Facilitation in an Intergenerational Making Activity:

How Facilitative Moves Shift Across Traditional and Digital Fabrication

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ABSTRACT

Intergenerational making activities provide an opportunity for family collaboration where parents and children learn together. We discuss the *facilitative* moves that emerged between researchers, parents, and children during a half-day making program where participants played and created games. Four families with a variety of knowledge of digital fabrication technologies participated in three activities: playing a variety of games, designing and making their own games using arts and crafts materials, and optionally utilizing digital fabrication tools to complete their games. We position traditional fabrication and digital fabrication as two different modalities of making. Accordingly, we examine the facilitative moves and behavioral shifts that emerge across the two modalities and as observed through qualitative analysis. This work contributes insights to the field on program structure and the ways formal facilitators and parents can sustain child engagement in a making workshop.

CCS CONCEPTS

• Applied computing → Education → Interactive learning environments

KEYWORDS

Making; Makerspace; Intergenerational Making; Families; Facilitation; Child; Digital Fabrication

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1 Introduction

Intergenerational making experiences provide opportunities for parents/guardians and children to interact as learning partners and to co-create understandings around making [1]. We refer to making as the creative process through which a person "design[s] and build[s] projects for both playful and useful ends." [2] We understand co-creation as a method of broadening the voices that shape a learning process and generating ideas that are personally meaningful or relevant. We designed a making workshop that would value families engaging in making with a low-floor and high-ceiling in mind: parents and children were not expected to have prior knowledge of digital fabrication tools or techniques. Instead, families were encouraged to draw on their shared past experiences during open-ended activities in order to support a range of making initiatives and outcomes,

When supporting familiar and unfamiliar forms of making and activities, parents' facilitative moves shift. Examples of familiar activities might be cooking or playing games; less familiar activities would be 3D printing or laser cutting. Additionally, as facilitators within the family sphere, parents are positioned to facilitate by engaging their children in making or suggesting ideas based on what they know of their child's interests.

This paper seeks to understand how parent-led facilitation and tiilt-lab facilitation changes across making activities, which will allow for future interventions during intergenerational programs to be better scaffolded. We thus examine how facilitator and parents' moves differ and align across traditional arts and crafts and digital fabrication activities, and how those facilitative moves impact participant interactions and engagement. The results focus on how parents and the facilitative team frame the experience for child participants.

In the next section we discuss prior literature in intergenerational making and in facilitation that occurs within Makerspaces. Following this, we describe our intergenerational making program, FamJam!, in more

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detail. We then describe facilitator moves, along with parental facilitation moves, across the traditional and digital fabrication periods. We conclude by discussing the insights gained and plans for future work.

2 Background

2.1 Intergenerational Learning and Making

Intergenerational learning values the existing knowledge and skills of multiple generations, often adults and children, that are brought into a collaborative learning activity. [3, 4, 5, 6]. The engagement of multiple generations thus positions adults and children as co-learners capable of constructing a meaningful learning experience [3, 7]. We center this work on the unique role of parents or guardians as facilitators for their children's learning during a hands-on making activity.

Parent involvement in child learning supports information retention for children and can positively impact academic achievement [8, 9]. For instance, it provides parents and children with an additional context for meaningful conversation, as well as an opportunity to disrupt the traditional roles of adults as teachers and children as learners. As such, we bring parents and children together for a making workshop where both parties can learn together and support each other.

Researchers have analyzed how parents' roles can support children's learning in maker activities, identifying a spectrum between the parent as a "peer" or "mentor" based on their attentiveness and initiative during a maker activity [10], and highlighted the importance of their awareness of these roles [11]. The Family Creative Learning program brought together families from non-dominant backgrounds to work on projects using the Scratch block coding platform and the MakeyMakey [6]. Roque (2016) found that as families constructed coding projects together, they also built perspectives of each other, the computational task, and their identities as computational creators [6].

2.2 Facilitation

Prior research suggests that parents do not necessarily feel equipped to facilitate their children's use of new technologies in expert ways, so framing parents as "experts" and children as "novices" can lead to greater divides [4]. Additionally, Brahms found that participation and familial roles shift in the face of new media technologies. This positions formal facilitators to play a significant role in the onboarding process for novice makers-- both parents and children-- as their facilitative *moves* scaffold the experience of learning and making [12]. Importantly, the role of facilitators is also to *model* effective facilitation strategies. As parents navigate a variety of roles, they may enter into a facilitative role within their families [1].

