Connecting Generations: Developing Co-Design Methods for Older Adults and Children

ABSTRACT

As new technologies emerge that can bring older adults together with children, little has been discussed by researchers concerning the design methods used to create these new technologies. How to give both children and older adults a voice in a shared design process comes with many challenges. This paper details an exploratory study focusing on connecting generations through co-design methods that can enable idea construction and elaboration to flourish. Design techniques were adapted that ranged from *low-tech prototyping*, to *sticky-note feedback*, to *distributed collaboration*. The critical finding in this research was how children and older adults need time together to collaborate, but also time apart to collaborate at a distance. This case study research reports on how our methods evolved and how others can apply these methods for their own work.

Author Keywords

Participatory Design, Co-Design, User-centered Design, Older Adults, Seniors, Retirees, Children.

ACM Classification Keywords

H5.2. User interfaces: Prototyping: User-centered Design.

INTRODUCTION

…University people were busy writing on little sticky notepapers. I do not believe that we were very helpful, but they were extremely encouraging. We were told that most people feel that nothing is happening at the beginning, but after a number of sessions ideas start to develop. They dumped an assortment of play material, feathers, pieces of Styrofoam, pieces of paper, scissors and tape on our table, and we were supposed to make something out of it. The kids took this assignment in stride and glued and patched things together. They said that this is what a computer should look like. We seniors were out of our element and just sat there somewhat embarrassed … [23]

These were the words of *Mel* (names have been changed for privacy purposes), an 81 year-old retired government worker who decided to write about his first experiences in co-design for his creative writing class. What his words reveal is the initial difficulty he faced in understanding how to be a co-designer or partner with children in creating new technologies that can bring children and older adults together to communicate and interact with one another. What his words also suggest is that the design methods we used at the start of our exploratory research did not help some older adults feel comfortable sharing their ideas. His words suggest that work was needed in developing our co-design methods.

This paper describes the challenges, the successes, and the evolution of giving both children and older adults a voice in the design process with methods that make sense for each. We report on what these children and older adults suggested was important to focus on with their co-design activities: technology to help both generations interact with each other. A case study approach was taken throughout this research and will be reported on in this paper. Our findings include a discussion of why these new co-design methods are needed, our own personal goals for these design methods, and reflections on how others can apply what we have learned.

Figure 1. Older adults, research staff, and children using low-tech prototyping methods

Figure 2. Older adults, research staff, and children presenting their low-tech prototypes

THE NEED FOR RESEARCH

Older adults and children typically are "relevant but absent" [6] social groups in the design and development of new technologies. Even though technology plays a role in their everyday lives, older adults and children are rarely asked to play a central role in the development process [12]. Designers of today's new technologies tend to be young adults with a very different view of the world than older adults and children, and can have little understanding of age-related differences and how those differences can affect the adoption and use of technology [8, 11-14, 29]. Therefore, it is important to fully involve conventionally "relevant but absent" social groups such as older adults and children in the design and development process of technologies.

Only recently has HCI research begun to emerge which reports incorporating in some way older adults' input in the design and development of new technologies. These include: email applications [10], Web browsers [9, 24], Web search engines [5], and informational Web sites [1, 2, 16, 27]. A common feature and limitation of this research is that older adults are not directly involved in the process until *after* the prototypes which are typically developed by young adults, have already been completed. In general, these researchers ask how an already developed technology could be modified to better accommodate age-related differences in cognitive, perceptual, and/or motor abilities. Although this approach clearly has its merits, it also suffers the limitation of underemphasizing the broader contextual aspects of the user [7, 32]. To facilitate the adoption and use of new technologies among the older population, it is critical to support the creation of new technologies that are more useful in meeting users' needs and better fitting into their everyday context [26, 34].

