participants a legitimate voice in the design process, is the potential for a lack of domain knowledge. As Scaife et al. detailed: "...[children] neither have the time, knowledge or expertise to participate in the collaborative model prescribed in PD approaches" (Scaife et al., 1997, p.344). While the goal of design teams is not to create experts in every domain (Guha et al., 2013), the need for domain knowledge—for both adult and child design partners—must be addressed. CI sessions include a period of discussion between the entire team regarding the content of the session's activities to introduce new topics (Fails et al., 2013). External domain experts may also work with the team to supply information the team requires.

Use of Ideas

Maintaining the values of PD that give end-users a legitimate voice in the design of technologies they are meant to use requires researchers to be conscientious in their inclusion of the ideas that are generated during each design session. Researchers have approached this process in several ways. Read et al. created checklists called CHECk1 and CHECk2 to make sure, at the outset of a project, that research processes are clear to children, such as how their ideas will be incorporated (Read et al., 2013). Members of this team also created a technique called TRAck (Read et al., 2014) to ensure fair representation of ideas that large numbers of child participants contribute during design sessions. In design sessions that include fewer participants, such as those that occur when using the method of Cooperative Inquiry, processes such as Idea Elaboration can be used to the include ideas generated by the entire intergenerational design team (Figure 4) (Druin, 2002; Guha et al., 2013). Idea Elaboration is the process of concurrently building upon a design with others, with each individual contributing new components to a single collaborative design (Guha et al., 2013).

Summary

This chapter covered the works related to participant perspectives on PD. Literature was reviewed which described the history and values that underlie PD; values which emphasize the inclusion of the user in the design process and valuing their perspectives on the systems being developed. Works concerning participation on PD teams around two topics that have received recent interest from the PD community were also considered: potential gains from participation on PD teams and concerns related to the inclusion of

children in PD research that have ethical implications. These areas have received varied degrees of attention from communities that employ PD methods, and the works described in this dissertation will extend these conversations by investigating these topics from the viewpoints of child and adult alumni of an intergenerational PD team.

Chapter 4:
A Study on the Perspectives of
Child Participatory Design Team Alumni

In This Chapter:
- Introduction
- Methods
- Findings
- Children's Perspectives on the Ethics of their Participation
- Children's Perspectives on Gains from Participation
- Limitations
- Conclusions

Chapter 4 presents work that contributed to two publications (McNally et al., 2016; McNally et al., 2017).

As previously mentioned, HCI practitioners have developed a number of ways to include children in Participatory Design. However, including children in PD has a number challenges that PD communities continue to discuss and try to address.

One of these discussions relates to challenges researchers encounter while striving to maintain ethical accountability toward the children on PD teams. For instance, researchers' commitment to respect for persons in the form of informed consent has traditionally focused on whether children are cognitively able to consent to participation (Morrow & Richards, 1996) or how to facilitate children's assent to participation while a parent or guardian remains

responsible for legal consent (Dockett et al., 2013). With regard to design research with children, there has been recent discourse on the challenge of making sure children understand how their ideas are incorporated into the designs to which they are contributing (Guha et al., 2004; Read et al., 2014).

Additionally, there has been discussion about the benefits child PD participants may receive from their participation. Indirect benefits—for instance, that their voice has been heard in the design of a technology that they, as a member of the user group, are meant to use—are often cited. In addition to remaining aware of indirect benefits, there is a need to assess what direct gains may exist for the children who are involved in PD. Specifically, if we uncover the benefits that youth on PD teams experience we can improve existing design techniques and devise new techniques that better support their paths to innovation. This could lead to better design recommendations from the PD process. In addition to potential process improvements, developing an understanding of participant gains would advance the ethical ambition to go beyond "preventing harm" to participants, as promoting direct gains builds upon themes that are central to PD: attention and care for users (Bossen et al., 2012) and mutual learning (Barendregt et al., 2016; Bossen et al., 2010; Hansen & Iversen, 2013), and core PD values of democracy, emancipation, and quality of work (Gregory, 2003; Muller & Kuhn, 1993).

In this study, I continued these discussions by surveying and interviewing former participants of a PD team, Kidsteam, giving them the opportunity to explicitly express their views on questions about ethics and gains that are traditionally left to the interpretation of researchers and practitioners. I asked two questions: 1) *How do former child participants*

view the ethical issues around their role on Participatory Design teams? and 2) *What gains, if any, do former child participants perceive from their involvement on a Participatory Design team?* The participants' retrospective, and in some cases adult, perspectives on these issues lend a new point of view to the discussions of children's participation design research.

Methods

Twelve child design partner alumni of Kidsteam with between 1-5 years of experience on the PD team participated in an anonymous online survey. Six child alumni volunteered to be further interviewed. The primary analysis of this study was the joint qualitative analysis of the survey short responses and transcribed interviews.

Surveys

Participants: I recruited former child design partners for an anonymous online survey by emailing their parents and asking them to pass on the invitation to their children. Two potential participants were not included due to a conflict of interest. Outdated contact information (e.g., work emails that were a decade old) prevented me from contacting at least 23% of the parents of the 56 eligible alumni. This resulted in 12 former child design partners (3 male, 9 female; Table 1) completing the online survey (21% response rate). Survey participants were members of Kidsteam for, on average, 2.3 years (SD=1.3) and at the time of the study four of these alumni were adults (age 18+). Survey participants included child design partner alumni who represented participation on the design team between 1998 (when the program began) and 2013.

Child Alumni Participant ID	Gender	Number of Years a Member*	Currently an Adult (Age 18+)*
CS1	Female	1-2	Yes
CS2	Female	3-4	Yes
CS3	Female	2-3	Yes
CS4	Male	4-5	Yes
CS5	Female	2-3	No
CS6	Female	1-2	No
CS7	Female	2-3	No
CS8	Female	3-4	No
CS9	Female	1-2	No
CS10	Female	1-2	No
CS11	Male	2-3	No
CS12	Male	5+	No

Table 1. Child alumni survey participants. Participants are identified by their participant group (i.e, C for child alumni), the data source (i.e., S for survey) and participant number (i.e., 3). For example, the third child alumnus to respond to the survey is "CS3".

*Exact measures are obscured to maintain participant anonymity; average years a member was 2.3 (SD=1.3).

Procedure: I created two survey instruments: one for child design partner alumni who were over the age of 18 (i.e., adults of the age of majority in the United States) and another for those who were under age 18 that required parents to consent and read an assent script to their child. Each survey began with a demographic questionnaire, was designed to take no more than 15 minutes to complete, and asked identical questions. Participants were not compensated.

Instrument Development. The survey instrument was designed to investigate the general experiences and expectations of child PD team alumni, and to prompt for reflections on subjects found within related literature. The structure of the online survey was designed to stimulate recall, as participants may have been thinking back as far as 1998 (up to 17 years at the time of the survey) and previous work suggested that participants reflecting on PD projects as recently as 6 months to 3 years after their participation ended may have challenges

with recall (Bossen et al., 2010). One way to, "increase [the] accuracy of reporting is to ask respondents to recreate an experience in their minds" (Fowler, 1995, p.24; Marsden & Wright, 2010]. Therefore, questions began broadly—such as, "In a few sentences, describe your experience with Kidsteam"—before delving more deeply into topics of interest. The online surveys included a combination of likert and open-ended short response questions. The language of the questions was derived from the Panorama Student Survey (Education, 2015), an open-source tool developed and validated by researchers at the Harvard Graduate School of Education and Panorama Education, which includes questions whose language is appropriate for children in grades 3-5 (or, alternately, grades 6-12). I performed expert reviews of the survey instrument with an online survey expert and a subject matter expert, updating the instrument based on their feedback. The online survey was then pilot tested with a current Kidsteam child design partner with 4 years of experience on the team—the participant was therefore knowledgeable about Kidsteam and would have several years of experience to reflect upon in the pilot test, but was also ineligible to participate in the study as they were not an alumnus.

Interviews

Participants: After completion of the online survey, participants had the option to sign up to participate in a follow-up, semi-structured interview. Seven child design partner alumni volunteered to participate in the follow-up interview; of these, I chose and interviewed the six participants (one male, five female) that best represented variety regarding the number of years as a member, time since participation, and gender. Interviewees were members of *Kidsteam* for an average of 2.0 years (*SD*=1.1) and, as a group, they represented participation

on the team between the years of 1998 and 2012. Half of the selected participants, 2 of whom were female and 1 was male, were currently adults (age 18+).

Procedure: Participants completed the follow-up interview at a location that was convenient to them, either on the university campus or via a videoconferencing service (e.g., Skype). Participants did not receive compensation. Parents of participants who were under the age of 18 could choose to be present during the interviews with their children as long as they agreed not to participate. Interviews lasted approximately 40 minutes. Participants agreed to be audio recorded during the interview in the consent and, as appropriate, assent processes. Interviews were transcribed for analysis.

Protocol Development. A semi-structured protocol was chosen to ensure topics were covered in a reliable, systematic order but would also allow me the flexibility to pursue relevant conversation topics as they transpired. To stimulate recall (Fowler, 1995), topics began broadly before more targeted questions were asked. Most topics were follow-up on survey questions; however, some topics—including consent, anonymity, and domain knowledge—were exclusively covered in interviews. I conducted an expert review with a subject matter expert before piloting the protocol. The interview protocol was pilot tested with the same current Kidsteam child member as the online survey. The protocol was iterated to reflect the feedback of the subject matter expert and the pilot test participant.

Analysis

My primary analysis consisted of the qualitative coding of the open-ended survey question responses and interview data. Following a method of coding prescribed by Strauss

and Corbin (1990), I began analysis by open coding the open-ended survey questions. This data was then iteratively categorized through two coding checks with my research team. I developed an initial codebook through combining codes that represented the results of the research group discussions, such as *Respect* and *Relationships with Adult Design Partners*, with ideas drawn from research literature, such as *Use of Ideas* and *Domain Knowledge*. This process resulted in an initial codebook containing 23 codes and their definitions, grouped under eight categories: *Relationships, Projects, Incorporation of Ideas, Security and Consent, Fun, Knowledge and Skills, Confidence,* and *Social Interactions*. The codebook went through an additional coding check with the research team to refine and clarify codes, resulting in 20 codes within the eight categories. The refined code set and code definitions formed the final version of the codebook.

Inter-Rater Reliability was then computed between myself and one other researcher on a random selection of 20% of the short response survey data and two randomly selected, transcribed interviews. We achieved a score of .92 using Cohen's Kappa, as calculated within NVivo software, considered *almost perfect agreement* (range: .81 to .99) (Viera & Garrett, 2005). Having reached agreement, I proceeded to independently code the remaining corpus of open-ended survey response and interview data.

To compliment this analysis, I provide responses to closed survey questions in the findings. All responses to Likert-style survey items are based on a 5-point scale, with 3 being neutral, and are reported in terms of average (*M*) and standard deviation (*SD*).

<center>Findings</center>

In this section I present my findings around children's perceptions of the ethics of their participation and their perceptions of gains from participation on a PD team. The illustrative quotes in this paper represent themes from the collected data. I identify the source of quotes by the participant group (i.e, C for child alumni), the data source (i.e., S for survey and I for interview) and participant number (i.e., 3). For example, the third child alumnus to respond to the survey has the identifier "CS3".

Consent

Interview participants stressed that the details of informed consent were the responsibility of their parents and that they were comfortable relying on their parents to provide this consent. For instance, when prompted specifically about their parent's consent to the potential use of their likeness in publications all (6/6) interview respondents indicated that they were fine with images of them as children being published. CI2 summarized this idea when discussing research publications, stating:

> *"Well I'm okay with it 'cause I knew my parents were okay with it. ...And the techniques they used for the research papers, I was okay with that because it was during sessions and we gave them permission"* (CI2).

In this participant's description of informed consent, there was a notable transition between the idea of permission coming from a parent (e.g., "my parents were okay with it") and permission coming from the parent and the participant (e.g., "we gave them permission"). Two participants went on to elaborate that the use of their image in academic publications was comparable to other experiences they had with clubs in which they had

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been members. For example, these clubs may have used their images in county newspapers or promotional flyers.

During discussions on their current thoughts about what was consented to on their behalf, two participants discussed times when they would have viewed the use of their information as inappropriate. Both participants described how using photographs that showed the likeness of children on the team would be only acceptable as long the images were not used *"in a judgmental context"* (CI5) or were not *"embarrassing"* (CI1). Participant CI1 also went on to explain that quoting statements she made as a child in works such as publications was only acceptable so long as the quoted statements, too, were not personally embarrassing in nature.

Dissent

Participants were asked if they had thought they could stop participating during parts of a session, for an entire whole session, or to leave the team entirely. Half of interview participants (3/6) explicitly described "never" wanting to stop participating in a session, as CI3 stated, *"I think it was too fun to ever think of [not participating] for me."* CI2 elaborated, describing that even if it was an "off day," participating was still desirable and acceptable to the team: *"I didn't bring my best ideas but it was still okay."*

The other half of interview participants (3/6) did not state that they wanted to stop participating during a session (or a part of a session), though they did describe a design technique or a recurring project that they did not enjoy. When asked if they would have felt comfortable not participating in these activities (i.e., to dissent), they provided two reasons why they felt that this would not be possible. First, the participants said that not participating

in a single session would not be possible due to logistical concerns (e.g., needing their parents picking them up). Second, the participants described that the project or technique being used was a temporary inconvenience. Regarding these inconveniences, CI4 explained:

> *"I enjoyed Kidsteam and I wanted to come back for future days, but it was like, I know we are doing the library [project] today. So instead of being more like, 'I'm going to quit today,' I'd be like, 'I'm going to go today because the next day it may be better.'"*

This suggests that child design partners might consider long-term experiences of their participation on the team and weigh them against short-term inconveniences, which may allow child design partners to set aside any less enjoyable aspect of the experience.

Ultimately, most interview participants (5/6) ended their participation on the team when the academic year ended, at the end of the consent period. One participant ended participation after an extended break between semesters. All interview participants described leaving the team to focus on other interests, such as hobbies or schoolwork, and two thought they were getting too old for the team.

Anonymity

Interview participants indicated different attitudes toward practices that relate to anonymity. In the previously reported findings on informed consent, participants indicated that the use of their likeness in publications, which may make them personally identifiable, was acceptable. However, two-thirds of interview participants wanted to remain anonymous with respect to the release of publications and other materials that might identify them by name. This is the practice required by standard ethics reviews and it complies with ethical

practices upholding the principle of beneficence. Interestingly, some interview participants indicated in their comments that this preference was complicated by other considerations. For example, when asked if they preferred that their identity be kept anonymous, CI3 stated, *"I don't know, probably anonymous. I don't want people to give me all the credit for just creating a simple idea."* This response was typical from participants and indicates that they perceive a relationship between wanting to maintain a degree of anonymity and wanting to balance attribution.

Adult-Child Power Structures

Participants in this study indicated the relationship that they had with other adult and child design partners was positive and respectful. According to the survey data, all child design partner alumni described their relationship with adult design partners as being respectful, with an average agreement score of 4.72 *(SD=0.52)*. Additionally, survey participants reported that their relationships with adult design partners and child design partners were similarly positive (*M=4.00, SD=0.89* and *M=3.8, SD=0.75*, respectively). Survey and interview participants attributed this relationship to factors such as environment, *"The setting was very comfortable"* (CS3), and feeling that adults were friendly toward them, *"Because it was very casual in a way that you could call them by their first names and that kind of made them more approachable."* (CI2). The overall environment, as CS12 described, was that, *"The members of Kidsteam were like a big group of friends that you worked with to solve problems."*

Additionally, survey and interview responses indicated that child design partner alumni recognized that adult design partners carried additional responsibilities (e.g., making

sure design sessions ran on time), but did not believe this influenced their ability to participate on their own terms when designing technologies. When interview participants were asked whether the responsibilities adults had during the sessions, such as structuring sessions, impacted their ability to have an "equal" partnership in creating design ideas, none believed it was an influencing factor. CI6 stated, *"No I don't think it ever influenced us at all."* Similarly, CI2 specified that, *"The adults just told us what [the design session] had to be about. They didn't tell us what we couldn't do or could do... Of course, there were times when they had to be like, 'we have to stop now.'"*

Domain Knowledge

Interview participants indicated that they were provided with the basic knowledge they needed to participate in design sessions as partners with adults. The majority (5/6) of participants described how adults either "always explained" what the session was going to be about or that adults were available to explain as needed. As CI2 summarized: *"They always explained what we were going to do, what was the background and everything. So, after that we got a pretty good idea what was going to happen and what we needed to do."*

One participant went so far as to say that, *"I think I felt like there was nothing we couldn't work on"* (CI1). However, CI6 suggested that domain knowledge could not always be sufficiently provided by the design team:

> *"We had Nickelodeon [...] a bunch. I didn't know anything about Nickelodeon. [...] The other kids who had grown up with Nickelodeon would participate more because they were more familiar with it [...] They could be like, 'oh blah dee blah can go here,' with the characters. I couldn't do that because I didn't know them."*

Participant Experience

While positive experiences were not universal, due to aforementioned issues such as not liking to use a specific design technique or working on a specific piece of technology, participants described an overall positive experience with regard to their membership on the design team. In their survey responses, participants indicated that their experience on *Kidsteam* was positive, with an average agreement score of 4.54 *(SD=0.52)*. CS4 stated, for example, that, *"My Kidsteam experience was some of the best times I ever had."* Statements like this were representational of the group's responses to experiential questions.

The use of certain techniques and the opportunity to work on certain projects were central in descriptions of participants' positive team experiences. For instance, CI4 stated, *"I remember Bags of Stuff was my favorite thing to do,"* and later returned to this idea in their interview, stating, *"I certainly liked the hazard stuff. Also, the group discussion where [adult researchers] take our Sticky Notes. And, the Bags of Stuff."* In the later statement, CI4 re-emphasized that particular techniques were enjoyable—the Sticky Note prototype evaluation technique and The Bags of Stuff low-fidelity 3D prototyping technique (Walsh et al., 2013). The participant also described a liking "the hazard stuff," which the participant described as a project that investigated how to create outdoor hazard signs that children would be able to understand. Similarly, CI1 described how experiences working on a specific project were foundational to reflecting on their design team experience positively: *"I was so proud of the Animal Blocks. Even to this day I think about how I got to impact that. In fact, it felt really cool to have that opportunity."*

Use of Ideas

Overall, participants believed their ideas were valued, understood their usage, and were motivated by the ways their ideas could be used. A majority of survey participants (9/12) believed that the team used their ideas directly or through synthesis with other team members' ideas. Survey participants also felt that it was important for the team to hear their ideas (M=4.30, SD=0.48). Additionally, participants agreed with the statement that their ideas were important to the team (M=4.10, SD=0.32) and that their ideas influenced the direction of the projects they worked on (M=3.90, SD=0.56).

In addition to indicating a belief that their ideas were important and useful, participants also described an understanding of the Idea Elaboration process that shaped how their ideas would, or would not, be implemented. CI6 specified how ideas were used when stating that,

> "We (Kidsteam) would always try to just combine ideas so there was never one above the other, it was all just equal. Sometimes ideas I had worked and sometimes they didn't and we'd solve it and move on. So, if an idea I had didn't really work out we'd scrap it. It wasn't a big deal."