Facilitators' identities play a significant role in what activities are chosen and how facilitators engage with participants [12]. Therefore, having facilitators from multiple backgrounds and a variety of ages is beneficial, as it opens up the possibilities for what the participants create and how they actively engage in making. Because facilitators are frequently positioned as "experts" in using the digital fabrication tools in a makerspace, they must constantly negotiate how and when interventions should happen [13]. These interventions support people interacting with different tools and activities available within the makerspace. The institutional framework, goals and visions of a makerspace also shape facilitation practices [14]. The vision for a makerspace impacts whether or not facilitators feel comfortable bringing their interests into the space and can thus help or hinder engagement. Past work in understanding the development of adult facilitators has highlighted how facilitators must also be engaged in learning while making with participants [15]. This allows participants to feel supported and challenges facilitators to continuously grow. We see formal facilitators as a support system for both parents and children's experience in making.

We are interested in the facilitative moves that occur within and across families while they are engaged in making games. Our work aims to expand upon prior work by drawing attention to the specific facilitative moves that emerged during a hands-on, collaborative making activity for families using digital and traditional fabrication tools.

Accordingly, this paper seeks to address the following questions:

1. How do facilitator and parent roles differ across traditional arts and crafts and digital fabrication activities?
2. How do facilitative moves impact the interactions and engagements of all participants?

By looking at facilitative moves across traditional and digital making periods, we aim to highlight important considerations for facilitating intergenerational making experiences.

3 Methods

3.1 FamJam! Program Structure

This program was structured into periods where families engaged in making with more traditional mediums (e.g. cardboard, paints, straws, etc.) and later with digital mediums (e.g. 3D printing pens, laser cutter, etc.). The research team designed the introduction of digital fabrication tools to engage participants with some of the possibilities that the digital tools support. Most, but not all, participants utilized the tools for the purpose of creating the game.

The iteration of FamJam! discussed in this paper was a 3-hour workshop where families created board games. Following personal introductions by the research team and participants, the research team provided an outline of the activities for the day, and then transitioned the families into playing games. Games were used to inspire families to discuss the features of a game they liked and to generate ideas for making their own games. Games included Sorry!, Trouble, Guess Who?, Connect 4, and UNO. Selecting relatively common games aimed to reduce time spent learning rules and focus on game play.

After playing games as a family, participants were presented with a series of prompts. These prompts were designed to help families reflect on experiences, skills, or knowledge that held personal relevance for them. Some of the prompts included: "How would you describe your family?", "What do you enjoy doing together?", "What is a funny story that involved your family?" Following this, the families began to brainstorm their own ideas for games and started making the board games using the arts and crafts materials.

The remainder of the workshop consisted of two segments; the first focused on traditional fabrication methods (i.e. using cardboard, paint, construction paper, etc.), and the second segment involved the integration of digital fabrication tools (i.e. 3D printing pens, 3D printer, laser cutter, etc.) in addition to the previously provided traditional fabrication tools.

3.1.1 Traditional Fabrication. The construction of board games using traditional arts and crafts materials values the prior experiences that families have around playing games and use of those materials. This was an intentional design move to provide a low barrier to making. This low barrier allowed families to collaborate in ways that were familiar to them and allowed the research team to observe initial facilitative moves and engagement of the participants.

3.1.2 Digital Fabrication. The introduction of digital fabrication tools for making was expected to change the experience due to families' unfamiliarity with the tools. This program aimed to expose the participants to a wider range of technology that might not otherwise be available to them. While prices vary, smaller scale digital fabrication tools can create a preview of some industry level tools and make creation of custom artifacts more accessible.

Facilitators introduced a laser cutter, 3D printing pens, a vinyl cutter, and paper circuits as the digital fabrication tools available for the families to use. During this time, the families were informed that the research team members (i.e. tiilt facilitators) would be available to assist with the tools as needed. Participants could choose to use the digital technologies to augment or finish their games. Digital fabrication tool use remained a choice so that participants did not feel forced to add irrelevant components to their game.