The same can be said of children's participation in the technology design process. Only in the last decade have children become more involved and accepted in co-design [11-13, 17]. Today researchers are partnering with children in Europe, Asia, Oceana, and the US, to create new digital libraries, storytelling applications, mobile phones, web

sites, and more. Since 2002, a great deal of this literature has been reported in the *Interaction Design and Children* (IDC) conference proceedings. Not only are new technology breakthroughs reported, but many times the methods that were used in the design process are the focus of the published paper (e.g., [3, 18, 33]).

There is a consensus in the literature that intergenerational relationships are extremely important in the everyday lives of older adults [4, 19, 25, 35]. Intergenerational interactions do not necessarily need to be limited to those between family members. Studies have shown that interactions between older and younger people, *who are not related* to each other, can promote social and civic engagement, lifelong learning, and well-being of older adults, while also improving college and middle school students' awareness of and respect for the special needs of the older population [15, 30].

Yet to date, the HCI literature has only reported how computer technology can facilitate intergenerational interaction in a handful of papers on use and development of technologies for families (e.g., [21, 22, 28, 31]). However in the family technologies literature, three generations are most frequently reported on — grandparents, parents, and children. Few consider how only older adults and children want computer technology to help them to interact with each other. Generally, their communication is mediated through a "parent" or care-giver. However, focusing on indirect interactions between grandparents and grandchildren may not be the most effective way to promote the grandparent-grandchild relationship. Research suggests that intergenerational communication can be more frequent when initiated by a grandparent or grandchild as opposed to a parent [20].

In addition, the intergenerational connection in the family literature is with older adults who are related to the children and not necessarily friends, mentors, or acquaintances. Little has been explored with co-design techniques that would bring together older adults and children who are not necessarily biologically-related or legally-bonded. What difficulties might there be when co-designing with older adults and children who did not have any prior interaction? And what special accommodations might be necessary in order to overcome those difficulties? In this exploratory study we attempted to understand what is possible between two generations of co-design partners who did not know any member of the other generation prior to their participation in this study.

GOALS FOR DESIGN METHODS

Over the last decade, researchers have developed co-design methods for work with children and have enlightened our team's sense of what is possible when unique points of view can be heard [11-13]. Empirical work with older adults [36, 37] has suggested the need for better technologies for older adults and asked us to consider how older adults' interest in children can be incorporated into

new tools. This in turn challenged us to create better design methods that can span users of all ages. Therefore, we set for ourselves three goals:

1 – *Help users, young and old, understand they can have a voice in the co-design process*

The challenge of convincing users they can be heard in the technology design process may be considerable. Older adults may feel marginalized due to changes in family and careers. Therefore, design methods must enable them to understand they have something important to contribute. Equally difficult is the challenge of convincing children that co-design is not just an exercise for a school grade, but can have real and lasting impact.

2 – *Use methods comfortable for all co-design partners*

Users at both ends of the age spectrum, have different needs and preferences for physical activity, for cognitive and physical accommodations, and for even satisfying their physical hunger during design sessions. To find ways that those differences can be addressed but still bring people together in one design team is no small challenge.

3 – *Revise and improve methods with co-design partners*

Based on our participatory design experience, we have come to believe that design methods are best evolved with the design stakeholders. Co-design of the co-design methods can be an effective way of revising and improving methods quickly and understanding its impact.

PILOT CASE STUDY
In August, 2007 we initiated our work with older adults and children. We worked with each age group together and separately in two locations. What follows is a description of our design partners followed by the methods used and the evolution of these methods.