Similarly, CS10 described how children and their teammates co-created successful designs: *"Many of the ideas that I have inputted have been seen in public, like the 'Do Not Touch' button. I may not have created the idea, but I certainly supported it."* During this process, it was also expected that, *"If [the team] worked on a project for two sessions, the ideas from the first session were present the second time"* (CS12). Not meeting this expectation could cause frustration. Participant CI5 described a series of design sessions where an external partner did not, *"incorporate any of our ideas or make [the technology]*

look more like the iterations we thought were best," and yelling at the partner because of this, saying, *"You're evil!"*

With regard to ideas that are disseminated publically, participants implied that they understood and were motivated by the potential for their ideas to be used in technologies with wide reach. Also regarding this wider reach, survey participants described liking that external, affiliated partners would use the team's ideas in their technologies (M=4.4, SD=.7). Discussing motivation for participating on the design team in general, CI5 described, *"If I didn't go [to Kidsteam] ... I'd go back to being an ordinary citizen with no impact on the world."* Discussing the partners the team worked with (e.g., the US National Park Service), survey participants indicated that they liked that partners could use their ideas (M=4.00, SD=0.94). CS10 described liking the additional impact these contributions could have, as, *"[The kids] knew that those partners had a higher chance of making our ideas public."* As an example of this impact, CS8 described that, *"During my time we improved the National Park Service's website."* Additionally, all interview participants who mentioned external partners (5/5) found the potential to impact the designs of external partners to be both exciting and motivating. CI5 encapsulated this idea, stating, *"I thought it was very cool that we had external partners that would use ideas for very big things."* One participant described a more direct motivation:

> *"We'd get to design things for companies and groups such as Nickelodeon and the [US] National Park Service. I was motivated because we'd get to work with these big groups"* (CI2).

Attribution

Participants described very specific desires for external attribution, and whether their names should specifically be used. All interview participants suggested that the idea of receiving public, individual credit for their ideas was unnecessary. One participant expressed concern over potential ramifications of having *"kids' names out there,"* suggesting, *"it doesn't seem like a good idea"* (CI5).

Half (3/6) of the interview participants suggested that the team as a whole should receive credit for contributions to the design of a technology they work on. CI2 provided an example of this perspective, stating: *"I think Kidsteam in general should be recognized because it wasn't just a single effort, it was a team effort."* Individual credit for their contributions to technologies the team worked on could then be obtained as desired through self-identifying as a member of the design team, as participant CI5 described:

> *"The kids can take credit all they want to their friends and parents' friends.*
> *[They can] say, 'These people work with Kidsteam, and I'm a member of*
> *Kidsteam.'"*

Furthermore, one-third (2/6) of interview participants described how the Idea Elaboration process that the team used would prevent individual attribution from being possible. *"It's hard to say exactly who had what idea. There was so much combining ideas so I don't feel like there needs to be specific credit"* (CI6).

In addition to the external attribution participants receive, one interview participant expressed a desire for additional internal attribution, suggesting child participants be given a commemorative plaque or that photos of the design team be hung on the lab's walls.

Initial Responses on the Existence of Gains

Survey respondents were initially asked a binary question about whether they had learned anything from their participation on the team, with most (10) answering *yes*. One participant abstained from answering this question and another responded *no*. When the 10 survey participants who answered *yes* were subsequently asked a short-response question about what they learned, they described learning about design processes (9) (e.g., synthesizing ideas, brainstorming), conveying their ideas (4) (e.g., presenting), domain knowledge (3), and that their opinions mattered (3). These responses, in addition to those described throughout the entirety of their surveys and interviews, are elaborated upon in the following sections.

Communication

Improvements to their ability to convey ideas to other people, including giving presentations, were observed by half of the interviewed alumni (3/6). These participants described how their ability to communicate with non-peers improved—both communicating with adults as a child or, in one case, communicating with children now that the participant is an adult. One of the interview participants described how presenting helped her overcome feelings of shyness, as being able to rely on her teammates to present with her created a safe space to learn how to communicate her ideas: *"One thing that helped was being in a group and presenting. I didn't always have to talk independently"* (CI1). Similarly, survey responses by two alumni re-iterated the ideas that participation on the PD team helped them to, *"express my ideas to other people without feeling afraid"* (AS8), and to communicate with non-peer groups:

"I learned how to present and convey my ideas more effectively. I also think it helped me in my interactions with adults and expressing my ideas and concerns to them" (CS2).

Collaboration

New and improved collaboration skills—specifically, being the ability to work with teammates to produce and evaluate prototypes—was a gain noted by half of the alumni participants (4/6 interview, 5/12 survey). As CI6 said: *"I think the most important thing I gained from Kidsteam was working in a group. [...] You had to work and learn how to mix people's ideas and make new things from that, and not overpower the group."*

This participant also explained how these new skills applied to current schoolwork: *"They make me work in groups in school, so it's helpful to know how to not [only] be a leader but to help move the group forward, which is what I felt like I did in Kidsteam."* Similarly, CS10 described working with the team as a safe space to produce and combine ideas, *"Being able to give equal amount of support in designing something as the next person, and having those ideas be listened to without the fear of discrimination."* In addition to mixing and combining ideas to make a single design prototype, collaboration was discussed in terms of facilitating brainstorming: *"Even if my thoughts were not used directly, all of the ideas bounce off each other and spark new trains of thought"* (CS3).

Confidence

During discussions about their experiences on the team, most alumni interview participants (5/6) described an increase in their confidence (i.e., their ability to handle design

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tasks) as being interrelated with impacts on *self- esteem* (4/6) (i.e., how they felt about themselves as a person). More specifically, alumni realized the *value of their opinions and ideas* (5/6), especially when working with partners outside the university, such as the White House: *"When we went to the White House I realized [our ideas] are probably going to be affecting the whole country"* (CI2). These ideas were reflected in the survey responses, through comments such as, *"I learned that my opinion mattered"* (CS1), or another participant who noted that, *"My ideas do matter as a child"* (CS3).

Material Benefit

Alumni participants described the benefits of receiving the end-of-the-year gift. When asked what they believed the purpose of the end-of-the-year gift was, survey participants (12) described it as: a thank you (6), a reward for hard work (3), a way to attract new members (3), and a way to inspire kids with technology (2). Interview participants (2/6) described how choosing technology gifts they wouldn't normally receive was motivational:

> *"[There was] the prospect of getting this thing at the end of the year when I was at a point in my life when other people are deciding what I would get. Ram sticks so I could play Lord of the Rings, Battle for Middle Earth? There was no possible way I could have gotten that besides Kidsteam"* (CI5).

Participant CI1 similarly described the end-of-the-year gift: *"It was a $75 parrot robot. This was the most extravagant thing I ever owned... I remember thinking that it was something that we could have created at Kidsteam."*

Design Process

Design process knowledge was one of the most common gains expressed by both interview participants (6/6) and survey participants (12/12). Alumni discussed the design process in three primary ways: 1) the design techniques that were used, 2) having new problem-solving skills, and 3) insights into the complexity of the design process. With regard to the design techniques used in the sessions, when referring to the Big Paper technique CS1 described how, *"I learned... it is also possible to draw something on a piece of paper and have it show up as a game on the computer."* Certain techniques were favored over others by participants, as with CI1 who, *"hated journaling with a passion"* but, *"love[d] Bags of Stuff more than anything."*

Alumni also spoke about their understanding of design processes in terms of having new strategies to solve problems: *"I learned how to approach problems differently"* (CS6). Participant CI4 expanded on this idea, stating, *"It's not exactly like I could tackle problems I normally couldn't, it's about having a different strategy to solve the problem."* This ability to address problems in a different way applied to current creative interests and schoolwork of alumni. For example, participant CI4 described how creativity learned from Kidsteam helped with "art and fiction writing" that was done for fun, while Participant CI3 described how using design techniques learned on Kidsteam helped with schoolwork:

> *"When I'm doing a craft for a school project I kind of use the designing techniques that Kidsteam taught us. And also, I'm going to be taking Robotics Class. I'm pretty sure that's going to start helping. Even though we didn't really work with robots [on Kidsteam], the design factor is still there."*

Finally, alumni described how they navigate the complexity of designing technologies. For instance, CS3 described how part of the responsibility of being a designer is taking into consideration how technology will *"work with many people"* and how designers *"have to consider many points of view."*

Career Direction

The three alumni interview participants who were currently adults (age 18+) each described how their history with adult members of the PD team influenced their career paths. These alumni described how they had re-contacted adult design partners who were currently working with the team, and how these adult design partners had directly influenced the alumni's job prospects through helping them obtain internships and job opportunities. Two alumni participants also described how Kidsteam influenced their undergraduate course selection, such as participant CI5:

> *"Now I'm studying CS, trying to figure out how to take as many design classes as I possibly can... I don't think I ever would have gotten close to that career path if I hadn't been in Kidsteam, but that's definitely the stuff that Kidsteam does, and it's what I'm hoping to do."*

Factors Influencing Gains

Child alumni discussed factors that may influence the prevalence of gains or their ability to report gains from their participation on a PD team, including enjoyment, recall, enjoyment, frustrations. For instance, all survey participants (12/12) found the experience to be *"fun"* or *"very cool."* Participants also described their relationships with adults as being respectful and positive. As participant CI4 summarized, *"I really liked the program."* Alumni

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also cited frustrations, such as disliking a particular design technique, a recurring project, or not always *"getting along with"* the other child members of the team. While not a frustration per se, one participant described the importance of having an inviting design environment: *"The new location was so much better. It was clean. [It] didn't smell musty or have dark hallways like The Shining, where the lights were always off"* (AI1).

Discussion on Children's Perspectives on the Ethics of their Participation

The increased involvement of children in design research magnifies already complex issues of ethics and values underlying design processes. Power structures must be continually addressed, domain knowledge for individual design sessions must be consistently provided, opportunities for assent and dissent must be consistently monitored, and participants must be made aware of the diverse uses of their ideas. In this work, I tie the voices of former child design partners to these issues to better improve our understanding and further enable researchers to "do more" than the base requirements of ethical accountability (Read et al., 2013). Here I discuss the findings as they relate to three topics: (i) finding a balance between attribution and anonymity, (ii) promoting ongoing dialogues about consent and dissent, and (iii) cultivating a balanced design partnership between adults and children.

Balancing Attribution and Anonymity

Legal and ethical requirements rightly protect the anonymity of research participants (Martin, 2007). However, when the involvement of children in research moves into the creative sphere, as it does with Participatory Design, issues of attribution arise. *Do child*

participants desire credit for their designs, regardless of what parents have consented to on

their behalf? If so, is it possible to balance attribution with protecting their identities?

Being a member of Kidsteam was a source of pride for many former child design partners, and therefore many desired some form of attribution for their work. This study suggests that public attribution for contributions should be given to the team as a whole. Participants described this method of attribution as having two benefits: protecting anonymity and maintaining accuracy. With respect to protecting anonymity, participants in this study described how crediting the team protects their individual identities by keeping their names private, particularly on projects that were "larger." Participants felt this form of attribution provided them with a degree of discretion, as they described how this measure allowed them to decide who knew they participated on Kidsteam or what projects they were contributing to. Participants also described how this form of credit most accurately represented who deserved the attribution, which here refers to the entire team as opposed to a single member.

The preference for team attribution may be related to the participants' understanding of how their ideas were included in the Idea Elaboration processes. While other methods of PD with children allow for the tracking of individual ideas, and therefore makes individual attribution possible, the method of Cooperative Inquiry relies on Idea Elaboration (Fails et al., 2013; Guha et al., 2013) and individual contributions were perceived as being somewhere between difficult and impossible to determine.

Promoting Ongoing Dialogues on Consent and Dissent

Consent to participation in research activities should be an ongoing process (Bourke & Loveridge, 2014; Dockett et al., 2013). While yearly renewal of consent may not be

required by standard ethics reviews, participant feedback suggests that natural breaks, such as the end of a year or a break between semesters, provided a natural end point where they could comfortably leave the team to pursue other interests and activities.

While some design partners described always wanting to participate, and therefore had not faced issues pertaining to dissent, others described techniques or projects that were not enjoyed. These elements of participation were approached with the mindset that, while a particular day's activity might not be enjoyable, the next session's activities would likely be better. Nonetheless, dissent is defined as, "the capacity or *opportunity* to say or express 'no,'" (Bourke & Loveridge, 2014), and the comments of participants leave us wondering if the design partners who described not liking a particular project or technique fully perceived their opportunity to dissent to different aspects of participation. This particular issue is one with nuance that is unique to design research, and suggests that all PD researchers who work with children should consider issues of dissent thoroughly.

Children may feel unable to dissent because of the context of the situation and the power structures that exist outside the area of designing: Would their parents be upset, or able to pick them up early? In a long-term partnership, children may also be disinclined to dissent because they want to participate in the next session, and, correctly, consider the current "obligation" to be temporary. These considerations suggest that additional mechanisms to allow for child dissent in design research may be necessary. Pragmatically, we may only have a limited time to work with children and may be depending on their input. Nonetheless, we have a responsibility to gauge children's ongoing assent to participation and need to facilitate environments where they understand, and are comfortable, dissenting.

Additionally, researchers engaging in long-term intergenerational PD research have to be perceptive enough to consider whether or not an "off" day indicates that the child is unhappy with participation overall. Participants suggested that while child design partners may have "bad days" they still want to participate on the team. Accordingly, participants should not be asked to leave a design team or be perceived as dissenting to participation as a whole based on one difficult design session. Instead, researchers must assess the situation in terms of ongoing participation to determine whether or not this is a temporary state that needs to be accommodated.

Cultivating a Balanced Design Partnership

The first, and most substantial, step toward helping children develop an understanding of the democratic process that underlies how and why they engage in PD is addressing power structures of the adult-child relationship. This work suggests that through a PD approach to design, child design partner alumni related to the adult design partners they worked with in a manner similar to how peers are described in constructive workplaces: respectful, positive, and balanced. Participants recalled endeavors that researchers deliberately put in place to address power structures and noted that they increased their comfort during the design sessions. The measures participants recalled were simple ones, such as wearing casual clothing and using first names, and can be easily applied to PD research methods adapted for use with children (Druin, 1999).

Another essential component of minimizing power structures, toward the goal of achieving balance in a design partnership, is making sure that child participants know that their design ideas matter just as much as the ideas of other stakeholders. The feedback from

former participants in this study agrees with reflections from other researchers about their PD processes, namely, that: "The Scandinavian approach effects the power relations among stakeholders and provides children with a legitimate access to the decision-making process" (Iversen & Smith, 2012, p.113). My work demonstrates that participants not only understood the Idea Elaboration process used by the design team— to the extent that they knew not all ideas generated would be used in a resultant design— they also *expected* that the most commonly agreed upon ideas among the entire team would be part of the final technology, or the next design iteration that they were asked to work with. Connecting the teams' ideas to features that were implemented in the next iteration of a technology or to technologies that were publically released was one of the most common ways participants described their positive experience on the PD team. The pride felt in participating on a PD team was linked to participants' ability to have a real-world impact.

Discussion on Children's Perspectives on Gains from Participation

How participants are involved on PD teams matters. To continue to improve the PD process and techniques, and to create better technologies from this improved process, it is critical that HCI research goes beyond discussions of indirect benefits to participants by acknowledging that participant gains can be a part of PD outcomes. My study found evidence of direct gains from PD team membership, which included new personal skills and competencies. A number of issues that are relevant to conducting PD activities with children, ages 7-11, will be discussed, which include the continued applicability of gains, the missing gain of content knowledge, and obstacles to gains.

Continued Applicability of Gains

Within the findings of this study we learn that participants may actively benefit from their participation on PD teams, enabling a way for HCI researchers to do more than "prevent harm" to participants—to have an *attention and care* for participants such that they *actively benefit* from participation in research programs. While attributing gains to a particular experience can be a difficult task (Bossen, 2010), participants in this study nonetheless described ways that gains from their time on the PD team extended beyond their participation on the team and had relevance to their schoolwork and personal lives. This continued applicability of gains and lessons from participation are important, as methods of PD with children can ask a lot of participants—particularly those that require a long degree or duration of participation, as the team in this study did. In fact, it may be that these gains are due, at least in part, to participants' long-term participation; child participants in this study choose to remain with the team for an average of 1.8 years.

A Missing Gain: Content Knowledge

A noteworthy exception to the gains participants perceived in this work is *content knowledge*. The topics covered in design sessions (e.g., science inquiry, language learning) are a potential source of gains. Previous research suggested that content knowledge could be an expected outcome: *content* was a cognitive impact found in Guha's year-long case study evaluation of children on a PD team (Guha, 2010), and *specific content* is one of three areas, along with *general* and *design* skills, where Barendregt et al. posit PD could incorporate learning goals (2016). However, the gains described by participants in the research reported

here, while largely discussing the other topics within these two models, did not include content knowledge. This does not mean that content knowledge was not part of participants' immediate gains, nor do I believe these gains are non- existent after participation has ended. Rather, I believe this points toward an opportunity to encourage participants to perceive the value of the content presented in PD sessions, and that this gap points toward the need for work such as (Barendregt et al., 2016; Baytak & Land, 2010; Bonsignore et al., 2013) that make content goals explicit, and toward the potential for new roles such as Protagonist (Iversen et al., 2017), which already incorporates periods of reflection, to fill this need.

Reflections on Obstacles to Gains

An essential step toward the goal of fostering participant gains is not only to identify and illustrate direct participant gains, but also to develop an understanding of the obstacles to attaining gains. While participants in this study noted a number of gains and described relatively few frustrations, this may have been influenced by an increased likelihood to respond to calls to participation if they had a positive experience on the team. Nonetheless, child PD participants in this study as well as child PD participants in previous works have described frustrations that could have impacted gains (Guha, 2010; Bossen et al., 2012).

Limitations

I acknowledge several limitations to this study. While the participant perspectives described in this work may be valuable to any researcher including children in PD, these findings are described through the lens of participants who were members of a Cooperative

Inquiry team, which emphasizes long-term relationships with design partners. It is possible that the participants who chose to take the survey and sign up for the subsequent interviews were more willing to respond due to a positive recollection of their experience. While participants were asked to focus on their experiences as child design partners, some participants had returned to the team as adult design partners later in life and may have had challenges distinguishing between the experiences; though, the experiences were distinctly described. During the study, I asked participants to describe past events; therefore, recall bias is also a concern, particularly for participants that were asked to think as far back as 18 years ago. To minimize this potential source of error, former child design partners were both surveyed and interviewed. The respondents were also largely female in both the survey and interview participant groups, introducing a gender skew into the results.

While none of the child design partner alumni had a relationship with the interviewer during the time they were child participants on the design team, one interview participant had a prior adult working relationship with the interviewer. While this participant may have been less likely to provide negative feedback, this participant, unprompted, asserted at the outset of the interview that the feedback given was, "going to be candid."

Conclusion

In the course of understanding participants' perspectives of their membership on a PD team, I presented the first assessment of how child alumni viewed ethical issues around their participation in this research process, which is a necessary step for researchers in understanding the success of their ethical accountability practices. Additionally, this work

contributes a new understanding of what gains to former child members of a PD team experience and attribute to their participation. These findings identify and describe the direct gains to children and have implications for how the PD process of developing new technologies can positively impact the participants who partake in that process.

Chapter 5:
A Study on the Perspectives of
Parents of Child Participatory Design Team Alumni

In This Chapter:
- Introduction
- Methods
- Findings
- A Discusson on Parent's Perceptions of their Children's Gains
- Limitations
- Conclusion

Chapter 5 presents work that contributed to a prior publication (McNally et al., 2017a).

In the previous study, I surveyed and interviewed child alumni of a Participatory Design team to determine the first-hand perceptions of child membership on a PD team. Results from that study had implications for children's perceptions of the ethics of their participation as well as the gains from their participation.

In this second study, I obtained an alternate perspective on the gains children on a PD team experience by surveying and interviewing the parents of child alumni. This perspective is valuable because parents of child participants can observe their child's behavioral and attitudinal changes outside team participation, and therefore offer a new perspective on gains to children that may enhance or differ from those of participants—who

may not have noted behavioral changes in their youth—or researchers such as the adult design partners—whose ability to observe behavioral and attitudinal changes is limited to the time and purposes of PD sessions.