3.2 Setting
This workshop took place in the Technological Innovations for Inclusive Learning and Teaching (tiilt) lab facility, which functions as a makerspace. The facility is equipped with various digital fabrication tools, such as a laser cutter, 3D printers and microcontrollers, and traditional fabrication materials, such as construction paper, felt, glue, and popsicle sticks. The traditional fabrication materials were placed on one table so that the materials were at an accessible height for smaller children. All tools or materials that posed safety risks (i.e. scissors, hot glue guns, laser cutter) were placed at a higher level to deter children from using those tools without adult supervision.

3.3 Participants
Participants were recruited through fliers, email, and by word of mouth. The participants consisted of four families: five parents and eight children. The workshop included children as young as two years old and as old as 13 years old. The group of participants also had a range of language preferences. While all families spoke English, some spoke a second language with each other, such as Spanish or Portuguese. In these cases, facilitators paid attention to nonverbal cues in order to maintain attentiveness to these families. One tiilt facilitator spoke Spanish, and was available for assistance, although this was not required by the family during the program. Two families reported having prior experience with digital fabrication tools, one family was unsure, and one did not report having any previous experience.

3.4 Research Team Facilitators
Five members of the research team comprised the group of tiilt facilitators: three undergraduate students in computer science, one PhD student, and the lab's research study coordinator. Each facilitator brought their unique lived experience to the space as they are from a variety of locations, backgrounds, and fields. Three of the facilitators constructed games prior to the workshop to demonstrate to the families. All facilitators

had prior experience and varying levels of expertise with the technologies that were implemented.

3.5 Data Collection

We are motivated by the potential of multimodal learning analytics as a way to look for moments of engagement [16, 17]. As such, in addition to ethnographic field notes with video, we aimed to look for moments of learning through audio data, biometric data, and position data. Preliminary analysis from the authors using the positioning and biometric sensors can be found in the paper cited [16].

The focus of this paper comes from the ethnographic and video data. Three cameras were positioned around the room to capture the family groups for the entire 3-hour length of the program. We support our video analysis with field note observations. We transcribed video and audio data into a document including conversations and physical interactions.

3.6 Data Analysis

Four members of the research team reviewed and transcribed the footage and open-coded the interactions for facilitative moves. In this video data, the non-English speaking families were primarily documented based on body language during interactions as they provided insights to what was happening. The review of the video focused on the three families with older children as they all constructed games. The fourth family was documented in relation to the other families due to the frequent entering and exiting of the family from the space as the young child explored the new environment.

Guided by the research questions, the team reviewed video footage for interactions that involved questions or directions around constructing the projects or using materials and tools. From this review of interactions, the following bidirectional codes regarding participant interactions were developed: tiilt facilitator - family, tiilt facilitator - parent, tiilt facilitator - child, parent - child, family - family, child - child, and multiple facilitators engaged.

Across these categories, we coded 59 instances of parent facilitation and 74 instances of formal facilitation. We frame the results based on facilitation by parents, and then by tiilt facilitators during traditional and digital fabrication. We focus on moments of parent facilitation during ideation and digital tool introduction, as they led to more opportunities for discussions and decision making. We also look at how tiilt facilitators aimed to support participants through moves, such as providing prompts and modeling tool use.

4 Results

4.1 Traditional Fabrication

4.1.1 Parents Parents acted as facilitators throughout the program. During this portion, parents' major facilitative moves included leading brainstorming, intra-family mediation, and requesting help on behalf of their children.

After the prompts and example games were presented to them, each family approached brainstorming in different ways. One family began by discussing things they had in common, such as playing football. When informally asked by a tiilt facilitator about this shared activity, the parent responded, *"We all play, but not all together because they're in second and fifth grade."*

One family initially wanted to jump into making and said to a tiilt facilitator, *"We want to start making our game now."* However, after the facilitator asked them more questions, the parent initiated the brainstorming process. This parent passed out pieces of paper to each of the children and asking about characters in Portuguese, *"quantos personagens."* They then moved on to writing and discussing their games. In another family, the parent encouraged the children to immediately begin interacting with the materials rather than brainstorm. The parent modeled material interaction by picking up a pipe-cleaner and manipulating it. After tiilt facilitators prompted the families to brainstorm, this parent continued to direct the kids to *"start looking over there to see what you want to use."*

We saw additional evidence of intra-family mediation in the multilingual families. For example, in the Portuguese-speaking family, in addition to leading brainstorming, the parent could be seen giving tasks to each child. In the Spanish-speaking family, one parent provided instructions on leaving doors closed and asked the child what they would like to make, suggesting the use of Play-Doh. In the primarily English-speaking families, parents could also be seen bringing their child's attention back to the making activity by finding ways to engage them. For example, when working on sketching with one child, a parent noticed their other child sitting idly and asked if they would like to sketch also.