The Design Partners
The older adults and children with whom we worked were diverse in age, computer expertise, and life experiences. Our team consisted of six older adults (three male and three female) and seven children (four male and three female) as well as seven researchers from our university who were either faculty, graduate students, or staff in computer science or information studies. Three of the seven children had at least one year of prior experience in co-designing while none of the older adult participants had any prior co-design experience. In Tables 1-2, we further describe our older and younger design partners:

Pseudo-Name	Age	Computer Experience	Previous Job
Mel	81	Uses word-processing and voice recognition software, and email	Patent office manager
Peter	81	Extensive experience with computers over the years. Very comfortable with diverse applications	NASA researcher
Fred	77	Quite nervous; took one class in DOS and quit; uses word-processing software	Lawyer, writer
Isabelle	74	Difficulty reading screens due to poor eye sight; uses word-processing software	Pre-school teacher
Vickie	80	Comfortable, but novice user; hates computers	Actress
Jenny	68	Very comfortable, especially with Web technologies	Worked in the home

Table 1. Older Adult Design Partners

Name	Age	Computer Experience	Design Partner Experience
Stephen	9	Spends time using the Internet, video games, and word-processing	1 yr prior
Dana	8	Spends time using online communities, playing games and watching video	2 yrs prior
Ruby	7	Spends time using the Internet, video games, and word processing	1 yr prior
Kaerod	7	Very comfortable using all forms of technology	new
Thomas	6	Novice user but has used the Internet	new
Hunter	6	Novice user but has used the Internet	new
Alexandra	6	Novice user but has used the Internet	new

Table 2. Children Design Partners

The Co-Design Activities
Our co-design activities fell into three categories:

1- **Pre-design** preparation

Before their first meeting, the children and older adults each spent 40-minutes to half an hour discussing the design sessions to come. The children did this as a group at the university lab, while the older adults did this as a group at the senior center.

2- Flexible **co-design** activities

All of these activities were conducted at the senior center with the children and older adults together. Approximately, 4 hours were taken for four different activities as well as lunch. These co-design activities were adapted from methods that our team had used in the past with only children and the lab's researchers. It was expected that these methods would be revised based on our work together.

3- **Distributed** collaboration

When we began our work on this pilot research we anticipated the pre-design preparation and the co-design activities. However, we did not expect to need, or be successful with, distributed collaboration. This occurred for half of an hour near the end of the first full day, and for two and a half on the second day. The distributed collaboration for the older adults occurred at the senior center on both the first and second day. And for the children, this distributed collaboration took place at the university lab.

All design activities were photographed, partially video-taped and extensive participant observation and note-taking was accomplished by three of the researchers. Informed consent was obtained prior to initiating work with the group. Based on this data collection, the following describes each of the activities in more detail.

Pre-Design Preparation
A week before the children were to meet with the older adults for the first time, we spent an hour with the children at the lab and asked: *what did they look forward to*? *what worried them about working with older adults?* and *what did they wish for?* We asked each child to write one response to each question on a sticky note and these responses were aggregated. What we found was that the children wondered a great deal about the physical abilities of the older adults (e.g., would they be able to hear? Would they walk slowly?). The children, when asked what they worried about, responded with concerns that focused on their relationship with the older adults (e.g., would they like working with us? Will I be shy?) On the other hand, what the children seemed to look forward to seemed quite diverse (e.g., having a good partner, seeing if they know about volcanoes, seeing people older than me).

With the older adults we also had a pre-design preparation session, before the children arrived at the senior center

Instead of using sticky notes, a 40-minute free-form whole group discussion was initiated between the university researchers and the older adults. The older adults were most interested in understanding who these children were and what they were going to do with them. They also asked the "why bother" question. It was hard for the older adults to think of a computer as something other than a traditional desktop so they didn't quite understand how they could change technology and why we wanted to bother hearing from them.

Figure 3. Pairs of older adults and children reflecting on the design process using "sticky-notes"

Flexible co-design
Group Introductions: As a whole group, each of the design participants introduced themselves, how old they were, how long they had been a design partner (for the kids) or what they did as a job (for the older adults), and finally what they really liked to do on the computer. The results of this discussion are reported in Tables 1-2. While this introduction experience took close to half an hour, in some ways more introductions were needed since there was still a curiosity about one another. Once these personal introductions were completed it was explained that we would be working together over the next day and a half to not only design new technologies, but to change the way we design.