Obtaining a deeper understanding of participants' perspectives on the gains resulting from children's participation in PD could be of mutual benefit to both researchers and child participants, as it can lead to improvements to how PD design sessions are conducted as well as improvements to the outcomes of PD sessions. This work attends to the gains that child PD participants experience in an effort to 1) improve the PD process and PD techniques, 2) create better technologies from this improved process, and 3) enhance participant-researcher relationships. In this study, I ask, *"What gains, if any, do parents of former child participants perceive from their children's involvement on a Participatory Design team?"* To obtain the viewpoints of parents of alumni, 17 parents, who cumulatively had 21 children participate on the team, were surveyed online and four were subsequently interviewed.

Methods

This chapter presents an analysis of surveys and interviews that I conducted with parents of child design partner alumni. The survey short responses and interviews from this study were jointly, qualitatively analyzed.

Surveys

Participants. As parents could have multiple children participate in Kidsteam, the 17 parents that were surveyed (4 male, 13 female; Table 2) cumulatively had 21 children (10

Parent Participant ID	Gender	Number of Children Who Participated	Number of Years Children Were Team Members
PS1	Female	2	3-4; 3-4
PS2	Male	2	3-4; 3-4
PS3	Female	1	1-2
PS4	Male	1	1-2
PS5	Female	1	3-4
PS6	Female	1	0-1
PS7	Female	1	3-4
PS8	Female	1	0-1
PS9	Female	1	5-6
PS10	Male	2	2-3; 1-2
PS11	Female	1	2-3
PS12	Female	2	1-2; 0-1
PS13	Female	1	2-3
PS14	Male	1	2-3
PS15	Female	1	1-2
PS16	Female	1	2-3
PS17	Female	1	4-5

Table 2. Parents of child alumni survey participants. Participants are identified by their participant group (i.e, P for parents of child alumni), the data source (i.e., S for survey) and participant number (i.e., 3).

*Exact measures are obscured to maintain participant anonymity; average years a member was 2.0 (*SD*=1.3).

male, 11 female) participate on the team. These alumni participated on Kidsteam between the years of 1998 and 2013, stayed on the team an average of 2.0 years (*SD*=1.3), and left the design team an average of 7.9 years prior to the start of the study (*SD*=4.9).

Procedure. I recruited parents for the anonymous, online survey through email. The online surveys for parents of design partner alumni were designed to take no more than 10 minutes. Parent participants did not receive compensation.

Instrument Development. The survey instrument for parents of child alumni included closed, likert-scale questions as well as open-ended, short answer questions. As with previous study, recall was a concern due to the potentially long duration since participant's

children's participation on the team. Therefore, the surveys also opened with broad questions to increase accuracy by asking parent participants to recreate their experience and their children's experience with Kidsteam in their minds (Fowler, 1995; Marsden & Wright, 2010). Topics were reflective of the study's research question and issues described in related literature. I performed a cognitive walkthrough of the interview protocol with a subject matter expert and updated the protocol to reflect the feedback received. I then pilot tested the online survey with a parent of a current Kidsteam child member, who had been a participant on the team for 4 years and was ineligible to participate in the study as the parent of a current team member, and further iterated the survey instrument.

Interviews

Participants: Survey respondents who stated they were interested in participating in a follow-up interview were recruited for follow-up interviews. Persons with whom there was a conflict of interest (e.g., advising members of this research) were excluded from the potential participant pool. Four parents responded to the interview request (1 male, 3 female), and represented the experiences of 6 child alumni (5 male, 1 female) who participated on Kidsteam between the years of 1999 and 2013 for an average of 1.8 years (*SD*=.75). Children of participants left the design team an average of 9.0 years prior to the study (*SD*=5.4).

Procedure: All participants completed the follow-up interview at a location that was convenient to them, either at the University of Maryland or via a videoconferencing service (e.g., Skype). The semi-structured interviews lasted an average of 23 minutes (*SD*=6.3). Participants agreed to be audio recorded during the interview; all recordings were transcribed for analysis. Interviewees did not receive compensation.

Protocol Development. The semi-structured interview protocol was developed to promote consistency across interviews and allow for probing into participant responses to obtain more detail. To address the previously described potential challenge with recall, the interview questions began with broad, open-ended questions—such as, "In a few sentences, tell me about your experiences with Kidsteam"—and later moved on to more direct questions about areas of interest derived from the literature and in response to the previous study with child alumni. I pilot tested the interview protocol with a parent of a former Kidsteam child member who was ineligible to participate in the study due to a conflict of interest, and further iterated the interview protocol.

Analysis

To illuminate differences and similarities between the alumni and parent perspectives on gains from participation, my analysis of the parent survey and interview data began with the codebook that was established in Study 1. The codebook was further refined after I analyzed a randomly selected, transcribed interview with another member of the research team to refine, clarify, and discover any emergent codes. During this process, a 9th category of *Fiscal Considerations* was added to the codebook (Appendix A).

Inter-Rater Reliability was then computed between myself and one other researcher on a random selection of 20% of the short response survey data and one randomly selected interview. A Cohen's Kappa score of .86 was achieved, as calculated within NVivo software, considered *almost perfect agreement* (range: .81 to .99) (Viera & Garrett, 2005). Having reached agreement, I coded the remaining data.

Findings

In this section, I present findings on the gains to child PD team alumni as perceived by their parents, as well as topics that relate to gains, (e.g., factors that may have influenced gains). The representative quotes presented in this section are identified by: participant group (i.e., P for parents), data source (i.e., S for survey, I for interview), and participant number (i.e., 3). For example, the second parent interview participant has the identifier "PI2."

Initial Responses on the Existence of Gains

When parent survey participants were initially asked a binary question about whether their child/children learned new skills from participating on the design team, 16/17 answered *yes.* While one participant answered *no,* the participant identified gains (e.g., confidence) in later questions. When respondents choosing *yes* were subsequently asked a short- response question about what their children learned, parent participants listed: design skill sets (9) (e.g., prototyping), group-work and collaboration (7), ability to convey their ideas (7), and comfort with technology (5). These and other gains discussed throughout the parents' surveys and interviews are discussed below.

Initial Responses on Expectations of Children's Participation

When parent survey participants were asked an open-ended question on what their expectations were for having their child join an intergenerational PD team, 9/17 explicitly mentioned that they hoped their children would *learn* something from their participation on the PD team. Other parents (7/17), while not stating learning goals explicitly, listed the

potential for new competencies such as improving self-esteem, learning to work with others, encouraging an interest in technology. Only one participant described having no expectations of participation.

Communication

When asked what impacts they noted from participating on a PD team, most (12/17) parent survey responses described how their children made improvements in communication, particularly with regard to giving presentations and communicating with adults. Parents described gains such as, *"presentation skills"* (PS8) and how participation on the team, *"has helped [my son] with advocating himself in school and with adults"* (PS16). Another parent survey participant (PS13) described how team events, such as speaking at a conference, contributed to improvements in her child's public speaking. In the follow-up interviews, a parent participant described how her children's team experiences might yet benefit them in the future:

> *"Also working remotely with people. The work [Kidsteam] did working with other teams far away will help [my son] because a lot of people work with others around the world"* (PI2).

Collaboration

Half of parent participants (3/6 interview, 11/17 survey) observed changes in their children's collaboration skills. Some parent participants discussed aspects of collaboration broadly in relation to working with teammates, such as the experience being, *"a good experience working with others"* (PS14) or, *"working within a group or team"* (PS1). Other

parent participants were more specific regarding how their child had learned to work with others to design technologies, such as PS16:

> *"He is so good at working with a group of people. He understands preparation, he knows that when he makes a commitment to work with others that he needs to do his share, but he can step back and let others do what they need to do and not feel like he isn't doing his job."*

This ability to compromise was an aspect of collaboration that was also described by other parent participants, such as PS11, who stated, *"She learned more about working with groups and the necessary compromises"* (PS11).

Confidence

Parents of alumni (4/4 interview, 10/17 survey) described how their children gained in confidence during their participation on the PD team, partially attributing this to how participation illustrated to their children how important their ideas were. Parents described how, *"[Participating] made [my daughter] more confident,"* (PS3) and, *"My child gained self-confidence in general"* (PS8).

Frequently, parent participants connected this confidence to children speaking about or sharing their ideas. Parent participants described how their children gained in *self-esteem* by having their *opinions valued*:

> *"It was very positive from the self-esteem point of view—the, your opinions are valuable point of view. [...] This is may be one of the few places where kids have their ideas seriously considered and discussed- and rejected or not, but in a real way"* (PI3).

Technology Exposure

Some parent participants (2/4 interview, 6/17) described how their children gained, *"computer skills"* (PS4) and became, *"more comfortable around new technology"* (PS3). Parent participants also noted that their children were *"exposed to interesting technologies"* (PS5) through participating on the design team, and that the exposure fostered continued interest in working with computers.

Financial Benefits

While potential financial benefits of children's participation was not specifically covered in the surveys, all parent interview participants (4/4) discussed the financial benefits of children's membership on the PD team, some noting that these benefits could motivate facilitating other children's participation on the team. These pragmatic gains included the facts that the program 1) was a free after-school activity, 2) included a free, 2-week summer program, and 3) offered a technology gift at the end of each year of participation.

Design Processes and Techniques

Design processes, such as *"brainstorming"* and *"applying specific prototyping techniques"* (PS8), were part of what parent participants (3/4 interview, 7/17 survey) discussed as an element their children had learned. Parent participants also described how their children still use specific design techniques from the PD team in their schoolwork and professional lives, such as PI2 who described their child's use of Sticky Noting: *"[My child] still loves his post-it notes."*

Respect in Relationships with Adults

Most (12/17) parent survey participants agreed that participating on the PD team changed perceptions of respect between their children and adults: both in terms of offering respect and expecting respect. As participant PS16 concisely explained, *"He affords [adults] respect and expects it in return."* Three of these participants specified that the PD team participation supported existing expectations of respect toward their children from adults, such as PS14 who stated, *"[It was] good to have adults model respect for him (but not saying it was a big change)."* Other participants discussed how the new expectations of their children contrasted with other adult relationships their children had:

> *"[My children] came to realize there were some adults who attended to what they were saying and to their ideas. They came to respect and like those adults. [...] And when they went to school and had to deal with adults who had no interest in their ideas they could recognize OK this is an adult that doesn't do that. We could think it over and talk about it, and that became part of our conversation in dealing with their public schooling"* (IP4).

Attribution of Gains

While all participants were asked to focus on what gains they believed stemmed from membership on Kidsteam, parent participants often emphasized both why and to what extent they attributed the impacts they were discussing to participation on the PD team. As previously mentioned, some parents described how the PD team setting either supported or enhanced existing expectations they held with regard to their children's behavior, such as SP11 who stated, *"[My child] was [...] accustomed to having [her] thoughts and ideas taken seriously by adults [...] I think the Kidsteam environment further supported this belief."*

Others, such as PI2 who homeschooled her child, credits participation on the team with cultivating certain gains entirely, and with great confidence:

> *"I was getting him educational opportunities wherever they were. I know there is where he picked up some reasoning skills, there is where he picked up typing skills. [...] I can ascribe [specific gains] to working with Kidsteam pretty firmly"* (PI2).

Factors Influencing Gains

Parent participants recounted two factors that may have influenced how they reported their children's gains: recall and enjoyment. Regarding recall, during interviews 2 of the 4 parent participants began descriptions of the experiences they and their children had by emphasizing that they were trying to recall events from many years ago, so it may be difficult to recall everything. The only parent interview participant who did not appear to have recall issues had a child who had left the team within two years of the interview. None of the survey responses (0/17) indicated issues of recall. Regarding enjoyment, parent participants observed that their children appeared to have fun on the PD team. *"He always complained to go to school every day but he was always very happy to come to Kidsteam"* (IP1). However, one parent recalled that their child said being on the team was, *"sometimes boring"* (PS15). Other parents explained how there was more excitement about attending on some days more than others, such as when the team was working on a particularly interesting project.

Discussion on Parent's Perceptions of their Children's Gains

This study explored the perspectives of parents on the direct gains their children received from participation on an intergenerational PD team. Below, I reflect on how these gains relate to 21st Century Educational goals and the methodological implications of acquiring multiple perspectives on gains from participation on a PD team.

Toward 21st Century Educational Goals

Parents of alumni who participated in this study described being motivated to sign their children up to participate on the intergenerational PD team by the potential for their children to learn new skills and gain new competencies. Moreover, while the team in this study meets outside of school hours, many methods of PD with children take place within classrooms. In considering this broader context of PD with children and the motivations of parents for signing their children up to participate in this type of research, researchers have suggested that the benefits of participation on PD teams should reflect the expectations of the schoolroom context that children are in (i.e., there should be learning involved) (Barendregt et al., 2016). Despite not seeing content knowledge in the results of this study, or in the results of study 1 with child participants, the parent participants in particular described other gains that relate to modern educational goals. The Partnership for 21st Century Learning (P21) is the most "detailed and more widely adopted" (Dede, 2010, p.4) of existing frameworks for 21st century skills (Partnership, 2017). Many specific skills are focused on within the P21 framework, including Life and Career Skills—among them *Flexibility and Adaptability, Initiative and Self Direction, Social Skills, and Leadership*—and

Learning and Innovation Skills—covering *Creativity and Innovation, Critical Thinking and Problem Solving,* and *Communication and Collaboration.* A number of these desired 21st century competencies overlap with the gains to child participants of the PD team highlighted by this work, including increased confidence, technology knowledge, and communication with adults. While work has begun to adapt PD practices for work in schools, both to make it more school-friendly (Horton, Read, Mazzone, Sim, & Fitton, 2012) and to design better learning tools and to uncover learning processes (Bonsignore et al., 2013; Barendregt et al., 2016; Baytak & Land, 2010), the overlap of gains from PD and 21st century learning goals suggests that the process itself may help meet the educational expectations of parents of child PD participants.

Multiple Perspectives on Gains

Obtaining multiple perspectives on a phenomenon is a common methodological approach, and is one this study suggests is particularly relevant to researching potential gains from PD team participation. When compared to the results of from the previous chapter, this work begins to build an understanding of distinctions between how gains are perceived from the perspectives of child PD team alumni and their parents. Parents of child participants can observe their child's behavioral and attitudinal changes outside team participation, and therefore offer a new perspective on gains to children that may enhance or differ from those of participants or researchers.

Gains were either noted by both child PD team alumni and their parents, but emphasized differently, or only noted by one group or another (Table 3). Regarding the former, while *Communication, Collaboration, Confidence, Design Process/Techniques,* and

Material/Financial Benefits were found across both participant groups, each group had a slightly different perception of these gains. For instance, while both participant groups discussed gains in lasting knowledge about design processes, parent perceptions of gains in this dimension were largely focused on specific design techniques, while child alumni participants described an increased holistic understanding of the technology design process. Gains noted by

Gains Described	Study 1: Alumni	Study 2: Parents	Differences and Similarities Between Study 1 and 2
Career Direction	✓		—
Collaboration	✓	✓	Both groups focused on teamwork and group compromise; child alumni discussed its applicability to prototyping
Communication	✓	✓	Both focused on presentation skills. Parents focused on communication with adults and alumni on overcoming fears
Confidence	✓	✓	Both described knowing children's opinions matter; alumni also related this to self-esteem
Design Processes/ Techniques	✓	✓	Alumni focused on broader and process insights; parents on specific design techniques
Financial Benefits		✓	Both discussed end of the year gifts; parents also pragmatically described the team as free after school and summer programs
Material Benefits	✓	✓	
Respect with Adults		✓	—
Technology Exposure		✓	—

Table 3. A summary of the gains children experienced through participating on a PD team that were described by child alumni and their parents.

only one participant group were less common, though important. For example, while alumni described their relationship with the adult design partners on the team as being respectful, it was only parent participants—having observed differences in how their children offered and expected respect from adults outside the design team—who described *respect in relationships with adults* as something gained through participation on the design team. From these distinctions, I note that the approach of asking two populations about gains from PD activities in this work points to a necessity of obtaining multiple perspectives on gains from PD. These

distinctions are important for situating findings in this and future works looking to inspire more meaningful forms of participation by supporting direct gains from PD activities.

Limitations

The ability of participants to recall information from their participation, as the team has been active for 18 years, is a potential limitation of this study that was noted by the participants in this study. However, what a participant may recall in this regard may be connected to what gains were most ingrained. As some parents noted, another limitation arises from the potential difficulty in attributing gains to participation on the PD team. Additionally, the survey participants were mostly female, there were a small number of participants, and it is possible that the parents who chose to participate were more willing to respond because they recalled their children's experiences positively.

Conclusion

This work contributes a new understanding of what gains to former child members of a PD team experience from the distinct viewpoint of their parents. These findings identify and describe the direct gains to children parents perceive and have implications for how the intergenerational PD process of developing new technologies can positively impact the participants who partake that process.

Chapter 6:
A Study on the Perspectives of
Adult Participatory Design Team Alumni

In This Chapter:
- Introduction
- Methods
- Findings
- Discussion on Adult Design Partner
  Alumni's Perspectives of Participation
- Limitations
- Conclusion

Children are the target audience of the technologies being developed on intergenerational Participatory Design teams, and as such it is children's roles, experiences, preferences, needs, and interactions that are often emphasized in research and process outcomes. This tendency overlooks the experiences of half of the members of these teams: the adult design partners. In the recent words of Yip et al., "the adult designer is not an invisible partner to be ignored, but rather key and instrumental to how the partnership runs" (Yip et al., 2017, p.5750) For instance, while the roles of children on intergenerational PD teams was conceptualized in the late 1990s (Druin, 1999; Druin, 2002) and still sees iteration 20 years later (Iversen et al., 2017), conceptualization of the complementary roles of adults on intergenerational design teams has been overlooked until very recently (Yip et al., 2017).

Similarly, the perspectives of adult members of intergenerational design teams regarding *their* participation on intergenerational PD teams is often overlooked in favor of the perspectives of the child design partners. This may also be partly due to the fact that adult perspectives are more challenging to capture: while child participants tend to have a clearly defined role (e.g., informant, design partner) and objective (e.g., provide design feedback) on the team, adult participants on the PD teams have more varied roles and objectives.

Within intergenerational PD teams such as Kidsteam, some adults participate on the team in much the same way as the child design partners: they join the team for at least a year, and can choose to return for multiple years, and they work on the many projects that are brought to the team. These adult design partners may be long-term volunteers, recurring research partners, and employees of the team. However, the many adults who participate on the team have diverse professional backgrounds, roles, affiliations, goals for participation, degrees of participation, and duration of participation. For instance, some adults participate as visitors to learn the team's techniques and processes, while others are stakeholders bringing their technology to the team. Even those adults who participate on the team most similarly to the child design partners tend to have additional responsibilities such as facilitating the design session (e.g., timing the design session, planning meetings) and maintaining a safe environment (e.g., monitoring bathrooms, accompanying children to pick-up and drop-off locations). Because of these differences in how children and adults participate in intergenerational PD teams, Yip et al. (2017) identified both the roles of adult team members (e.g., *observer* to *facilitator* to *design partner)* and dimensions of adult-child interactions that adults are responsible for.

In the previous studies that discussed participants' perceptions of gains from participation on Kidsteam (Chapters 4 and 5), child alumni and their parents described direct personal gains such as *interpersonal communication skills, offering and expecting respect,* and *design process knowledge.* In addition to personal competencies, previous work with adult PD projects found participant gains to areas such as their *professional work* (Garde & van der Voort, 2014) and *access to diverse professional networks* (Bossen et al., 2010). Through a deeper understanding of the perspectives of adult intergenerational design team members on their participation—made possible by the team's 20-year duration and the long-term nature of team membership—there is the potential to aid practitioners in making sure PD practices facilitate the personal goals and professional goals of the adult design partners.

In this work, I investigated two questions: 1) *"How do adult alumni of intergenerational Participatory Design teams perceive their participation?"* and 2) *"What gains, if any, do adult participants of intergenerational Participatory Design teams perceive from their involvement on a Participatory Design team?"* The participants' diverse, and largely unexplored, perspectives lend a new point of view to the discussions of direct gains from PD research.