Sticky note ideas: In four groups of no more than five people (1-2 children, 1-2 older adults, and 1 university researcher) were asked to write down their ideas for a computer that would *bring together older adults and children*. They were asked to write one idea per sticky note, with children drawing their thoughts in pictures and adults writing their ideas with words (all were asked to "write" but some of the children felt more comfortable drawing, so they did so). These ideas were grouped and discussed with all of the teams. From this 20-minute brainstorming activity, three major areas emerged: Children and older adults wanted devices that would allow for distributed physical activities (e.g., cooking, playing, physical games), communication (e.g., sharing stories and family histories), and learning (e.g., sharing skills and information).

Bags of stuff ideas: Based on these design ideas, the same groups of five were asked to design a *computer of the future* that brought together older adults and children in a shared activity that involved communication and learning. To create sketches of these ideas, they used what the children call, "bags of stuff" or low-tech art supplies (e.g., paper, crayons, glue, feathers, stickers, etc.). The devices that were created during this 25-minute activity were easy-to-manipulate interfaces (e.g., touch screens and large buttons), portable (e.g., collapsible, rolling, pocket-sized), and had physical components on each end (each person has a tool of some kind to operate) (see Figures 1-2).

Sticky note reflections: Once lunch concluded, the older adults and children worked in pairs to brainstorm and reflect for 45 minutes on what they found easy and challenging about working together. Again they used sticky notes to record their ideas (see Figure 4). The interesting finding that emerged from the sticky note reflections was that both older adults and children found that "coming up with ideas" and "building the design ideas" were considered both difficult and easy. Apparently, the older adults found different parts of the process easy and challenging. For example Mel suggested building with the art supplies was difficult, yet, Jenny found this easy. Depending on life experience and interest, various methods and different parts of the process were challenging. The same could be said of the children's responses. Some children found it easier to come up with ideas, while others could build quickly. What did emerge however was a need for diversity of methods.

Distributed Collaboration

At this point in the afternoon, the children were given time to run around and burn off some energy. After working with children over the last decade in our lab, we have learned that it is critical to get children up and moving every few hours, or less than useful design collaborations can occur (e.g., lack of attention, arguing with peers, little creativity). During this half-an-hour timeframe, the older adults stayed to talk with researchers. As it happened, it was through this discussion with the older adults that we learned what new technology we needed to focus on. One of the older adults raised the feeling that he had very little understanding of kids and felt very disconnected from his own grandchildren. As he offered his insights other older adults not only agreed, but pointed out how disconnected they felt from children of this generation. We asked about email, and many older adults felt that when they sent things to their children or grandchildren, it put a burden on the receiver since they felt obliged to respond when they did not necessarily need to.
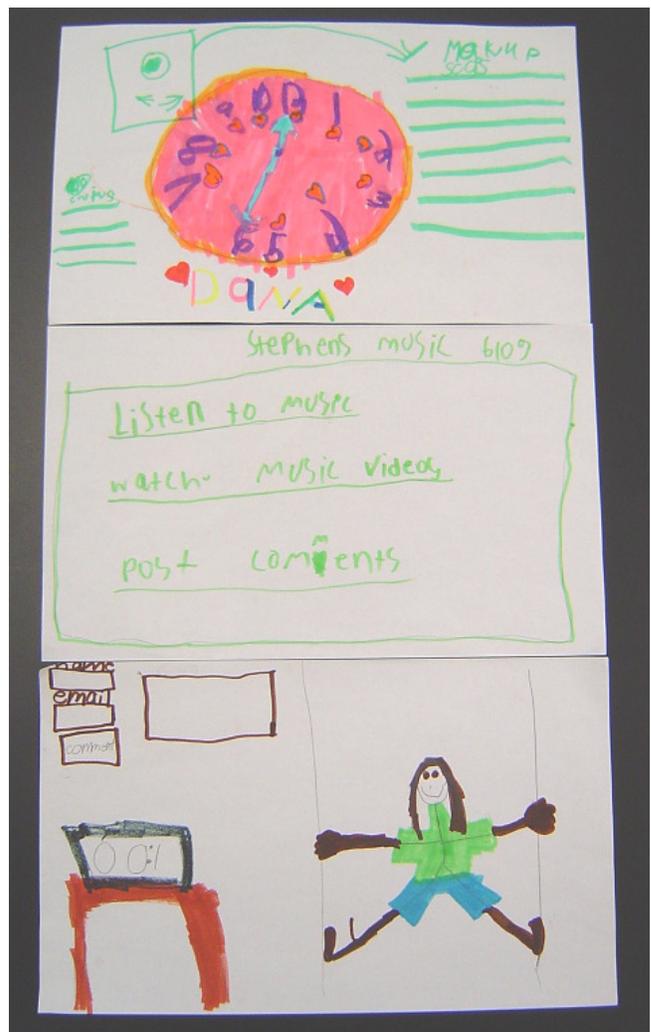

Figure 4. Ideas from a brainstorming activity conducted during our intergenerational design session

Figure 5. Blog design ideas to link older adults to young children.

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At this point in the session, we discussed blogs and asked the older adults if they had seen any. Only one was familiar with what they were, but they all indicated interest in learning to use blogs, we decided that the second day would be devoted to exploring blogs with the older adults at the senior center's computer lab, and with the children back in the university lab. Since this was not a method we anticipated exploring in this case study, it was a bit challenging for researchers to drive between sites. However, by staggering the timing of the two sessions, we were able to accomplish both. After the sessions we compiled the design ideas and looked for similarities and differences.

The next day, two university researchers led demonstration of blogs at each site and then a design session to sketch new ideas. The researchers that led these discussions each had extensive experience in working with children or with older adults. One university researcher drove between the sites to share information between the two groups (the two sites were approximately 20 minutes apart). For example, at the start of the children's session, she relayed what the older adults had discussed late in the afternoon of the previous day on their own. She asked the children how often they see their grandparents and the majority of the children suggested they only saw them once a month or less. When she asked them how normal was it for their grandparents to ask, "How's school going?" "What's new?" there was a round of giggles confirming these were common questions. When questioned further, the children admitted to answering these questions with one word, "good" or "ok" or "nothing." Then she explained that the older adults thought it would be important to make new technologies for *connected communication* between generations. The children agreed after which blogs were introduced and discussed.

At the senior center, the older adults became quite involved in understanding what blogs could do. They wanted to start their own so that they could share their writings with their children and grandchildren without imposing the same burden that emails might. However, there were challenges in finding buttons to press, knowing how to leave a comment and more. At the university lab, the children became quite excited by seeing blogs with video, images, and other forms of media. They too had challenges with small buttons and how to post comments.

During the distributed design sessions similar ideas emerged from both groups. Ideas were suggested concerning where you post versus where you comment on a post. Both groups felt that comments needed to be more obvious and more connected visually. Not surprisingly, both groups suggested buttons and text needed to be larger and more configurable even for the reader, not just the creator of the blog. Where they differed was their interest in multiple forms of media to communicate. The older adults mainly spoke about textual communication, perhaps a picture, while the children considered video, animation,

sound, images, and text. The older adults offered their design ideas through a full group discussion while one of the researchers drew their ideas on a large piece of paper. Based on the previous day's challenges with art supplies, we decided it would be best to have a researcher to draw what these older adults talked about. On the other hand, for the children who felt quite comfortable drawing their ideas, each drew their own blogs on 8.5 x 11inch paper (see Figure 5).

The sessions ended by explaining we would continue working in the Fall and thanking them for their design efforts. We then gave the older adults lab t-shirts, and the children Frisbees. Each seemed appreciated for their efforts and a bond between the children and older adults was observed.