Methods

This study consisted of two parts: anonymous, online surveys and follow-up, semi-structured interviews with adults who had been members of the Kidsteam intergenerational Participatory Design team. The primary analysis was the joint, qualitative coding of the short-response survey and transcribed interview data.

Adult Alumni Participant ID	Gender	Years a Member*	Age*	Role on the Team
AS1	Female	1-2	30-39	Consistent Volunteer or Visiting Scholar
AS2	Male	5+	30-39	Visiting Project Collaborator
AS3	Female	2-3	20-29	Paid Student Employee
AS4	Female	1-2	50-59	Consistent Volunteer or Visiting Scholar
AS5	Male	1-2	20-29	Paid Student Employee
AS6	Male	4-5	40-49	Paid Student Employee
AS7	Female	2-3	20-29	Paid Student Employee
AS8	Male	0-1	20-29	Consistent Volunteer or Visiting Scholar
AS9	Female	0-1	20-29	Consistent Volunteer or Visiting Scholar
AS10	Female	0-1	20-29	Visiting Project Collaborator
AS11	Male	5+	40-49	Paid Student Employee
AS12	Prefer not to say	1-2	30-39	Paid Faculty or Staff Employee
AS13	Female	3-4	30-39	Paid Faculty or Staff Employee
AS14	Female	5+	30-39	Paid Student Employee
AS15	Male	1-2	30-39	Paid Student Employee

Table 4. Adult alumni survey participants. Participants are identified by their participant group (i.e, A for adult alumni), the data source (i.e., S for survey) and participant number (i.e., 3).

*Exact measures are obscured to maintain participant anonymity; average years a member was 2.4 (SD=1.8) and average age was 33.7 (SD=8.4).

Surveys

Participants: Adult design partner alumni were recruited via email in fall 2017. Potential participants with whom there was a conflict of interest (e.g., advising members of the research) were excluded. Similarly, due to their potential prior participation in the child alumni study, those child alumni who returned to the team as adult design partners were excluded. Fifteen adult design partner alumni (8 female, 6 male, 1 preferred not to say; Table

4) completed the online survey. Participants 20–51 years old (*M*=33.7, *SD*=8.4). Their participation on Kidsteam ranged between the years of 1999 and 2017, averaging 2.4 years a person (*SD*=1.8). Participants left the team an average of 6.6 years before the study (*SD*=5.1).

Procedures: Surveys included a brief demographic component followed by questions about the participant's experiences, expectations, and outcomes from working with the design team. Surveys were designed to last no more than 15 minutes. To maintain consistency with the previous studies, participants were not compensated.

Instrument Development: The surveys questions included Likert-style items and open-ended, short-response questions. Questions began broadly to aid with recall (Fowler, 1995; Marsden & Wright, 2010), asking short-response items such as, "What was your strongest memory of Kidsteam?" before becoming more pointed.

The instrument was iterated from the survey instrument used with child design partner alumni and expanded to include questions relevant to adult experiences (e.g., facilitating sessions). I conducted an expert review with a former Kidsteam director and updated the instrument before conducting a first pilot test with an adult design partner who was currently a member of Kidsteam, and who had 3 years of experience on the team. Because the resultant iteration included new questions, I pilot tested the instrument again with another Kidsteam adult member, who had 1 year of experience with the team.

Interviews

Participants: After completing the online survey participants could volunteer to participate in a semi-structured interview to enable us to delve deeper into topics that were

broadly covered in the surveys. From the survey volunteers, 7 adult design partner alumni (3 male, 4 female) were asked to complete a follow-up interview. Interview participants were between the ages of 25-42 (*M*=34.9, *SD*=7.0), and participated on the team between the years of 1999-2017. Participants were selected to represent a range of duration of participation (*M*=3.4 years, *SD*=2.0) and time since they left the team (*M*=8.6 years, *SD*=5.2).

Procedures: Participants completed the follow-up interview at a location was convenient to them, either on the University of Maryland's campus or via a videoconferencing service (e.g., Skype). Participants did not receive compensation. The semi-structured interviews took an average of 40 minutes (*SD*=5.9), and covered topics related to participants' experiences and the utility of design session outcomes. Interviews were transcribed for analysis.

Protocol Development: The interview protocol was iterated from the one used with child design partner alumni and expanded to include questions relevant to adult experiences (e.g., their role(s) on the team). I performed a pilot test of the protocol with a Kidsteam member who had one year of experience on the team and I iterated the instrument. As this phase of my dissertation research required a second researcher to conduct the interviews (see "Role of the Researcher"), I trained the second researcher on this version of the protocol and had her conduct a second pilot test. This served the dual purpose of 1) testing the interview protocol and 2) making sure the new researcher was comfortable with the protocol as well as her knowledge of the topics that participants would discuss. I then made minor updates (e.g., formatting, typos) to the protocol based on the second researcher's feedback.

Data Analysis

My primary analysis for this study was the qualitative analysis of the transcribed interviews and the short response survey data. NVivo software was used to assist with the analysis. Coding began with the previously established codebook to promote comparison of differences in similarities in perspectives across these data, the child alumni population in Study 1, and the parent populations of Study 2. I further iterated the codebook by open-coding two randomly selected, transcribed interviews and 20% (n=3) of the short response survey data. Through this process, the category "Fun" (which was used to code any instance of "being or not being" enjoyable) was renamed "Sentiment on Membership" and two sub-codes were added to the category—Enjoyment and Displeasure—to aid later analysis. A new code for "Facilitation" was added, and the definition of "Material Considerations" was expanded (e.g., to include publications).

Inter-Rater Reliability (IRR) was computed between two researchers, myself and one other, on a random selection of 20% of the short response survey data (n=3) and two randomly selected, transcribed interviews. We achieved and IRR of .86 using Cohen's Kappa, considered *almost perfect agreement* (range: .81 to .99) (Viera & Garrett, 2005). I then proceed to independently code the remaining corpus of data.

To compliment my qualitative analysis, I analyzed responses to the 5pt likert scale survey questions and report them in terms of mean (M) and standard deviation (SD). Results from these questions will be paired with related, qualitative results.

Findings

In this section, I begin with a description of the gains adult design partner alumni participants perceived and attributed to their membership on Kidsteam and their perceptions on matters that influenced membership. The representative quotes presented in this section are identified by: participant group (i.e., A for adult alumni), data source (i.e., S for survey, I for interview), and participant number (i.e., 3). For example, the fourth adult alumni interview participant has the identifier "AI4."

Gains of Adult Design Partners

Design Process and Techniques

All participants (15/15 survey, 7/7 interview) described gains to their knowledge of the technology design process. The adult design partner alumni described changes to 1) their understanding of design techniques and research methods, 2) their design mindsets, and 3) their data analysis and interpretation skills. Techniques such as brainstorming, sticky noting, big paper, and bags of stuff were discussed by participants as having contributed to their *"strong understanding of research methods"* (IP2). As AS3 explained at several points, participants developed of a new understanding of the necessity of *"considering multiple points of view"* and *"not to be[ing] married to [their] designs."* AI3 elaborated, stating, *"It was very valuable for me to be there to really see and accept and understand why things needed to get done."* Finally, gaining the ability to interpret and analyze the data generated during the design sessions was appreciated by the participants. *"Listening to kids often*

involves a layer of interpretation" (AS8). This was also a skill, as AS2, described, that takes time to develop: *"Understanding how to translate the children's insights into the work we were doing is one challenge for novice adults."* Notably, multiple participants described how they learned to tackle these tasks rapidly, which has been helpful to them in future employment: *"Trying to think of those things on the fly-that's been really helpful"* (AI2); *"I learned the qualitative organization of information, really rapidly"* (AI1).

Career Direction

The participants (11/15 survey, 7/7 interview) who described how their Kidsteam membership affected their career described both direct and indirect influences. In describing the overt influences, SP6 explained that *"It got me started in my research career"* and AS11 stated, *"To be blunt, it changed the direction of my life."* Those participants who described more incidental influences emphasized the how participation offered experience that opened up new career paths; in fact, 14/15 of survey participants said that the *"practices or techniques"* learned from Kidsteam were relevant to them outside their participation on the team. As AI6 made explicit: *"It definitely expanded the career paths that I felt were open to me,"* (AI6). AS14 concurred, stating, *"Kidsteam was pivotal to all the work I did while in grad school, and has continued to be relevant in my professional career"* (AS14). Expanding on how influence had persisted through their academic and professional career, AI5 stated:

> *"I was able to talk about this concept of participatory design and that being something I was interested in doing or co-design on my grad school applications. [...] I did some research [at grad school] with kids and [...] I was able to use my experiences with Kidsteam for that project. And then*

that led to other projects and another grad school application and getting

into grad school elsewhere. So, it indirectly led to a lot of things."

Confidence

The majority of adult design partner alumni participants (12/15 survey, 7/7 interview) described increased confidence (i.e., their ability to handle design tasks) that stemmed from their design team participation. *"I am comfortable running all types of research today, and I feel I gained this confidence when leading Kidsteam sessions as a student"* (AS14). In addition to confidence in their personal skillsets, participants described how their new design mindsets made them more confident: *"Kidsteam made me a better designer and a more empathetic designer. Period"* (AI7). Finally, participants who had brought technologies to the team described how outcomes from the design sessions made them more confident in their technology designs, as AS2 described: *"The sessions with Kidsteam also helped to illuminate blind spots in our own designs and theories of action behind our designs."*

Collaboration

Participants (11/15 survey, 7/7 interview) described learning new collaborative processes (*i.e,* the ability to work with teammates to produce and evaluate prototypes): *"It's not just asking kids for their opinions and then we're taking their ideas. It's a give and take. It's an elaborative and collaborative process"* (AI4). Adults considered Kidsteam a "safe space" for collaboration, where *"somebody could come and draw on top of something I was doing. I never felt like anybody would just take something back or get very defensive about their work and didn't want it to be touched"* (AI2). Through this process, participants

"learned how to consider multiple points of view while letting those with more domain knowledge feel more empowered" (AS3). This style of collaboration changed how participants valued working with others, beyond children: *"It showed me the benefits of designing with users and of collaborating across disciplines"* (AS13).

There were, however, potential limitations to participants' collaborative gains. As AI1 described, "I think that one of my weaknesses in co-design is that it's hard for me to incorporate the ideas of other adults. I think the kids are better at it than I am."

Respect for Children

Survey respondents considered the Kidsteam environment to be respectful (M=4.7, SD=0.6; 5pt likert scale). The environment was, in fact, deliberately respectful. *"The adult team always made an effort to respect the children and treat them as collaborators"* (AS8), paying careful attention to *"[...] power dynamics that might get in the way of kids expressing their ideas"* (AI3).

Beyond their appreciation for the environment that was fostered at Kidsteam, participants (9/15 survey, 7/7 interview) described how they gained new respect for children's abilities and their expertise: *"I always learned something new from the kids"* (AS9). As AI6 summarized, *"It really raised my expectations for what kids are capable of doing."*

Material Considerations

Many of the eligible participants for this study would have received a form of funding (e.g., faculty salary, stipend with tuition remission, academic credit) at some point

for their participation on the team; 9/15 survey and 5/7 interview respondents in this study received funding as a result of their team participation. Beyond these financial benefits, participants (10/15 survey, 7/7 interview) described other material benefits from their participation, including: academic credit, contributions to personal MS theses or PhD dissertations, publications, and iteration of personal technology prototypes.

Facilitation

In addition to learning and contributing to the *requisite aspects* of facilitating a design session with children (e.g., scheduling, session planning and preparation, picking up/dropping off children, safety measures and instructions, debriefs and analysis) most adult design partner alumni participants (10/15 survey, 7/7 interview) also described their experiences with *design facilitation* and how they developed knowledges through the mentorship model that the Kidsteam design process employs. This knowledge was considered a gain by participants, such as AS2 who described, *"I was able to learn new facilitation skills that I have brought with me to other research projects."*

With regard to design facilitation, adult design partner alumni elaborated on their efforts to engage children in actively designing. *"Sometimes it would take a little bit more coaching for some kids to get them out of their shell, other times some kids would just be like 'this is great, this is what I'm doing'. Trying to balance those within the group could be tricky"* (AI2). *"Adults prompting to get ideas flowing"* (AI2) was commonly described, IP5 similarly described the process of encouraging children to design together: *"Sometimes it was one kid had one idea and the other kid had another idea and so there was this process*

of trying to merge them together so that everyone was happy, I feel that's more of what the adults did in the group" (AI5). As AS13 summarized, *"I recall the kids diving in and getting the ball rolling in brainstorming sessions. Adults asked questions, suggested new directions, and asked team members to expand upon ideas."* This was not an easy task to accomplish, given that one of the primary goals of the design process is to design equitably with children. AI5 described it as, facilitating, *"without trying to be seen as a facilitator, which is interesting."*

Participants also described how they gained design facilitation skills and knowledges through mentorship and mentoring. "When I started volunteering, [I was] kind of learning the process from the people who were the current GAs and professors and leaders of the team, watching what they were doing and then taking on more responsibility" (AI2). As adults become more senior and gained more experience, they become "more of a model, so whoever is leading will pair a more senior grad student with a less senior grad student, so the less senior grad student can learn how to work with the kids from the more senior grad students" (AI4). Being a mentor was also a role that experienced child design partners took on, as AI4 described: "I've seen many times where a child [...] takes the lead and are making sure that newer kids are being part of the process." It was when enough experience with the process was attained that the most successful design practices were achieved: "With new children, the adults would act more as mentors, while with the experienced children the partnership would be in full force" (AS6).

However, the lack of formal processes could also lead to uncertainty and a lack of clarity about the design team. AI5 reminisced about being unsure of their performance: *"When I first started conducting sessions I was nervous. Like, am I doing this right?"*

Participants also described a lack of clarity about recruitment practices, not knowing how children were signed up for participation (AI5), and how the research questions that the team investigated were developed (AS15).

Communication

The half of participants (8/15 survey, 3/7 interview) who spoke of gains to their communication skills described changes to four skill types: intergenerational communication skills (e.g., *"I became good at talking to kids as people"* (AS14)), cross-disciplinary communication skills (e.g., subject matter experts and technologists), public speaking and presenting, and general interpersonal communication improvements (e.g., listening, patience). Participants described becoming attuned to the different groups they were speaking to, *"To try to get a better feel for what they wanted to communicate"* (AI5), and how learned *"to listen completely without starting to populate your own ideas how you think a problem should be solved first"* (AI2).

Perceptions on Membership of Adult Design Partners

Enjoyment

Survey participants considered their participation to have been very pleasant (M=4.8, SD=0.6) and the environment to have been respectful (M=**4.7, SD=0.6).** Both survey and interview participants frequently described their time as being "enjoyable" and "fun." Their positive experiences were attributed to several factors, including the friendly environment within Kidsteam and working with external collaborators (e.g., Nickelodeon). As AI1

described, *"It was refreshing and rejuvenating... It was a highlight of my week."* Other participants agreed, noting how participation was *"an energizing break"* (AS14) because *"interacting with kids always brightened up my day"* (AS9); it was an overall *"rewarding, positive experience"* (AI6).

Frustrations

While overall rewarding, almost half (7/15) of survey participants responded yes when asked whether they "experienced frustrations" when working with Kidsteam, and all interviewees were asked to expand on any challenges to participation. The primary source of frustrations came from *program scheduling*, such as cancellations due to inclement weather, parents dropping of children late or cancelling last minute, coordinating with other researchers and visitors, and accounting for the schedules of children from different school districts. *Managing children* was next most common among frustrations, with regard to general behavior—*"managing kids who weren't making the adjustment"* (AS12), facilitating the design sessions—*"kids wouldn't combine their ideas"* (AI1), and managing interpersonal relationships—*"Some of the older kids, say ten or eleven years old, might not want to work with someone who's seven years old"* (AI5). However, participants also stressed that they needed to allow for children to have "off days", since sometimes *"Kids would just be tired or cranky and it was hard to work with them. Not their fault"* (AI3). This was especially true around national testing times, as *"those days [the kids] just look completely drained-like little zombies"* (AI2).

A few participants described frustrations outside these areas. *"Keeping up with the kids' energy"* (AS9) was considered a frustration, as *"working with the children can be tiring"* (AS11). Along a similar vein, the program structure was sometimes considered taxing: *"The pace of sessions 2X weekly is insane—it's a huge commitment for kids and adults"* (AS14). Receiving design feedback that wasn't constructive was another, more hurtful, challenge: *"One of the children wrote something that was upsetting, something like, 'I hate this thing.' You know, it's hard. You have to keep a thick skin, but it didn't make me feel good"* (AI7).

Program Impact and Attribution

Adult design partner alumni who were surveyed about whether they liked the fact that affiliated partners used the team's ideas in their technologies strongly agreed (*M*=4.8, *SD*=.4). Some participants (3/15 survey, 5/7 interview) discussed how the value they derived from participation was partly derived from the impact of their design contributions:

> *"You know, I think for a lot of kids the first time they would realize that something they had helped contribute to ended up in the software, that made something click and they realized that they were really having an impact on the design or technology"* (AI3).

Participants also questioned the process's limitations. *"I also wanted Kidsteam work to disseminate further outside the academy"* (AS13). Expanding on this idea, AI6 stated: *"We put so much thought and energy and time into developing these things that ultimately became research papers or websites that were rarely used, or prototypes that never became actual products. I guess it's kind of a frustration with academia in general [...]"* (AI6). Similarly, AI7 discussed limitations of the uses of the ideas the team would generate:

> "Many times, when the children would have these great ideas I would get
> back to my desk and realize you can't do any of them because you have
> constraints that the children weren't aware of" (AI7).

Where impact was attained, two participants described issues around attribution of ideas. Because of the Idea Elaboration (Guha et al., 2013) process, offering design credit was challenging: "The best ideas could never be attributed to an individual because they arose through exchanges between children and adults" (AS5). Attribution also encountered challenges due to policy restrictions, particularly for child participants, as AI3 noted, "In some ways the lack of credit for the kids is not a choice of the researchers but more of a legal requirement" (AI3).

Valuing the Opinion of "The User"

While adult design partner alumni survey participants somewhat agreed that it was important that the team heard their ideas (M=3.5, SD=1.1) and that their ideas were important to the team (M=3.8, SD=1.3), they offered a more pronounced (11/15 survey, 7/7 interview) description of how their participation was "an eye-opening experience" (AS6) that helped them develop personal confidence in the opinions of children:

> "When I first heard about the kinds of sessions that were run I was a little
> skeptical. I was like, here I am, I work really hard and study hard to make
> it to grad school. And there's going to be these kids telling me what I need
> to be doing. It just seemed a little odd and I was skeptical about it. [...] Over
> time I learned the value of the activity —that the kids would come up with
> ideas I wouldn't have come up with" (AI3).

This understanding translated beyond valuing the opinions of children, to valuing the opinions of *any* user population. *"I think we learned to embody the 'I am not the user' principle of HCI, listen to stakeholders, and synthesize results"* (AS7). AI3 expanded on this idea, commenting, *"I think just learning about the value of different perspectives, even if they're not coming from so-called experts or people with high levels of education. How that's really useful."* Similarly, AI7 described, *"We recognize that actually seeing people, hearing people talk about the problem directly, helps. [...] They understand their problem better than we do"* (AI7). Participants also described the value including users early in the technology design process: *"You need to ask users and include them from the ground floor. Users aren't secondary to the design and development of technology, they are the reason we are doing it"* (AS12).

Discussion on Adult Design Partner Alumni's Perspectives of Participation

The aim of this work in this chapter was to understand how adults who participate in intergenerational PD teams perceive their participation–that is, how they perceived that their participation may have impacted them, and what they may have gained. Their retrospective looks at their membership in a team that has been operating for almost 20 years, drawing on their perspectives as people who have gone on to pursue new endeavors, offers a unique view into the lasting and most useful gains from intergenerational PD team participation and into the lasting attitudes of participants.