Reflections on Co-Design Methods
Through this study, we learned a great deal about co-design methods while working with both older adults and children. We also learned more about the needs and desires of these design partners in feeling connected.

The main challenge we faced was developing co-design methods that felt comfortable to both older adults and children when working directly with each other. We found that the art supplies which work seamlessly with young people [11] were at times not the medium of choice for the older adults. A number of the older adults felt embarrassed or saw this as "playing not working." On the other hand, when the team spent time in whole group discussion, the older adults in general felt much more comfortable and the children fidgeted, lost focus, and at times became frustrated.

The co-design technique that was the most successful for each age group when in the same room together seemed to be using sticky notes. Some inherent features of this medium for brainstorming and reflection might have contributed to its out-performance: It was a constrained method for generating new ideas where each could feel empowered to offer their ideas. In addition, with this method older adults and young people could work in pairs or very small groups, which seemed to lend itself to more focused collaboration. Sticky notes were also a medium that all design partners had used recently and there was no conceived bias that this medium was just for kids or just for adults. Because sticky notes were used both near the beginning of the day and near the end of the day with equal success, it suggests that this method is not dependent on a time of day or an activity proceeding or following it.

When we asked the older adults and children what other approaches we might use to work together, voice recording and acting out scenarios were mentioned. In addition, it was suggested that more time to better get to know each other would have been helpful for better communication. One child was so nervous about talking to older adults that she clung to the arm of a university researcher for the first

20 minutes of our work together. Another older adult was so nervous with the whole process, that he kept getting up and leaving the room. We anticipated some discomfort and and originally planned to make ice cream sundaes together after lunch so that the older adults and children could get to know each other better in a more social, informal way. This plan was later changed due to the director of the senior center's discomfort with serving ice cream to older adults who should be staying away from fats such as these. In addition, there was some concern about the mess this would cause in allowing children and ice cream in the center.

Would these difficulties associated with having to get acquainted with total "strangers" in a short period of time occur if the older adults and children already knew each other? Despite the answer to this question, our study of co-design partners who did not know each other previously may have great implications for designing and developing technologies to facilitate intergenerational relationships in a broader sense. In this exploratory study, we did not explicitly ask our co-designers to brainstorm on new technologies that would bring together older adults and children to develop relationships that go beyond the grandparent-grandchild relationship. It would be interesting to see what ideas older adults and children, partnering together might be able to design creative ways, technological products and/or services for older adults to (continue to) actively engage in community and civic affairs, and for children to develop positive images about age and aging (that could be applied to the general older generation instead of only their own grandparents).

In co-designing with older adults and children, another major challenge to overcome was the lack of compatibility between older adults and children for when to eat, when to take breaks, and even the physical layout of the room. For example, when children are our design partners in the university lab, typically much of our work together is done sitting on the floor. This is not something you can do easily when some older adults have physical challenges walking, and getting up and down from sitting.

One way we found that could address these differences was to collaborate in a distributed manner. While the older adults and children worked reasonably well together, considering they had never met before, when separated after the initial co-located design sessions, more and better ideas were expressed. This differs from typical co-design methodologies we have developed and used with young children in the past. In the past, we have always assumed that co-located collaboration is essential in order to facilitate elaboration. Here it seems that although a co-located collaboration is still critical, a distributed, asynchronous component not only is beneficial but indispensable. Both children and older adults expressed fears, disappointments, and ideas about how to resolve some of the issues when working together. What was useful was to have at least one researcher moving between locations to further enable the elaboration and communication process. But it should be noted just because working separately works well does not mean that the older adults and children shouldn't still spend time together. It is through that time that each began to learn a bit more about the other. In some ways the discomfort helped to instigate design ideas and more elaboration.