New Perspectives

Within this study were recurrent discussions on how membership on an intergenerational PD team helped adult design partner alumni develop new perspectives. All participants perceived that they had new or improved personal capabilities through direct gains (e.g., communication, design knowledge); interestingly, this was true regardless of the varied roles of adults on the team (e.g., ranging from regular visitors to research assistants). Long-term participation seemed to be key to direct gains, which makes sense given the mentorship model participants described and the time gains would have required to develop.

Individuals also described how they developed new mindsets on the value of user participation in the technology design process. Working with children, whose contributions some participants were initially skeptical of, engendered new perspectives on who they believed could offer valuable contributions to technology designs. We noted participants developed an understanding that working with users does not mean that users will tell them

explicitly what to design, and they will simply follow directions—a cause of skepticism that is somewhat common with regard to PD (Portigal, 2013). They moved beyond this attitude to understand, value, and be able to facilitate the contributions of users. Moreover, this attitude extended beyond just children to all users, particularly those whose expertise would normally be overlooked (e.g., non-technologists)—as Bossen et al. described (2010), they gained a new appreciation for who could shape technology. Finally, this attitude extended beyond just PD process to technology design processes more broadly (e.g., usability testing).

Together, these complementary perspective shifts—new personal capabilities and new outlooks on the technology design process—were described by participants as offering new ways to thrive in their careers and new career paths to pursue. Across the industry and academic, the research and non-research positions participants had gone on to occupy, participants attributed feeling confident in their experience and capabilities in these new environments as partially due to their membership on the team. As other work has noted (Bossen et al., 2010), PD team membership expressly changed the careers participants desired, having exposed them to new opportunities and ways of thinking.

Missing Gains: Content Knowledge and Technology Exposure

Previous literature has pointed to the potential for participant gains to content knowledge (Barendregt et al., 2016; Bonsignore et al., 2013; Guha, 2010)—that is, knowledge about the domains of the PD projects such as history or science—and from technology exposure (Bossen, 2010; Guha, 2010)—such as what technologies exist and how they can be applied to different contexts. None of the survey or interview participants in this study noted

such gains. This is perhaps because, unlike PD *projects*, where a single endeavor is undertaken in depth, the very model of this intergenerational design *team* is to work on many projects across a wide variety of technology platforms and content areas—alternating platform and content area from session to session sometimes within the same week. Gaining knowledge about these aspects of participation was not a deliberate goal of participation for adult team members. Accordingly, while understanding of the technology design process was improved, the value of exposure to new technology as such was not considered a gain from participation by adult design partners, as other intergenerational PD populations (e.g., parents of child design partners) have considered it (Guha, 2010; McNally et al., 2017a). Similarly, developing new content knowledge was not an explicit goal of participation, instead the adult alumni participants described relying upon the domain experts that the team brought in during design sessions, or upon the adults and children's general knowledge in cases where a domain expert was not required (McNally & Guha, 2017).

Implications for Practitioners

The findings from this work may also offer guidance for PD activities to bring them in to alignment with the values and desires of adult design partners of intergenerational teams.

Publically Disseminate Ideas

In this work, participants tied their estimation of the value the team's contributions to whether their contributions had a visible impact. In the context of the Kidsteam intergenerational PD team, where multiple projects are worked on in partnership with many

external partners and researchers, questions of visibility are nuanced. While participants knew the team's design ideas could have impact on technologies, they desired more consistent feedback about how and whether the team's ideas had been implemented and public visibility of these outcomes, which suggests these actions as requirements to aligning participant desires with the process they contribute to.

Unfortunately, this is more challenging than it would sound at the surface. Public access to outcomes are limited: academic publications are subject to paywalls (and when not behind paywalls may not be written for public consumption) and industry impact may be unclear due to their internal structures. Therefore, save for instances such as Nickelodeon's "Do Not Touch" button (Kolko & Druin, 2017) or the "Every Kid in a Park" website (US Department of the Interior, 2015) where the involvement of the design team was described by industry partners in publicly released materials, the public visibility of the team's work was limited. This points to the importance of movements that advocate for the removal of paywalls to research public tax money has funded and individual efforts to publish research written in straightforward language to blog websites (e.g., Princeton's Center for Information Technology Policy (CITP)[1], magazines such as "Communications of the ACM"[2] or "Interactions"[3], and publically accessible research white papers (e.g., publications from the Joan Ganz Cooney Center[4]).

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[1] https://citp.princeton.edu
[2] https://cacm.acm.org
[3] http://interactions.acm.org
[4] http://joanganzcooneycenter.org/publications/

Promote Knowledge Transfer

The ability to transfer knowledge from one context to another is a critical outcome of learning (National Research Council, 2000). We saw evidence of knowledge transfer in the ways the skills and mindsets participants attributed to learning as adult design partners were impactful later in life. Despite this, the mentorship model that the team relied upon received criticism from some participants, who described being unsure whether they were progressing into leadership positions adequately and who were unaware of some of the team's internal processes and overarching methodological philosophy. While the mentorship model was successful in many ways, PD teams that desire to foster participant gains as an outcome should 1) incorporate individual feedback processes—such as one-on-one meetings that make the potential gains of participation to individual members explicit, and 2) include a supplemental formal lesson about PD processes and the specific team structure after an initial, introductory period of mentorship—such as a group presentation, discussion, or special design session.

Be Sensitive to Program Intensity

While the long-term participation of the Cooperative Inquiry method was described as being necessary to the mentorship model, relationship building, and the gains to participants, this did not inhibit frustrations that related to the requirements around holding twice-weekly design sessions (e.g., time commitment, mental energy). Unfortunately, little can be done to lower the requirements of similar programs without potential negative effects. Some teams have switched to a once-weekly design session model, cutting the time

requirements in half, though this may negatively impact the development of relationships and gains. In any model, it would benefit practitioners to keep in mind that the adult, and not just the child, design partners need space for "off days". Allowing adults to withdraw and recompose during sessions or rotating staff and to give them days off when possible could ease the frustrations participants voiced.

Limitations

Several limitations will exist within this study. Firstly, the perspectives described in this study were derived from alumni of the Cooperative Inquiry method of PD, which has notable differences from other intergenerational methods of PD with regard to degree and duration of participation of design partners. It is also possible that the people who choose to participate in the surveys and interviews did so because they have positive recollections of their work with the design team. Finally, responses in this study may have been subject to demand characteristics (Rosenthal & Rosnow, 2009); study participants, by nature of their prior membership on the team and in some cases as researchers in the field, may have made assumptions about expected outcomes and procedures underlying questions and may have tried to offer desirable feedback. Comments at the end of interview responses such as, *"Are you going to transcribe these by the way? [...] I'll try to speak in complete sentences. [...] I don't want a real person sitting there, 'Uh, he's thinking again.'"* or repeatedly saying, *"I'm sorry"* for not having a lot to say on a specific topic were indicators of this potential limitation.

Additionally, in any retrospective research participant recall is an issue of concern. Even given participants elaborate feedback and survey and interview structures that were

designed to stimulate recall, as some participants were asked to recall events and experiences from more than a decade ago it is unsurprising that some challenges to memory were noted. Some participants were unable to answer specific questions, though more commonly a participant would ask for a moment to recall details correctly or would not recall specific terminology around design techniques (e.g., *"I don't remember the actual word for it"* IP5).

Conclusion

In this chapter, I presented an evaluation of 15 anonymous, online surveys and 7 follow-up interviews with adult design partner alumni of the Kidsteam intergenerational Participatory Design team. In exploring the perceptions and potential gains of this diverse and largely unexplored perspective, it was found that direct gains (e.g., design process knowledge, communication, collaboration) and new mindsets (e.g., value of user inclusion in technology design, personal capabilities) were perceived by participants. Moreover, participants attributed their membership on Kidsteam to changes in their career paths and long-term applicability of new skillsets.

Chapter 7:
Discussion

In This Chapter:
- Introduction
- Synthesis and Comparison of Gains
- Recommendations for Aligning Intergenerational Participatory Design Practices with Participant Expectations on Matters that Affect Them
- Limitations and Future Work
- Conclusion

At the start of this dissertation I asked the question, *"How do alumni of intergenerational Participatory Design teams perceive their previous team participation?"* Through full participation in intergenerational Participatory Design (PD), adults and children work as equitable partners in the creation of children's technologies. Previous work has pointed to the potential for long-term gains for adults on traditional PD projects (Bossen et al., 2010; Bossen et al., 2012; Garde & van der Voort, 2014) and the immediate impacts for child and teen members of PD projects (Garzotto, 2008; Guha, 2010; Hansen & Iversen, 2013). It has also pointed out challenges pertaining to membership on intergenerational PD teams. However, to investigate how membership on an intergenerational PD team may have influenced participants in the long-term a retrospective investigation of the perspectives of participants themselves was required.

To begin addressing this question, I surveyed and interviewed child alumni, parents of child alumni, and adult alumni of an intergenerational Participatory Deign team that has been active for 20 years (Chapters 4-6). The participants had, therefore, left the team years prior to their participation in this research. This series of retrospective studies illustrated how intergenerational PD teams can achieve their higher-level values of improving the participant's qualities of life and work in the long-term and making participation meaningful within itself, exterior to other goals such as technology innovation and inclusion. The studies offer the missing retrospective perspectives of intergenerational PD team members themselves on matters that affect them: how they reflect on the ethics of their participation, what they gained from participation, where they found value in having participated.

Within this final chapter of my dissertation, I offer a discussion that synthesizes ideas across the three studies and describes the potential broader impact of this work. I will discuss what gains were described by different participant populations and elaborate upon their key commonalities and differences. Drawing on this cross-study comparison of gains as well as the previous discussions of alumni perspectives on matters that impact their membership on intergenerational PD teams, I then offer a set of 10 recommendations for practitioners of intergenerational PD, emphasizing ways to align participant expectations with team practices and encourage participant gains.

With attention to the limitations of this body of work, I will then discuss potential avenues of future work: 1) incorporating the perspectives of alumni from other Cooperative Inquiry design teams, 2) pursuing the current and retrospective perspectives of affiliated partners, 3) differentiating gains and perspectives by demographic information, 4) the

potential for additional gains, and 5) investigating the perspectives of active and alumni members of teams that include children in different roles (e.g., Informant, Protagonist). Finally, I will offer concluding remarks on this dissertation.

Synthesis and Comparison of Gains

The importance of direct participant gains stems from an ethical desire to "do more" than meet the bare minimum requirements toward research participants (Read et al., 2013) and the desire within Participatory Design practices to achieve mutual learning (Barendregt et al., 2016; Bossen et al., 2010; Hansen & Iversen, 2013) and improve the participants' quality of life (Gregory, 2003; Muller, 1993; Bødker & Kyng, 2018). In the chart below (Table 5) and subsequent text, I describe and contrast the gains that alumni of an intergenerational PD team themselves identified. I then discuss the implications of these findings for the interdisciplinary communities that may find them relevant.

Gains Described	Study 1: Child Alumni	Study 2: Parents of Child Alumni	Study 3: Adult Alumni	Differences and Similarities Between Populations
Career Direction	✓		✓	Child and adult alumni described exposure to new career paths and obtaining the necessary skills to pursue them; adult alumni described incidental career benefits
Collaboration	✓	✓	✓	All populations focused on teamwork and group compromise; child and adult alumni specifically related collaboration to prototyping
Communication	✓	✓	✓	Child alumni and their parents spoke of presentation skills; child alumni described overcoming fears; adult alumni emphasized intergenerational & cross-disciplinary skills
Confidence	✓	✓	✓	All described new confidence in the value of children's opinions–adult alumni extended this to other user groups; child and adult alumni related this to self-esteem
Design Processes & Techniques	✓	✓	✓	Child and adult alumni focused on broader and process insights; parents on specific design techniques; adult alumni described analytic approaches
Facilitation			✓	–
Financial Benefits		✓	✓	Child alumni and their parents recalled end-of-the-year gifts; parents spoke of free after school and summer programs; adult alumni mentioned stipends, thesis or dissertation contributions, publications, etc.
Material Benefits	✓	✓	✓	
Intergenerational Respect		✓	✓	Parents described how their children offered and expected respect from adults; adult alumni described new respect for children's capabilities
Technology Exposure		✓		–

Table 5. A comparison of gains described by participants across all three studies, noting the similarities and differences between how the different populations described each gain.

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These long-term gains, noted across all studies, offer support for the idea that participation itself can benefit participants (Bossen, 2010; Barendregt et al., 2016; Guha, 2010; McNally et al., 2017a); numerous gains were identified by participants themselves, were attributed to their former PD team membership, and were described as being useful later in life. This transfer of learning from one context—Kidsteam—to another—future jobs or personal interests—is an important educational competence (National Research Council, 2000). While foundational goals of PD emphasize societal development and organizational change cannot necessarily be found within more pragmatic forms of PD due to the nature of their team or project structures, it is significant that the direct gains to participants further other goals and values within PD such as mutual learning.

While all participants experienced some long-term direct gains, which they themselves attributed to their participation on an intergenerational PD team, it is crucial to note that this retrospective, self-report data is insufficient to establish causal relationships. Additionally, the existence of gains was not at the exclusion of frustrations related to team membership, which may impede gains (Bossen et al., 2012). All populations described frustrations related to interpersonal relationships, and adult and child alumni described frustrations such as unclear team processes or disliking specific projects, respectively.

As seen in Table 5, gains were not discussed uniformly by participant populations. Not all child or adult alumni experienced all the potential gains of that population (i.e., different people took away different gains from participation). Even among those gains that were commonly discussed across all participant populations—collaboration, communication, confidence, design process & techniques, and material benefits—there were marked

differences in how gains presented within the different participant populations. For instance, while all populations described developing a lasting confidence in the value of children's opinions, adult alumni applied this understanding more broadly to "users" in general in addition to other specific populations (e.g., older adults). In two cases, only two populations described a particular gain. The development of intergenerational respect was described by adult alumni and parents of child alumni; child alumni, while noting that they felt very respected in the design environment, did not themselves offer reflections on development of intergenerational respect as something they gained. Perspectives between child and adult alumni were more aligned with regard to career direction, describing how membership influenced their desired career paths, ability to obtain jobs, and success in personal and professional endeavors. However, the "educational benefits" and "opportunities" of participation were described as a motivation for signing their children up for the program in the first place. Lastly, some gains were distinct to individual participant groups, such as adult alumni's development of facilitation skills.

Of course, these gains are likely to evolve as intergenerational PD methods evolve. With regard to facilitation, for example, evidence of children's desires and abilities to facilitate their own sessions has already been seen on Cooperative Inquiry design teams (Yip et al., 2013). New forms of intergenerational PD that include children more heavily in the planning and facilitating processes of design sessions (e.g., in the role of a Protagonist) may lead to child alumni of such projects experiencing gains to their facilitation skills which mirror what adult alumni described (discussed in future work).

The long-term engagement, as noted by previous researchers (Bossen, 2010; Guha, 2010) and by this dissertation's participants themselves, is likely to be a requirement for many of these gains. However, this same long-term engagement that may encourage gains can exacerbate the frustrations participants described, which may therefore simultaneously impede gains. Parents and adult alumni described challenges with the twice-weekly pace of the program and transportation to and from the site. Child and adult alumni both recalled interpersonal challenges between child-child dyads and children-affiliated partners. Similarly, child and adult alumni described frustrations with specific partners, projects, and needing more space for "off" days. How members participate within the teams may also be critical to encouraging the development of gains; persons who do not engage may be less likely to experience gains (Pitt & Davis, 2018; Van Mechelen et al., 2015).

Implications of Long-Term Direct Gains

In this section I discuss the potential broader impacts of the participants' perceived existence of long-term gains from membership in intergenerational Participatory Design teams, including how this knowledge relates to the fields of Human-Computer Interaction, Participatory Design, and Education and across both academic and industry settings.

Motivating the Use of Intergenerational PD

Much research in the space of "designing for children, with children" has been motivated by the desires to give children a say in the technologies they are meant to use. Moving beyond such indirect benefits, researchers within the fields of PD and Human-

Computer Interaction have investigated the existence of direct gains during participation on a team or project, and have found evidence of such. In previous work by Guha (2010) that investigated and established the social and cognitive impacts to child participants during their active participation on an intergenerational PD teams, she stated:

> *"No longer will researchers need to couch their language in speaking of these experiences with 'may' or 'informally' or 'potentially'. As a community, we can now affirmatively state that these cognitive and social experiences were shown to exist in one rigorous study"* (Guha, 2010).

To this, we can now add that many of these previously identified experiences and more are applicable to not only to the children who participate, but also to the adult participants. Moreover, we now know that gains from Cooperative Inquiry persist long after participants' participation on the team has ended. We can claim this knowledge from the perspectives of CI alumni themselves.

The implications of these claims extend beyond motivating researcher's and practitioners use of intergenerational PD methods. The means researchers use to motivate, for instance, teen participation in PD has been a topic of study has included some of these direct gains (e.g., offering respect, recognition, being listened to) (Hansen & Iversen, 2013). Pragmatically, this work suggests new means of recruitment, as development of direct gains can now be disclosed to child participants, adult participants, and parents of child participants who may wish to develop these skills, competencies, and future opportunities.

The existence of direct gains to child participants also has ethical implications. Researchers have questioned the use of children's ideas without being able to appropriately attribute ideas to children, debating the potential inappropriateness of such actions alongside

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desires to treat their child participants fairly (Read et al., 2014). US federal law prohibits children from receiving financial compensation, and in most cases IRB policy requires that participants—particularly protected populations, such as children—remain anonymous (Bankert, 2006). While this work suggested that child alumni felt comfortable relying upon their parents to provide informed consent and felt that their contributions were valued, the existence of long-term, direct gains may help alleviate concerns around fairness, and what direct benefits what can be offered to child members of intergenerational PD teams.

Empowerment and Gender Equality

PD was founded as being a way to enable empowerment among technology users. Particularly with the child alumni in this study, we saw that value of their own opinions was one of the strongest gains participants themselves perceived, as was acknowledgment of their achievements and impact on the technologies they were contributing to, indicating that PD has successfully empowered children, a normally marginalized population. This may be due to children's stage of development between the ages of 7-11 (the range of participation on Kidsteam), as children of this age are at a developmental stage that establishes identity—such as self-esteem, individuality, and learning to be competent (Eccles, 1999). Out-of-school programs, such as Kidsteam, can "allow children to safely explore independence, peer relationships, and leadership; and to form long-lasting relationships with adults outside their families" (Eccles, 1999, p.36). Additionally, empowerment was seen across both male and female child alumni. With the ongoing challenges of addressing gender issues in childhood (Buchmann, DiPrete, & McDaniel, 2008), and how children are adversely affected by gender

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issues (Conant, 2017) making sure all children regardless of gender identity are empowered to make decisions about the lives and futures, potentially through programs such as intergenerational PD, is critical to breaking the cycle of gender discrimination.

Potential for New K-12 Educational Approaches

Contrary to the team studied in this work, intergenerational PD is commonly undertaken in schools, even during the school day (Horton et al., 2012). The existence of long-term direct gains may address concerns about the appropriateness of conducting PD in schools (e.g., taking children's time away from their studies), thereby making the use of PD in schools more contextually appropriate (Barendregt, 2016).

Current initiatives seek to not just conduct PD in schools as a matter of convenient access to participants and for technology design input and to give children a say in technology design, but to actively marry PD and Learning Sciences to encourage learning benefits to students (Carl, Bonsignore, Yip, & DiSalvo, 2017). In this way, educators could teach students multiple skills and domain knowledge concurrently. Given the overlap of the long-term gains uncovered in this work with 21st Century Skills (Partnership, 2017), educators who seek to encourage the development of skills such as creativity, communication, collaboration, may turn to intergenerational methods of PD such as Cooperative Inquiry for school projects. Incorporating content knowledge—which was notably absent from the gains described by alumni participants of this dissertation—into the technology design process is a current initiative of PD practitioners (Barendregt et al., 2016; Carl et al, 2017). Perhaps most challenging to this initiative will be promoting the reflective practices recent research points

out as being both necessary for content gains from PD in schools and exceptionally challenging to attain (Barendregt, 2016). Here, educators and PD practitioners may be interested in new roles and methods that emphasize reflection (e.g., the Protagonist role) and leveraging that toward content learning goals. However, these endeavors will still face substantial challenges to encourage the gains stemming from intergenerational PD that overlap with 21st Century Skills: supporting the long-term duration of participation, the close adult relationships, breaking down power structures within the school environment that generally enforces them.

Empathy Building

Empathy, being the ability to understand and share the feelings of others, is part of what encourages the use of PD approaches, and has been a subject of study by psychologists, practitioners of PD, and educators alike. Through PD, empathy is developed for the users of technologies broadly, and can encourage empathy between designers and the user-groups who participate in the design process (e.g., persons with dementia (Lindsay et al., 2012)). The existence of gains from this work such as valuing others' opinions, intergenerational and cross-disciplinary communication, and intergenerational respect support the application of PD initiatives that have the direct goal of encouraging empathy between designers, stakeholders, and user-groups.

This support for empathy-building is also relevant to children in particular. Intergenerational PD researchers are beginning to investigate how to encourage children to develop empathy through co-design activities in schools (Van Mechelen, Schut, Gielen, &

Klapwijk, 2018). Educators may similarly be interested in this approach, as the aforementioned 21st Century Skills include empathy as part of vital Social and Cross-Cultural Skills (Partnership, 2017).

Benefits to Industry

PD originated in a movement to give workers a say in the technologies they were meant to use, and is still being employed in industry today—including intergenerational PD. However, the resources required to carry out a PD project or run a PD team—in terms of facilities, resources and personnel—can be a deterrent. To the more common motivators such as obtaining product insights, promoting cross-company communication, and community outreach (achieved by including community members as the "users" in the process), the motivator of employee development can be added. There are myriad programs, speaker series, and continuing education applications that offer companies the ability to improve their employees' collaboration, cross-disciplinary communication, and rapid design and data synthesis skills—all gains that adult alumni described in this study.

Recommendations for Aligning Intergenerational Participatory Design Practices with Participant Expectations on Matters that Affect Them

Practitioners should ever be aware of their responsibilities to their participants and should seek ways to align their goals to participant expectations and improve participants' experiences whenever possible. Intergenerational Participatory Design teams have the challenge of accounting for the perspectives and needs of their diverse participants, and in this section I will propose ways to ensure equity and foster direct gains to participants within intergenerational PD sessions.

Below I have listed areas of recommendation based on the new understandings of the perspectives of the child alumni, parents of child alumni, and adult alumni investigated in the three previous studies toward the goal of making PD better support the people who are involved in it. This list of recommendations was generated through memoing (Birks, Chapman, and Francis, 2008), taking note of areas where practice contrasted participant desires or goals, and were discussed with a director of a Cooperative Inquiry design team to ensure that the recommendations would be actionable and relevant to practitioners. The goal of each recommendation is to assist practitioners with aligning the expectations and benefits participants have regarding their participation with the practices that are applied during intergenerational PD sessions. Each of these recommendations, many of which would apply to PD broadly, are grounded in literature and then described in more depth, relating how participants felt these matters affected them and the practices practitioners can either employ or maintain to meet participant expectations.

1. Attribution

In the light of legal restrictions that protect the anonymity of participants (Martin, 2007), the practice of Idea Elaboration (Figure 4) (Guha et al., 2013), and the practical challenges of working with external affiliated researchers and partners, directly crediting the adult and child members of an intergenerational PD team would be at best a challenge and at worst unethical or illegal. Both child and adult alumni groups described how crediting individuals may be inappropriate, as within Idea Elaboration one person may begin an idea but others expand up on it, making it no single person's idea. Despite this, adult alumni voiced concerns over not being able to publicly acknowledge the contributions of team members, in particular the contributions of the children.

Conversely, child alumni cited not only concerns of the appropriateness of being credited but fears of embarrassment over things they may have been quoted as saying or awkward photographs that may have been taken of them during design sessions. It is therefore recommended that when crediting ideas, the team itself is named. Participants can then either distance themselves from the project or can take ownership through identifying their membership on the team, at their personal discretion.

2. Develop Equitable Practices

Given the different requirements of adult and child roles on intergenerational PD teams—that is, that adults will always have some additional responsibility and therefore power—the practices can never be *equal*, or the *same* (Yip et al., 2017). However, making sure that these practices are equitable, encouraging adult partners to put effort toward helping

child partners overcome challenges and find success, is foundational to including children in roles such as Design Partners (Yip et al., 2017). Equitable but unequal practices that were considered necessary for adult alumni to conduct sessions were described as undisruptive by child alumni in this study, who understood there were "extra things" adults needed to do (e.g., buy their snacks, iterate technologies between design sessions).

However, while equity was adequate regarding the overall session structure and interactions between partners during design sessions, *equality* must be striven for during actual design time. During these times, when adults and children are actively working together to ideate, prototype, and iterate technologies, it is important that children feel their voices have the same value as the voices of adults (Druin, 1999; Guha et al., 2013). Conversely, as the Idea Elaboration process is based upon the valuing the knowledges of all participants, it is important that *adults* know their voices are as valued as the voices of the child participants, and are encouraged to participate. Some adult alumni described how they did not feel their ideas were as valued to the team; while the children's ideas should be foregrounded to help manage the power dynamics and elicit ideas, it is important that adult practitioners are aware that they needn't suppress their own ideas.

3. Emphasize High-Impact Techniques

Child alumni, parents of child alumni, and adult alumni found some design techniques, such as Sticky Noting and Big Paper (Walsh et al., 2013), to be both more memorable and more useful later in life. Sticky noting was used by child alumni and adult alumni in their schoolwork and future employment. By choosing to use these techniques

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where able—that is, emphasizing their use over other techniques that could address similar research goals within design sessions—these high-impact techniques could help promote gains that were associated with them, such as understanding the complexity of the design process and developing rapid analytic thinking.

4. Enable Dissent

Dissent is not only the capacity to say "no" to participation, it is the opportunity to say no to participation (Bourke & Loveridge, 2014; Morrow & Richards, 1996). Given that child alumni in this study were largely unaware of opportunities to dissent to participation in part or in whole, practitioners of intergenerational PD need to improve their sensitivity to two forms of dissent: temporary and ongoing.

Within each of these forms of dissent, it is researcher's responsibility to look for signs of non-verbal dissent in additional to explicit dissent, particularly with children, which may include physically withdrawing from team members, disinterest in communicating with team members, causing disturbances during design session activities, picking fights with team members, or refusing to engage in design activities (Dockett, Perry, & Kearney, 2013; Morrow & Richards, 1996; Read et al., 2013). Regardless of the need for research participants, a child's temporary dissent—be it to a specific project, technique, or due to simply having an off day—must be accommodated, as it is their right to withdraw. Despite concerns about disruption to the research at hand, accommodating these situations can be accomplished through many ways that do not derail the session's activities. Children can be offered time to decompress on their own, can write in a journal—perhaps on topics related

to the design session if they like, can be offered a stress ball, or can sit back and observe the design activities, all with the knowledge that if they choose, they may return to the day's design activity. The purpose, overall, is to allow the child space in a way they personally require.

While adult alumni did not discuss issues of dissent per-se, they did discuss frustrations around their own "off" days and general exhaustion. Dissent in these cases is also challenging, as most adult team members are simultaneously research participants of a PD team and university employees, hired to attend the research sessions. While not required to allow space in the same way we are required to for child research participants, it is good practice to offer adult researchers days off whenever possible and to rotate facilitation responsibilities among different people to minimize fatigue.

5. Flexibly Address Frustrations

Intergenerational PD requires participants to have a degree of comfort with rapid change and ambiguity. Situations such as interpersonal disputes will arise (Pitt & Davis, 2017; Van Mechelen et al., 2015), especially toward the end of a year of working together twice weekly with the same small group of people. Adult alumni, child alumni, and the parents of child alumni all noted challenges with interpersonal relationships—generally between child dyads—as one of their primary frustrations. When issues do arise, an enjoyable environment can be reestablished by adjusting session plans on the fly, changing who is working together in small groups. Just as allowing for "off days" is important, allowing for time away from challenging long-term design partners is important. Additionally, encouraging adult team members to debrief on more than the research outcomes, but also on the team dynamics

and incidents during post-session discussions can provide necessary acknowledgement and personal validation for these and other challenges.

6. Formalize Knowledge

Mentorship models of career training have great value (Hunt & Michael, 1983), and were described by the child and adult alumni in these studies as being beneficial within the context of intergenerational PD. Adult alumni discussed the promotion of knowledge transfer in depth and child alumni described its utility. However, formalizing the knowledge, couching it in the real-world vocabularies and applications that child and adult alumni may see later in life may enforce the applicability of the processes the team undertakes to the participants' lives. For instance, familiar terms such as Sticky Noting and Bags of Stuff are forms of affinity diagramming and 3D prototyping, respectively. Discussions formalizing such knowledge and vocabularies during additional meetings or special design sessions could advance gains such as career impact, as these techniques could then be more directly mapped to future occupations. This is especially true as—if one considers related movements such as Design Thinking[5]—these skills are more relevant today than ever before.

7. Maintain Functional Practices

A number of well-documented functional practices were noted as being effective and appreciated by all alumni participants of this work (Druin, 1999; Guha et al., 2013). Building

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[5] https://www.ideou.com

intergenerational relationships with measures that reduce power structures—such as using first names only, wearing casual clothing, sitting on the floor together, and having a joint snack while establishing rapport—helped create a casual, respectful, and fun environment that laid the foundation for the gains participants described. The adequacy of domain knowledge offered during design sessions has been questioned (McNally & Guha, 2017)—that is, how can a team design technology about topics in which they are not an expert, such as thermography or language learning? However, child and adult alumni found the combination of presenting domain knowledge during circle time introductions and having experts on hand, as necessary, to be more than adequate. A word of caution that emphasizes the importance of offering this domain knowledge, though, is that members of child and alumni participants groups each noted sessions where the domain knowledge presented was inadequate, and the design session itself was considered a failure. Finally, the environment in which the team works is important. Child and adult alumni each described an early location where the team met as being "dark" and generally uninviting. The newer physical environment—an open space with room to move and brightly colored furniture—was more pleasantly described, and designing in such comfortable, informal spaces when possible should be a preference to practitioners.

8. Public Impact of Ideas

Within traditional PD approaches, participants' ideas influence the systems and technologies that the user-groups and team participants themselves see and use (Bødker & Kyng, 2018; Gregory, 2003; Muller & Kuhn, 1993). In intergenerational PD, where team

members are given a say in how technologies for children should be built but are not, in all roles, included in other decision-making processes, the impact of their ideas may be less obvious. All participant groups stressed the importance of seeing the impact of their ideas, particularly on the product: it was personally validating and inspired confidence.

Internally to the team, openly discussing outcomes—showing examples of how the team's ideas were incorporated into a technology, or which "big ideas" were presented to hundreds of people at a conference, or showing the team a research poster that was presented—emphasizes that the team's ideas were heard, and are valued in a variety of ways. At minimum, how the work is discussed during circle time (Figure 5) can emphasize the value of the contributions of the team. For instance, when describing a project that is returning for another round of iteration, the following the narrative of is commonly used at Kidsteam: *"Remember when _____ was last here? We worked on _____. They included our ideas such as _____ and _____ in their technology, and now we are going to work on _____ with them!"* While child alumni described their expectation that the team's ideas would be used (and frustrations with researchers and affiliated members who did not listen to their ideas) and interest in seeing how projects they had contributed to had evolved after having left the team, adult alumni further discussed desires for better public dissemination of the team's ideas.

In some cases, the use of the team's ideas is highly visible, meeting participant's desires for validation and impact: the ideas can be seen in publicly released products (e.g., Nickelodeon's "Do Not Touch" button, the "Every Kid in a Park" website, the Children's International Children's Digital Library, NPS's Aurora Up Above mobile app) and the team

receives direct attribution in the media. Alerting team members to these releases—which may, due to technology development cycles, happen after a team member's participation as ended—may be critical to meeting their desires for knowing how their ideas have been used. However, researchers face challenges to maintaining direct contact with participants: the quantity of participants may be great, or they may not be legally allowed to maintain ongoing contact with participants after their research has ended. This points to the importance of movements that advocate for the removal of paywalls to research outcomes public tax money has funded. It also puts great value on the efforts of individual researchers who offer public outreach beyond journals and conference papers: such as regularly updated, publicly-accessible websites that interested participants can return to for updates or, moving beyond written materials, researchers who take the extra steps to publicly release the technologies they work on.

9. Ongoing Assent

Related to the earlier discussion on enabling dissent is obtaining ongoing assent process (Bourke & Loveridge, 2014; Dockett et al., 2013). Assent is the verbal acknowledgement that children give to indicate their approval of involvement in research, as they, being minors, cannot give consent (Dockett et al., 2013). This practice is especially critical long-term research, and doubly so in intergenerational PD (Read et al., 2013). Children's understanding of the time commitment, the use of their ideas, and the overall design process develops with experience. As such, even though the practice is not legally required researchers should practice getting children's assent at multiple points throughout

the long-term intergenerational PD process. While this may come at the potential cost of losing research participants at inconvenient times, it is nonetheless the ethical responsibility of the researchers to obtain ongoing assent. If assent to participation as a whole is revoked, it is then the researcher's responsibility to advocate for the child's wishes, even if not in the team's best interest or against the parents' wishes.

10. Safe Design Environment

Participants' physical safety is, of course, paramount to any research—including research involving children. Design materials (e.g., scissors) should be child-safe, bathrooms should be monitored, and children should be escorted during pick-up and drop-off periods.

In addition, child and adult alumni described the design team as being a socially "safe space" to test out ideas and to learn. For instance, presenting design ideas as intergenerational groups, instead of having children stand alone to present, felt supportive to child alumni who then felt more confident in presenting their ideas. It is important to apply this recommendation to both the child and adult members of intergenerational PD. Much emphasis is, by necessity, placed on creating a safe space for children and concerns over their welfare. However, it is similarly important to make sure the design space is safe and the design feedback is constructive for the adults who bring their technologies to the design team.

Limitations and Future Work

While limitations to each study's individual implementation are presented in their respective chapters, within this section I discuss broader limitations to this dissertation's approach that point to the opportunities for future work in this area.

Beyond Kidsteam: Additional Cooperative Inquiry Design Teams

The outcomes presented in this work stem from alumni of a single intergenerational Participatory Design team: Kidsteam. The practices, culture, and values that define membership on Kidsteam have been handed down through the team's mentorship model for the 20 years it has been active. While the team has somewhat evolved from its early days (e.g., a single grant-based project model to a multiple-partners and projects model), the long-term participation of the team's leaders, university staff, and student researchers have made the value structure remarkably consistent. However, the Cooperative Inquiry model of intergenerational PD is not practiced solely at the University of Maryland's Kidsteam. While Kidsteam is the first CI design team, the method has subsequently been adopted by academic and industry researchers worldwide. Future work researching the perspectives of alumni from these teams would provide an opportunity to determine what gains are robust to different geographies, cultural expectations, internal team cultures, and contexts (e.g., industry vs academia). It also has the opportunity to unearth new potential gains and perspectives on membership.

Perspectives of Affiliated Partners

The adult alumni perspectives this work sought out included persons affiliated with the University of Maryland who had a close, long-term relationship with the team (e.g., research assistants, long-term volunteers, recurring collaborators). However, the team—and many Cooperative Inquiry teams like it—works with external university researchers, industry partners, government partners, and non-profit organizations on technologies they bring to Kidsteam for as little as a single session. Future work investigating their perspectives could provide valuable insights into the practices and gains from intergenerational PD. Anecdotal evidence from 6 years of asking affiliated partners, *"So, what surprised you most about working with Kidsteam?"* (a practice begun by Kidsteam's founder, Allison Druin) suggests to me that as little as a single session can alter a person's perspectives on the value of children's ideas. Additionally, if we recall that organizational change is a cornerstone of PD, outcomes relating to this area of interest could be investigated through the perspectives of affiliated partners by probing into what is done in their design session outcomes internally, and if they have had substantial influence within their respective organizations. These perspectives would have value both in looking at current, active affiliated partners as well as the retrospective views of past affiliated partners, as these differences in perspectives may, as within this work, illuminate key differences in what persists.

Demographic Differentiation

Two of the studies in this dissertation contained a female gender skew in the respondents, and none of the works investigated differences based on demographic

characteristics such as gender or participant age. Investigations into differences between persons of different gender and of different age groups—particularly for children, whose development changes drastically between ages 7 to 11 (Eccles, 1999)—could illuminate important differences in gains and perspectives on membership. Similarly, a breakdown based on duration of participation (e.g., 1 year vs 4 years) could illuminate differences on the existence and potential lasting effects of gains.

Potential for Additional Gains

The recruitment method of this dissertation depended upon volunteers, and did not include every alumnus of Kidsteam as a participant. This may have resulted in some gains being left undiscovered.

Additionally, case studies on intergenerational PD by Guha (2010) and Iversen & Smith (2012) noted that child and teen participants, respectively, experienced an increase in their content knowledge, which was not noted by any participants in this dissertation's three studies. Of course, this may be due to previously discussed limitations related to participant recall considering the work's reliance on retrospective perspectives of participation. However, given, in particular, that Guha's work involved the same intergenerational PD team as this dissertation, future work could investigate why content knowledge was not perceived as a gain by alumni. This would be especially critical to current initiatives that seek to simultaneously teach design skills, which alumni participants did discuss, and content knowledge in schools through a PD approach (Carl et al., 2017).

Beyond Design Partners: Children's Roles in Participatory Design

This work is framed from the perspectives of participants on a Cooperative Inquiry team, a method which emphasizes long-term relationships between children and adults who take on the roles of Design Partners (Druin, 2002). Other roles of children found within intergenerational Participatory Design methods, such as the role of Informant within Informant Design (Scaife & Rogers, 1997), apply a different form of participation of children—bringing them in on projects in a more flexible, but less immersed, approach. Conversely, new approaches to intergenerational PD offer children more decision-making power over the design process itself—such as projects that work with children in the role of a Protagonist (Iversen et al., 2017). Future work investigating how children's roles impact their perspectives on their membership and their potential gains, as well as how their different roles impact the perspectives and potential gains of their adult team members, could be therefore be informative. Such future work could reveal new perspectives and gains. Through comparison with this work, there is the potential to understand what degree of involvement (e.g., duration of participation or agency required) leads to different long-term gains, which could aid practitioners and participants interested in inspiring specific gains to pursue them in new ways.

Conclusion

In this dissertation, I sought to answer the question, *"How do alumni of intergenerational Participatory Design teams perceive their previous team participation?"* To explore this question, I conducted a series of three studies, each with a different population relevant to an intergenerational PD team: (i) child alumni, (ii) parents of child alumni, and (iii) adult alumni (e.g., university researchers such as graduate assistants and long-term volunteers). I focused on their retrospective perspectives on matters that affected them and on potential long-term gains from participation. Part of this dissertation work includes outcomes presented in two publications: McNally et al. 2016 and McNally et al. 2017a.

Summary of Contributions

In summary, this dissertation makes several contributions to the areas of PD, Human-Computer Interaction, and Child-Computer Interaction:

A synthesis and comparison of potential participant gains to child and adult alumni from their participation on an intergenerational PD team.

Through a cross-study synthesis of the retrospective perspectives on gains from intergenerational PD offered by such a team's adult alumni, child alumni, and parents of child alumni, I provide a synthesis and comparison of potential gains to intergenerational PD team participants. I explain the similarities and differences between how the different populations described each gain and the prevalence of each gain to within the child and adult alumni populations.