The success with distributed collaboration did raise more questions for us to address in the future. How often is it necessary to separate the team by ages? Should it be done with each design session (as it was done in this exploratory study)? Or should it be done only intermittently? And what should come after distributed collaboration? Would it be logical, after the being apart-together-apart again process, to bring the co-design partners together again to begin another cycle that could enable further distributed collaboration? We also wondered as the team spent more time together (to know each other and the methods better), would the need for separate or distributed collaboration be reduced? Or would it remain constant? We also considered how to make it easier to have distributed collaboration. In the work we reported here, it was necessary to work out of two different locations since each location had specific accommodations for each age partner. In the future, could there be spaces in the same building to accommodate older adults in a room down the hall from the children? Or, could one room be flexible enough to have the different generations in the same room with groups of only older adults and only children? If, for any reason (research- or non-research-related such as transportation and other logistic reasons), the two groups do need/have to be in two different locations, could the distributed collaboration be accomplished via some type of technology (e.g., teleconferencing), instead of having one researcher physically moving between the sites to mediate the collaboration? How would these different arrangements affect the co-design process and the final products (e.g., new technology that improves international interaction) that emerge from the process? We believe as we continue to use these methods, the answers to these questions will emerge.

RECOMMENDATIONS FOR METHODS
Based on this exploratory case study, the following initial recommendations can be made to HCI professionals interested in co-designing with children and older adults:

• Important to spend time together and apart

Supporting distributed collaboration enables older adults to add and elaborate in a less stressful environment (e.g. they don't feel intimidated by the younger children). Older adults may be more comfortable sharing their ideas with another adult for fear they cannot communicate with younger children. On the other hand, without some shared experiences together in the same room, both will have a hard time imagining the needs of the other.

• Need to accommodate for differences

No matter how hard the team tries to accommodate each person's needs, there will be enough differences between design participants that frequent and diverse possibilities are needed.

- Elaboration is the goal

No matter if design partners are in the same room or collaborating by a distance, building on each other's ideas is important. When an idea evolves between partners it offers a shared design path.

- Work primarily in small groups or pairs when children and older adults are together

This allows children and older adults to work together more intimately. With smaller groups older adults and children feel less overwhelmed or intimidated by the other group.

- Give time for large group discussion with older adults only

Allowing the older adults the opportunity to verbally share thoughts and ideas *after* working directly with the children affords many advantages. It enables them to better conceptualize their own wants and needs. It also allows another outlet of ideas without feeling "behind" or "slower than" the younger partners.

- Use art supplies with children

Children seem to contribute best when they can draw, combine materials, and build their ideas. It is a comfortable bridge for communication with peers and between generations.

- Use sticky notes for children and older adults to share ideas in the same room

Children and older adults can represent their ideas well using simple sticky notes. Once each participant has contributed their ideas, the sticky notes are grouped and analyzed for shared ideas.

- Give food and gifts of appreciation to all

Small tokens of gratitude indelibly affect relationships. This is no different in the relationship between design partners. Interestingly, on the second day some of the older adults brought small tokens for the children in gratitude for the experience of working with them. This simple gesture certainly made an impact on the younger partners.

- Make arrangements for transportation for design partners

While it may seem like a detail, both populations of design partners are truly *transportation-challenged.* For older adults, they may not drive any longer and have only a set number of places they can go to easily. For children, they are dependent on parents or researchers. If resources are not available for transportation support, this can change the context of where it is possible to design.

CONCLUSION

We will not know what came out of this "experiment" for a long time. However the session was successful in that it drew one concept from [me] that seemed to come out of nowhere ... [23]

Mel is correct; we will not know all the lessons learned for many years to come. More HCI researchers will be needed to work with these methods in their own labs on their own projects. As for our team, since we are among the few groups pursuing this type of research, we will continue to refine these co-design methods using the project we have begun — "intergenerational blogs." We hope to understand how distributed our collaboration needs to be, and what methods and infrastructure need to be supported to better support this type of research in the future. We expect that just as co-design can lead to the refinement of new technologies, our methodological co-design will lead to the refinement of new and better design methods for the future.

ACKNOWLEDGMENTS

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