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Perspectives of child intergenerational PD team alumni on matters that have ethical implications and the personal gains they attribute to their team participation.

Through an anonymous, online survey and follow-up, semi-structured interviews with child alumni of an intergenerational PD team, I present the first assessment of how former child participants perceive the ethical issues around their previous involvement on a PD team to improve our understanding and further enable researchers to "do more" than the base requirements of ethical accountability. I also describe the personal gains that alumni ascribe to their prior participation on an intergenerational PD team.

Perspectives of adult intergenerational PD team alumni on matters regarding their previous team participation and the personal gains they attribute to their participation.

Through an anonymous, online survey and follow-up, semi-structured interviews with adult research alumni of an intergenerational PD team, I offer a description of the gains they perceived and attributed to their previous PD team membership as well as their perceptions on matters that influenced their membership (e.g., enjoyment, frustrations, new mindsets).

Insights into the mindsets of parents of child alumni of an intergenerational PD team, regarding their motivations for signing their children up to participate and their attitudes and observations regarding their children's past participation.

As parents of child alumni of intergenerational PD teams could observe their child's behavioral and attitudinal changes outside team participation, and therefore offer a new perspective that may enhance or differ from those of participants or researchers, I conducted anonymous, online surveys and follow-up, semi-structured interviews with parents of child alumni of an intergenerational PD team. Outcomes describe parental motivations for including their children on the team and observations of gains to their children.

A set of 10 recommendations for aligning intergenerational PD practices with participant expectations on matters that affect them.

I identify ten recommendations based on the new understandings of the perspectives of the child alumni, parents of child alumni, and adult alumni investigated in this dissertation's three studies toward the goal of making intergenerational PD better support the people who are involved in it. The goal of each recommendation is to assist practitioners with aligning the expectations participants have regarding their participation with the practices that are applied during intergenerational PD sessions. Many of these recommendations apply to PD broadly, in addition to their relevance to intergenerational PD teams.

Final Remarks

Through the retrospective perspectives of intergenerational PD team alumni, this dissertation demonstrates the lasting gains and personal development that participants perceive and attribute to their former PD team membership and offers new paths forward to ensure our means of innovation fit participants' expectations.

Appendix A:
Codebook

Description

The final codebook for this dissertation research has 23 codes under 9 categories.

Each code has a definition and example. Each incident can have multiple codes applied.

Data was coded at the sentence level.

Codebook

Relationships

- **With Adults**: Participant discusses relationships with or between adults on the design team. *Example: "I remember getting along with them well!"*
- **With Children**: Participant discusses relationships with or between children on the design team. *Example: "Like friends, although mostly not very close friends."*
- **Team Building Activities**: Participant discusses memories of team building activities. *Example: Kidsteam summer camp where we did scavenger hunts and went to the ice cream shop.*
- **Respect**: Participant discusses feelings of respect from other teammates. This includes, but is not limited to, having the same status, rights, or opportunities in their relationships with others, including being listened to by teammates. *Example: "I felt respected by them."*
- **Facilitation:** Participant discusses issues around facilitating Kidsteam sessions. *Example: "The adults still had to manage their groups, drawing in kids who were distracted [...]"*

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Projects

- **Partners**: Participant discusses a specific partner that was worked with. *Example: "They were people who wanted us to help design something for them."*
- **Technologies**: Participant discusses a specific technology the team helped design. *Example: "Music Blocks, which we helped develop into animal blocks."*

Incorporation of Ideas

- **Use of Ideas:** Participant discusses how or why ideas were used in the design process by the team. *Example: "If we worked on a project for two sessions, the ideas from the first session were present the second time."*
- **Ideas Being Visible to the General Public**: Participant discusses the public reach of the participants' or the team's ideas. *Example: "Many of the ideas that I have inputted have been seen in public, like the do not touch button."*

Security and Consent

- **Anonymity**: Participant discusses issues or desires around being an anonymous member of the team. *Example: "I'm with another team outside of Kidsteam it's a Circus Team and we have to use our images to like help get the group out there so we can get more gigs and so I'm just fine if my image is out there [for Kidsteam]."*
- **Attribution:** Participant discusses credit or attribution for their contributions, or the contributions of other team members. *Example: "I feel like the credit was fine but I just don't feel like there needs to be credit."*

Sentiment on Membership:

- **Enjoyment:** Participant describes an aspect of the Kidsteam experience as being enjoyable (e.g., fun, exciting, cool). *Examples: "It was fun, which was part of the reason I like being able to contribute." "It was sometimes boring."*
- **Displeasure**: Participant describes an aspect of the Kidsteam experiences as being displeasing (e.g., boring, frustrating). *Example: "The pace of 2x weekly sessions is insane."*

Knowledge and Skills

- **Design Process:** Participant discusses a change in how one approaches or uses the design process. *Example: "I learned how different ideas can be synthesized to make something that works with many people."*

- **Problem Solving:** Participant discusses a change in how one solves problems. *Example: "I learned how to approach problems differently."*

- **Domain Knowledge:** Participant discusses how having background knowledge on a topic area impacted their ability to design technologies addressing that topic. *Example: "Well other kids who had grown up with Nickelodeon would participate more with that just 'cause they were more familiar with it... I couldn't really do that part cause I didn't know them."*

- **Technology Knowledge:** Participant discusses a change in one's technical knowledge. *Example: "Programming, networking, dynamics of technology."*

- **Creativity:** Participant discusses a change in one's creative thought process. *Example: "Think outside the box, not to limit ideas or imagination."*

Confidence

- **Self-Esteem:** Participant discusses a change in one's self-esteem. *Example: "Boosted confidence and was a good experience working with others."*

- **Value of Opinions:** Participant discusses a change in one's understanding of the value of people's opinions. *Example: "Also learned that my ideas do matter as a child."*

Social Interactions

- **Communication**: Participant discusses a change in how or why one conveys ideas to other people, including a change in their ability to give public presentations. *Example: "[I learned] how to express my ideas to other people without feeling afraid."*

- **Convey Ideas to Others**: Participant discusses a change in how they are able (i.e., their skill) to work with others. *Example: "Work as a team."*

Material Considerations

- Participant discusses elements of material benefit, such as free after school care, free summer camp, the end of the year gift, publications, project guidance, and job prospects. *Example: "It was a $75 parrot robot."*

Appendix B:
Survey Instrument for Child Design Partner Alumni

The following pages contain the online survey instrument that child design partners who were under the age of 18 were asked to complete.

The consent form for this survey instrument is for child design partner alumni who were under the age of 18. The instrument for child design partner alumni who were age 18 or older was identical in content, however the consent process was changed. Being legal adults they could choose to either agree or disagree to participation, whereas in the sample below parents are asked to obtain assent from their children before indicating their consent to their children's participation.

Thank you for your interest in participating!

Parents or Guardians, please review the following consent form. Please read the statement at the end to your child.

The Long Term Experiences of Child Design Partners in Intergenerational Design Teams

Purpose of the Study

This research is being conducted by Dr. Allison Druin at the University of Maryland, College Park. We are inviting your child to participate in this research project because your child has previously participated in our design group, Kidsteam, as a child design partner. The purpose of this research project is to understand the long-term impacts of having been a child design partner.

Procedures

Previously, your child designed new technologies for children as a design partner alongside graduate students, undergraduates, and other staff and faculty. Now we would like to obtain feedback from your child about the impact of this experience. Your child will be asked to complete an online survey, which should take no longer than 15 minutes, answering questions such as, "Did anything you learned during Kidsteam help you in school?"

Potential Risks and Discomforts

There are no known risks to participating in this research.

Potential Benefits

There are no direct benefits to you or your child, but the results may help the investigators to learn how to better benefit future child design partners. It is hoped that the work of this new research team will include designing technologies that can better serve children in their learning and play in the future.

Confidentiality

Any potential loss of confidentiality will be minimized by storing our data in the locked Human-Computer Interaction Laboratory at the University of Maryland. All digital data (e.g. survey results) will be stored in password protected digital archives. Paper documents will be stored in a locked office belonging to the investigators of the study at the lab. The only people with access to the materials will be the researchers involved in the study for coding and analysis purposes. Your child will never be identified by name in reporting of data; your child will only be identified by common characteristics, such as age or gender, or through the use of an alias. You and your child's information may be shared with representatives of the University of Maryland, College Park or governmental authorities if you or someone else is in danger or if we are required to do so by law.

Right to Withdraw and Questions

Your child's participation in this research is completely voluntary. Your child may choose not to take part at all. If your child decides to participate in this research, your child may stop participating at any time. If your child decides not to participate in this study or if your child stops participating at any time, your child will not be penalized or lose any benefits to which your child otherwise qualify. If your child decides to stop taking part in the study, if you have questions, concerns, or complaints, or if you need to report an injury related to the research, please contact the investigator: Dr. Allison Druin 2116A Hornbake Building, South Wing, College Park Maryland, 20742 Phone: 301-405- 7406 Email: allisiond@umiacs.umd.edu

Participant Rights

If you have questions about your rights as a research participant or wish to report a research-related injury, please contact: University of Maryland College Park Institutional Review Board Office 1204 Marie Mount Hall College Park, Maryland, 20742 E-mail: irb@umd.edu Telephone: 301-405-0678 This research has been reviewed according to the University of Maryland, College Park IRB procedures for research involving human subjects.

1. Parents or Guardians, please read the following message from us to your child:

Hello! Today we are going to ask you to answer questions about what it was like to be a Kidsteam Child Design Partner. Your name will never be connected with your answers. If at any point you want to stop, please feel free to do so. Thank you for participating!

◯ I have read the above statement to my child

2. Parent or Guardian:

Statement of Consent
Selecting "I Agree" indicates that you are at least 18 years of age; you have read this consent form or have had it read to you; your questions have been answered to your satisfaction and your child voluntarily agrees to participate in this research study. Please print this form for your records.

◯ I Agree

Demographic Questions: Learning about you

(Question page 1 of 3, then a Thank You page.)

Child Design Partner Alumni, please answer the following questions:

3. Are you male or female?

◯ Male

◯ Female

◯ Other

4. Which category below includes your age?

◯ 12-13   ◯ 22-23

◯ 14-15   ◯ 24-25

◯ 16-17   ◯ 26-27

◯ 18-19   ◯ 28-29

◯ 20-21

5. How many school years were you a member of Kidsteam?

(Not including Summer Kidsteam or Teen Kidsteam)

◯ Less than 1 year

◯ At least 1 year but less than 2 years

◯ At least 2 years but less than 3 years

◯ At least 3 years but less than 4 years

◯ At least 4 years but less than 5 years

◯ 5 years

6. What is the highest level of school you have completed or the highest degree you have received?

◯ Less than high school degree

◯ High school degree or equivalent (e.g., GED)

◯ Some college but no degree

◯ Associate degree

◯ Bachelor degree

◯ Graduate degree

7. What hobbies or extracurricular activities have you participated in since leaving Kidsteam?

8. If you continued your education past high school, what is or was your major?

9. What is your ideal job?

Your experience on Kidsteam

(Question page 2 of 3, then a Thank You page.)

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10. Overall, how pleasant or unpleasant was your experience on Kidsteam?

Very unpleasant	Unpleasant	Neither pleasant nor unpleasant	Pleasant	Very pleasant
○	○	○	○	○

11. How much respect did adults from Kidsteam show you?

No respect at all	A little bit of respect	Some respect	Quite a bit of respect	A great deal of respect
○	○	○	○	○

12. How connected did you feel to the other members of Kidsteam?

	Not at all connected	Slightly connected	Somewhat connected	Quite connected	Extremely connected
Adults	○	○	○	○	○
Children	○	○	○	○	○

13. After a design session ended, do you think your ideas were used?

○ No.

○ Yes. Please tell us how you think your ideas were used:

```
┌─────────────────────────────┐
│                             │
│                             │
│                             │
│                             │
└─────────────────────────────┘
```

14. During Kidsteam you addressed a lot of open-ended problems where there were no right answers. How likely are you to work on these types of questions today?

Not at all likely	Slightly likely	Somewhat likely	Quite likely	Extremely likely
○	○	○	○	○

15. Do you remember non-university partners or people coming in to work with you?

○ No.

○ Yes. If you can recall, please describe who they were:

```
┌─────────────────────────────┐
│                             │
│                             │
│                             │
│                             │
└─────────────────────────────┘
```

16. Did you learn anything from Kidsteam?

○ No.

○ Yes. Please tell us what you learned:

17. Please define what being a "design partner" meant in Kidsteam.

18. What is your strongest memory of Kidsteam?

19. Is there anything you would like to share about what your Kidsteam experience was like?

Your experience on Kidsteam

(Question page 3 of 3, then a Thank You page.)

20. Please rate the following statements.

	Strongly Disagree	Disagree	Neither Disagree Nor Agree	Agree	Strongly Agree
I felt empowered by being a part of Kidsteam.	○	○	○	○	○
It was important to me that the team heard my ideas.	○	○	○	○	○
My ideas and opinions were important to the team.	○	○	○	○	○
I could influence the direction of the projects I worked on.	○	○	○	○	○
I liked the fact that the non-university partners that visited Kidsteam may have used the team's ideas.	○	○	○	○	○

21. As a child design partner, were you aware that Kidsteam may have been paid by some of the non-university partners that you worked with?

○ Yes

○ No

○ Other (please specify)

[   ]

22. How do you feel about the potential that Kidsteam may have been paid by some of the non-university partners?

Strongly Dislike	Dislike	Neither Dislike nor Like	Like	Strongly Like
○	○	○	○	○

23. As a child design partner, were you aware that some of the professors and graduate students you worked with may have been paid with money that was given to Kidsteam by non-university partners?

○ Yes

○ No

○ Other (please specify)

[   ]

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24. How would you describe your relationship to the**adult** design partners of Kidsteam?

[ ]

25. How would you describe your relationship to the child design partners of Kidsteam?

[ ]

26. What did you learn about designing technology from Kidsteam?

[ ]

27. How did working with non-university partners influence your decision to participate in Kidsteam?

[ ]

28. What did you think the purpose of the end of the year gift was?

[ ]

Thank you for participating!

Thank you for participating in our survey about your experiences on Kidsteam!

Would you be interested in talking with us in a follow up interview? If so, please ask your parent or guardian for permission and have them enter their contact information below.

29. Contact information for a follow up interview:
(This information will be stored separately from the survey responses.)
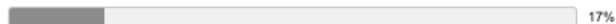
Parent or Guardian's Name	[ ]
Child's Name	[ ]
Email Address	[ ]

Appendix C:
Survey Instrument for
Parents of Child Design Partner Alumni

Welcome and Consent

17%

Thank you for your interest in participating in our survey! Your feedback is important to us. Please review the following consent form.

The Long Term Experiences of Child Design Partners in Intergenerational Design Teams

Purpose of the Study
This research is being conducted by Dr. Allison Druin at the University of Maryland, College Park. We are inviting you to participate in this research project because you are a parent of a child who has previously participated in our design group, Kidsteam, as a child design partner. The purpose of this research project is to understand the long-term impacts of having been a child design partner.

Procedures
Previously, your child designed new technologies for children as a design partner alongside graduate students, undergraduates, and other staff and faculty. Now we would like to speak with you about the impact of this experience. You will be asked to complete an online survey, which should take no longer than 15 minutes, answering questions such as, "Did you see your child applying skills that s/he gained during Kidsteam, or applying learning from Kidsteam, in other activities?"

Upon completing the survey, you will be asked if you OR your child would like to participate in a follow up interview. If so, you will be asked to enter you email address, which will be stored separately from the study data, and you will be contacted within a few months of the survey.

Potential Risks and Discomforts
There are no known risks to participating in this research.

Potential Benefits
There are no benefits directly to you or your child, but the results may help the investigators to learn how to better benefit future child design partners. It is hoped that the work of this new research team will include designing technologies that can better serve children in their learning and play in the future.

Confidentiality
Any potential loss of confidentiality will be minimized by storing our data in the locked Human-Computer Interaction Laboratory at the University of Maryland. Any digital data (e.g. survey results) will be stored in password protected digital archives. Paper documents will be stored in a locked office belonging to the investigators of the study at the lab. The only people with access to the materials will be the researchers involved in the study for coding and analysis purposes. You will never be identified by name in reporting of data; you will only be identified by common characteristics, such as age or gender. Your information may be shared with representatives of the University of Maryland, College Park or governmental authorities if you or someone else is in danger or if we are required to do so by law.

Right to Withdraw and Questions
Your participation in this research is completely voluntary. You may choose not to take part at all. If you decide to participate in this research, you may stop participating at any time. If you decide not to participate in this study or if you stop participating at any time, you will not be penalized or lose any benefits to which you otherwise qualify. If you decide to stop taking part in the study, if you have questions, concerns, or complaints, or if you need to report an injury related to the research, please contact the investigator: Dr. Allison Druin; 2116A Hornbake Building, South Wing; College Park Maryland, 20742. Phone: 301-405- 7406 Email: allisiond@umiacs.umd.edu

Participant Rights
If you have questions about your rights as a research participant or wish to report a research-related injury, please contact: University of Maryland College Park; Institutional Review Board Office; 1204 Marie Mount Hall; College Park, Maryland. 20742 E-mail: irb@umd.edu Telephone: 301-405-0678 This research has been reviewed according to the University of Maryland, College Park IRB procedures for research involving human subjects.

1. Selecting "I Agree" indicates that you are at least 18 years of age; you have read this consent form or have had it read to you; your questions have been answered to your satisfaction and you voluntarily agree to participate in this research study. Please print this form for your records.

◯ I Agree

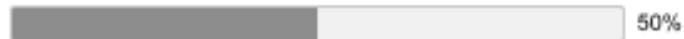**2. How many of your children participated in Kidsteam?**

◯ 1

◯ 2

Next

50%

3. What is your gender?

○ Female

○ Male

○ Other

4. How many years old was your child when starting Kidsteam?

○ 7

○ 8

○ 9

○ 10

○ 11

○ Uncertain

5. What year did your child join Kidsteam?
(Approximate year is fine.)

[   ]

6. For how many years was your child a Kidsteam member?
(Not including Summer Kidsteam or Teen Kidsteam)

○ Less than 1 year

○ At least 1 year but less than 2 years

○ At least 2 years but less than 3 years

○ At least 3 years but less than 4 years

○ At least 4 years but less than 5 years

○ 5 years

7. What is your child's gender?

○ Female

○ Male

○ Other

8. Please describe your views on what being a "design partner" meant in Kidsteam.

9. What were your expectations when your child joined Kidsteam as a design partner?

Prev   Next

Working with Partners

67%

10. Sometimes partners from outside the university would come to work with Kidsteam. Did you like the fact that these partners may have used the team's ideas?

Not at all	A little bit	Somewhat	Quite a bit	A tremendous amount
○	○	○	○	○

11. Were you aware that Kidsteam may have been financially supported by some of the visiting partners your child(ren) worked with?

○ Yes

○ No

○ Other (please specify)

12. How do you feel about the possibility that Kidsteam was financially supported by some of the visiting partners?

Strongly Dislike	Dislike	Neither Dislike Nor Like	Like	Strongly Like
○	○	○	○	○

13. Were you aware that some of the professors and graduate students your child(ren) worked with may have been paid with money that was given to Kidsteam by the partners?

○ Yes

○ No

○ Other (please specify)

Impact

83%

14. How did participating in Kidsteam impact your child(ren)?

15. Do you think that participating in Kidsteam changed how your child(ren) related to adults?

◯ No

◯ Yes.

If yes, how so?

16. Did your child(ren) learn new skills during Kidsteam?

◯ No

◯ Yes.

If yes, please describe what your child learned.

Prev   Next

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Parent Survey: Your Child's Kidsteam Experiences

Thank you for Participating!

100%

Thank you for participating in our survey about your child's experiences on Kidsteam!

Would you be interested in talking with us in a follow up interview? If so, please enter your contact information below.

17. Contact information for a follow up interview:

(This information will be stored separately from the survey responses.)

Name

Email Address

Prev   Done

Appendix D:
Survey Instrument for Adult Design Partner Alumni

Thank you for participating in our survey on your Kidsteam experiences!

Please review the form below and indicate your consent at the bottom of the page.

Purpose of the Study
This research is being conducted by Dr. Allison Druin at the University of Maryland, College Park. We are inviting you to participate in this research project because you have previously participated in our design group, Kidsteam, as an adult design partner. The purpose of this research project is to understand the long-term impacts of having been a design partner.

Procedures
Previously, you designed new technologies for children as a design partner alongside child design partners, graduate students, undergraduates, visiting partners, and other staff and faculty. Now we would like to speak with you about the impact of this experience.

You will be asked to complete an **anonymous, online survey** about your experiences and expectations with regard to Kidsteam, which should take no longer than **15 minutes**. Upon completing the survey, **you will be asked if you would like to participate in a follow-up interview.** If so, you will be asked to enter your email address, which will be stored separately from the study data, so that you may be contacted to participate.

Potential Risks and Discomforts
There are no known risks to participating in this research.

Potential Benefits
There are no benefits directly to you, but the results may help the investigators to learn how to better benefit future adult and child design partners.

Confidentiality
Any potential loss of confidentiality will be minimized by storing our data in a locked desk within the Human-Computer Interaction Laboratory at the University of Maryland. Any digital data (e.g., survey results) will be stored in password protected digital archives. Paper documents will be stored in a locked office belonging to the investigators of the study at the lab. The only people with access to the materials will be the researchers involved in the study for analysis purposes.

You will never be identified by name in reporting of data; you will only be identified by demographic characteristics, such as age or gender. Your information may be shared with representatives of the University of Maryland, College Park or governmental authorities if you or someone else is in danger or if we are required to do so by law.

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Right to Withdraw and Questions

Your participation in this research is completely voluntary. You may choose not to take part at all. If you decide to participate in this research, you may stop participating at any time. If you decide not to participate in this study or if you stop participating at any time, you will not be penalized or lose any benefits to which you otherwise qualify.

If you decide to stop taking part in the study, if you have questions, concerns, or complaints, or if you need to report an injury related to the research, please contact the investigator:
Dr. Allison Druin, 2116A Hornbake Building, South Wing; College Park Maryland, 20742
Phone: 301-405- 7406; Email: allisiond@umiacs.umd.edu

Participant Rights

If you have questions about your rights as a research participant or wish to report a research-related injury, please contact:
University of Maryland College Park, Institutional Review Board Office
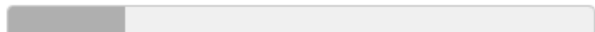1204 Marie Mount Hall; College Park, Maryland, 20742
E-mail: irb@umd.edu; Telephone: 301-405-0678

This research has been reviewed according to the University of Maryland, College Park IRB procedures for research involving human subjects.

* 1. Selecting "I Agree" indicates that you are at least 18 years of age, you have read this consent form or have had it read to you, your questions have been answered to your satisfaction, and you voluntarily agree to participate in this research study. Please print this form for your records.

◯ Agree

◯ Disagree

20%

Next

Background | The Team | Your Experience | Thank You

Tell us a bit about yourself.

* 2. How many years old are you?

* 3. What is your gender?

○ Female

○ Male

○ Prefer not to say

○ Prefer to self-describe:

* 4. Which of the following best describe your previous role(s) with Kidsteam?

(Select all that apply.)

☐ Visiting Project Collaborator (e.g., Master's Capstone project, National Park Service)

☐ Paid Student Employee

☐ Paid Faculty or Staff Employee

☐ Occasional Volunteer

☐ Consistent Volunteer or Visiting Scholar

☐ Other (please specify)

* 5. How long did you participate in Kidsteam?

(Select the nearest option.)

○ Less than 1 year

○ At least 1 year but less than 2 years

○ At least 2 years but less than 3 years

○ At least 3 years but less than 4 years

○ At least 4 years but less than 5 years

○ 5 or more years

* 6. In what year did you **stop** participating in Kidsteam?

(Please enter a 4-digit year; for example, 2007.)

[   ]

* 7. Why did you initially participate in Kidsteam?

[   ]

* 8. In 2-3 sentences, describe your overall experience of designing technologies with Kidsteam.

[   ]

* 9. Overall, how pleasant or unpleasant was your experience with Kidsteam?

Very unpleasant	Unpleasant	Neither unpleasant nor pleasant	Pleasant	Very pleasant
○	○	○	○	○

[████████████░░░░░░░░░░░░░] 40%
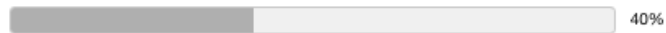
[Prev] [Next]

Background | **The Team** | Your Experience | Thank You

These **4 questions** ask you about UMD's Kidsteam.

* 10. How were unique ideas created while designing technologies during Kidsteam design sessions?

* 11. How would you describe the relationship between the adult and child members of Kidsteam?

12. What was the most challenging part of working with Kidsteam for the adults on the team?

* 13. Please indicate your agreement with the following statements:

	Strongly Disagree	Disagree	Neither Disagree Nor Agree	Agree	Strongly Agree
It was important to me that the team heard my ideas.	○	○	○	○	○
My ideas and opinions were important to the team.	○	○	○	○	○
I could influence the direction of the project(s) I worked on.	○	○	○	○	○
The Kidsteam environment was respectful.	○	○	○	○	○
I like that ideas created in Kidsteam may have been used in publicly released projects and publications.	○	○	○	○	○

60%

Prev   Next

Background | The Team | **Your Experience** | Thank You

These **7 questions** ask you about your experience with UMD's Kidsteam.

14. How did participating in Kidsteam impact you, if at all?

* 15. Did you learn anything about designing technology from Kidsteam?

◯ No

◯ Yes

If yes, please describe what you learned.

* 16. Did you develop other skills, besides any described previously, during Kidsteam?

◯ No

◯ Yes

If yes, please describe what you learned.

* 17. Did you experience any frustrations when working with Kidsteam?

◯ No

◯ Yes

If yes, please describe the frustrations you encountered.

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* 18. While you were actively involved with Kidsteam, did you ever hold a Kidsteam session on a technology that you were primarily responsible for working on or developing?

○ No

○ Yes

Please describe what you did with the ideas generated during Kidsteam.

[text box]

* 19. Were any of the practices or techniques you learned from Kidsteam relevant to you outside your participation with the team?

○ No, I did not learn anything from Kidsteam

○ No, nothing I learned was relevant outside of Kidsteam

○ Yes

If yes, please describe how what you learned from Kidsteam was relevant to you outside participating on Kidsteam.

[text box]

20. Is there anything else you would like to share about your experience with Kidsteam?

[text box]

[progress bar] 80%

Prev   Next

Thank You for Participating!

Background | The Team | Your Experience | **Thank You**

Thank you for participating in our survey!

21. Would you be interested in talking with us during a **follow up interview** about your experiences on Kidsteam?

If so, please enter your contact information below. This information will be stored separately from your survey responses.

Name:

Email Address:

100%

Prev   Done

Appendix E:
Interview Protocol for Child Design Partner Alumni

Kidsteam Alumni Study (Child)

For Semi-Structured Interview Sessions

Introduction:

[Introduce the Study]

- o Administer/Explain Consent Forms.
    - o Ask participants if they have any questions about the consent form.
    - o Clarify that the session will be audio recorded.

Begin Interview:

[Start recording] I have just started the recorder and we will begin the interview, which is broken down into several components:

1. Your Introduction to Kidsteam
2. Your Experiences on Kidsteam
3. Exiting from Kidsteam
4. Reflections on Kidsteam
5. (If Applicable) Experience as Adult Design Partner

Please remember to just to say what is on your mind. Remember that we can stop at any point and you should feel free to ask me questions at any time.

Are you ready to begin?

Part 1 – Introduction to Kidsteam

Getting Involved in Kidsteam

Main goals: (1) Get participant comfortable with answering questions and establish rapport. (2) Assess how participant got involved with Kidsteam, what their early experiences were like, and gain an understanding of how to classify their initial interactions.

1. How did you get involved with Kidsteam?
   a. How old were you?
2. Tell me about some of your early memories of Kidsteam.

[Particularly probe this area if the participant does not provide details about **what the team did**.]

Interviewer Notes:

Part 2 – Experiences on Kidsteam

Understanding the Participants Experience on Kidsteam

Main goals: (1) Understand how the participant's experience was similar to other child design partners. (2) Understand how the participant's experience was different from other child design partners. (3) Explore social roles, relationships, and practices as experienced by the participant.

1. How did you relate to the other members of Kidsteam?

    a. Adults and children?

2. Did you think children and adults had an equal partnership in creating design ideas? How come?

    a. Did the team listen to your ideas?

    b. Were you ever concerned about your ideas not being used in the technology you were designing?

    c. **If no to #2**: Was the fact that adults were responsible for other aspects of Kidsteam, such as putting out snack or telling everybody when it was time to stop designing and present our ideas, part of why you don't think they had an equal partnership in creating design ideas? Why is that?

    If yes to #2: Adults were responsible for certain aspects of Kidsteam, such as putting out snack or telling everybody when it was time to stop designing and present our ideas. Does that impact your thoughts on children having an equal partnership in creating design ideas?

Interviewer Notes:

1. Did you ever feel that you didn't know enough about the topic you were working on during a session to design technologies for it?

    For clarification: Each day you were given a topic to work on- science, thermography, storytelling- and you were asked to design technologies around that topic for kids. Was there ever a lack of understanding about the topic? Did a lack of understanding about the topic ever make it difficult to design technologies?

    a. **If yes**: what were you missing?

2. Did you feel like you could stop participating in Kidsteam at any point you wanted- whether that was for a single session or from the team as a whole?

Interviewer Notes:

Part 3 – Exiting from Kidsteam

Main goals: (1) Understand reasons for leaving Kidsteam. (2) Explore thoughts about exiting Kidsteam at that time.

1. Why did you decide to stop participating in Kidsteam as a child?

   If aged out: Would you have wanted to stay on if you could? How would you envision your continued participation in Kidsteam?

2. Is there anything you wish had been different?

Interviewer Notes:

Part 4 – Reflections on Kidsteam

Reflecting on answers from previous sections to explore Ethical Implications and Impact

Main goals: [Convert previous answers into questions that more specifically explore ethical implications and the impacts of being a Kidsteam design partner]

1. Looking back, what is the single most important thing you gained from Kidsteam? Why's that?
   a. Did you gain anything else from Kidsteam?
   b. Do you currently use these skills?
      i. **If yes:** How have you been able to apply these skills elsewhere?
      ii. **If no:** Have you ever been able to apply knowledge gained from Kidsteam elsewhere?

2. What did you think about how the ideas you generated during Kidsteam were used?
   a. Do you think you received proper credit for your work?

3. What did you think of the fact that partners came in to work with Kidsteam?

   For clarification: NPS, Nickelodeon

   a. What do you think of the fact that the partners that visited us may have used your ideas? (use of ideas)
4. What kind of outcomes from research with Kidsteam are you aware of? (papers, tech, etc)
   a. Is it more important to be anonymous or to have gotten more credit? (privacy vs attribution)
   b. What do you think about the fact that your image may have been used in publications? (privacy)

5. Did you ever return to Kidsteam when you were older?
   a. **If yes**: Next page
   b. **If no:** Were you aware that there were opportunities to return?

Interviewer Notes:

Part 5 – (If Applicable) Experience as Adult Design Partner

Strengths and Weaknesses

Main goals: (1) Understand reasons for returning as an Adult Design Partner; (2) Determine impact of Kidsteam on participant.

1. Why did you return to Kidsteam as an adult design partner?
2. What were you expecting when you re-joined Kidsteam?
3. What surprised you about being an adult design partner?
4. Have you learned anything from your experience as an adult design partner? What have you learned?
   a. Have you been able to use this knowledge outside Kidsteam?
5. Any final thoughts or things you would like to share?

Interviewer Notes:

End Session:

[Stop recording!]

- o Thank the participant for participating.

Post Session:

[Perform this book keeping immediately after signing off with the interviewee.]

- o Record notes about session
- o Update participant records
- o Collect all data, logs, and other artifacts and store on data repository.
- o Send reminder to remaining participants.

Appendix F:
Interview Protocol for
Parents of Child Design Partner Alumni

Parents of Kidsteam
Child Design Partner Alumni Study
Semi-Structured Interview Protocol

Introduction

[Read aloud to participant.]

Hello, my name is Brenna. On behalf of my research team, thank you for completing the Kidsteam online survey and for volunteering to participate in this follow-up interview. Our goal is to understand the experiences of Kidsteam's child design partner alumni.

Prior to this interview you completed and sent me your consent form. But before we begin, I need to remind you that this session will be audio recorded and that your data will be kept confidential. We may use anonymized quotes in resulting publications. Additionally, you can opt out of this session at any time. Do you have any questions before we begin?

Begin Interview

[Start recording.]

We will start with some general questions about your experience with Kidsteam and then move on to some more specific questions about you and your child's experiences.

Instructions For Researchers: This interview is semi-structured; feel free to pursue interesting lines of conversation at your discretion.

Part 1- Getting Involved with Kidsteam

Main Goals: (1) Stimulate participant recall, (2) investigate perspectives of participation.

1. In a few sentences, tell me about your overall experience with Kidsteam.
    a. Did anything surprise you about your child's (or children's) participation?
    b. (If multiple children participated) Was there anything different about your children's experiences?

2. What motivated you to sign your child up for Kidsteam?

3. Did you remember your child discussing any particular projects from Kidsteam?
    a. How did they describe these projects?
    b. Did they ever express frustration with Kidsteam?
    c. Did you child ever discuss not wanting to participate?

4. What did you think about the Kidsteam design process?

Interviewer Notes:

Part 2- Children's Experiences on Kidsteam

Main Goals: (1) Possible gains from Kidsteam, (2) team dynamics.

1. Did your child gain anything from their participation in Kidsteam?
   a. Were they able to apply these skills elsewhere?
   b. Do you think your child currently uses these skills?
   c. Why do you ascribe these gains to Kidsteam, as opposed to other experiences?

2. Do you think participating on Kidsteam changed how your child viewed relationships with adults?
   a. Did their participation change how your child viewed relationships with children?
   b. Did their participation change their actions (i.e., not just their views) toward adults or children?

3. What did you think of the fact that partners came in to work with Kidsteam?
   a. What did you think of the fact that the partners that visited us may have your child's ideas?

4. Why did your child stop participating in Kidsteam?

5. Did you child ever re-contact members of Kidsteam after they stopped participating? If so, what for?
   a. Did your child return to Kidsteam when they were older, as a teen or adult design partner?
   b. What did you think about your child's decision to return to Kidsteam as an adult design partner?
   c. Do you think your child has learned anything from being an adult design partner? If so, what?

Interviewer Notes:

Part 3- Final Thoughts

Main Goals: A catch-all for anything the participant may still want to discuss.

1. Do you have any advice, recommendations, or critiques of Kidsteam?

2. If another parent were considering enrolling their child in Kidsteam, what would you tell them?
    a. What would you tell their child or children?

3. Do you have other thoughts or experiences that you'd like to share?

Interviewer Notes:

End Session

[Stop recording.]
Thank the participant for participating.

Post Session

[Perform this book keeping immediately after finishing with the interviewee.]
- Record notes about session
- Update participant records
- Collect all data, logs, and other artifacts and store on data repository.
- Collect and store all physical artifacts (documents) and return to HCIL office.

Appendix G:
Interview Protocol for Adult Design Partner Alumni

Kidsteam Adult Design Partner Alumni Study
Semi-Structured Interview Protocol

Introduction

[Read aloud to participant.]

Hello, my name is Virginia. On behalf of my research team, thank you for completing the Kidsteam online survey and for volunteering to participate in this follow-up interview. Our goal is to understand the experiences of Kidsteam's adult design partner alumni. As an impartial researcher, I have no position on this topic and ask that you be as open, honest, and detailed in your answers as possible.

Prior to this interview you completed and sent me your consent form. But before we begin, I need to remind you that this session will be audio recorded and that your data will be kept confidential. We may use anonymized quotes in resulting publications. Additionally, you can opt out of this session at any time. Do you have any questions before we begin?

Begin Interview

[Start recording.]

I have just started the recorder and we will begin the interview; the interview is broken down into three parts:

- Getting Involved with Kidsteam

- Your Personal Experiences with the team

- Reflections on Kidsteam

- Final Thoughts

Instructions For Researchers: This interview is semi-structured; feel free to pursue interesting lines of conversation at your discretion.

Part 1- Getting Involved with Kidsteam

Main Goals: (1) Stimulate participant recall, (2) gather basic demographic information.

1. In 2-3 sentences, tell me about your experience with Kidsteam.
2. How did you first get involved with Kidsteam?
    a. **When was this?** (e.g., 1999, three years ago)
3. What is your strongest memory of Kidsteam?
4. **How long** did you participate on Kidsteam? (e.g., 5 years, 2-3 sessions)

Interviewer Notes:

Part 2- Personal Experiences with Kidsteam

Main Goals: Investigate any personal benefits or long-term usefulness of participation, establish participant roles on the team and their reason(s) for participating.

1. Looking back, what is the single most important thing you gained from Kidsteam? Why's that?
    a. Did you gain anything else from Kidsteam?
2. Was participating on Kidsteam useful to you in any (other) way(s)? *
3. Did you ever hold a session on a technology you were developing or researching?
    a. **If yes:** How did you use the outcomes from your Kidsteam session(s)? *Examples/Prompts: to discuss with team members, to improve the technology, to publish papers*
4. What did you see as **your** roles or responsibilities when you were an adult member of Kidsteam?
    a. Were your roles and responsibilities clear to you?

* Previous interviews suggest these questions are likely tangent areas. Feel free to follow up!

Interviewer Notes:

Part 3- Reflections on Kidsteam

Main Goals: Investigate (1) team dynamics and (2) possible impediments to gains.

1. How did adult and child members of Kidsteam relate to each other?

2. Did you think children and adults had an equal partnership in creating design ideas?

   a. What were the small group dynamics like?

   b. *[if necessary]* How were design ideas generated?

3. Has knowing this process ever been useful to you outside Kidsteam?

4. Did you experience any frustrations while working with Kidsteam?

   a. **If "yes"** and they don't elaborate: What were they related to?

   As answering, check off:

   O preparing for Kidsteam sessions   O conducting Kidsteam sessions

   O understanding Kidsteam's process   O team relationships

   O time management & scheduling

   b. You described frustrations relating to *[any checked items]*, did you experience any frustrations relating to *[unchecked items]*?
   Examples/Prompts: time required, travel, scheduling, interpersonal with adults or children, getting useful design outcomes, funding, publishing

5. Did you ever feel that you didn't know enough about the topic you were working on during a session to design technologies for it?

   For clarification: Each day you were given a topic to work on- science, thermography, storytelling- and you were asked to design children's technologies around that topic. Did a lack of understanding about the topic ever make it difficult to design technologies?

   a. **If yes:** What were you missing?

Interviewer Notes:

Part 4- Final Thoughts

Main Goals: A catch-all for anything the participant may still want to discuss.

1. Is there anything you wish had been different about participating on Kidsteam?
2. Do you have any final thoughts about your Kidsteam experience that you'd like to share?
   a. [If necessary] Or any feedback you think is important to the team?

Interviewer Notes:

End Session

[Stop recording.]
Thank the participant for participating.

Post Session

[Perform this book keeping immediately after finishing with the interviewee.]
- Record notes about session
- Update participant records
- Collect all data, logs, and other artifacts and store on data repository.
- Collect and store any physical artifacts (documents) and return to HCIL office.

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