One family wanted to incorporate a spinner into their game. Noticing the spinner was an aspect of one of the facilitator's games, the parent requested a facilitator who created one to help them make it. While one family member worked on the spinner, the parent specified that the whole family didn't want to learn and move onto this activity, rather, only one of the children would participate. This was in order to ensure each of their children had individualized tasks and sustain their engagement.

4.1.2 Facilitative Team We highlight three facilitative moves that served to scaffold and support making with traditional materials: showing example games made by facilitators, providing prompts as guidance, and deliberately stepping back from the room. Consequently, this portion of the program surfaced less direct one-on-one help between the families and facilitators.

The facilitators provided the families with prompts to initiate conversations and ideas that the families could incorporate into the narrative of their own game. Before they did so, they shared previously-constructed games in order to demonstrate the uses of different materials available in the lab.

One of the games depicted a facilitator's memory of playing don't-touch-the-lava with siblings. By contextualizing her game within her past experience of playing it with her siblings, this facilitator made explicit her motivation to incorporate her personal connection into the design of the game. The second game depicted a facilitator's natural hair experience, which drew on personal experiences with her hair. She also made evident her decision to remix [18] an existing game, Candyland™, for the design of her game. The final game was called "Fruit Salad" and was intended to promote healthy eating and incorporate a colorful aesthetic. This facilitator emphasized the way her theme (i.e. fruit) influenced the design of other pieces in the game. Across the games, facilitators involved materials such as paint, cardboard, strings, 3D printing pens, the laser cutter, and markers. None of the games used all of the same materials, which showed the diversity of approaches to game creation and inspiration.

Facilitator prompts included questions such as, "What are objects, traditions, people, or places that are special to your family?" and "What events have brought your family closer together?" These prompts acted as a segue into the discussions that families had during brainstorming. Some of these discussions were around the games. Other discussions occurred around what the family would like to do again as prompted by the questions, such as playing another game of football together and playing more games.

During making with traditional materials, the presence of facilitators was reduced. Three out of five facilitators were constantly present in the room. One facilitator was then available for each family engaged in making. The remaining facilitators cycled in and out depending on participant needs. We identify this facilitative move as "stepping back" and draw attention to the way facilitators sought to support parents and children as autonomous and agentic makers. The moments where facilitators stepped in were rare and often when help was explicitly requested from either a parent or a child. For example, a child asked a facilitator for a magnet, to which the facilitator responded, "I'm not sure [we have any]. What are you trying to do?" The facilitator proceeded to help with ideation around what supplies the family might use instead, and then stepped back so that the family could decide their next steps.

4.2 Digital Fabrication

4.2.1 Parents During digital fabrication, parents shifted between their own interests in the new technology and their children's. In these cases, parents advocated for their children by voicing what tools the kids wanted to use and by recruiting facilitators to use the tools. Parents could also be seen encouraging the use of the digital technologies to add to the game, though not all children were interested in this. In regard to the laser cutter, one family used it to create game characters, another for a board decoration, and in the last family, neither child was interested in using it for game-related purposes.

Children who were not interested in using the tech tools for game-related purposes were still interested in the tools. One of these children created a figurine of a man with the 3D pens. Others wanted their names laser cut, and they could be seen eagerly watching the laser carve out their names. In this case, the parent asked a facilitator twice to ensure that their child's requests were addressed.

Some parents attempted to master the technology so that they could then demonstrate to their child after initially asking a tiilt facilitator's help. One instance of this occurred when a parent asked a facilitator how to use the 3D printing pens. The facilitator demonstrated with one of the children, and then the parent used the facilitator's model of introduction to teach the other child strategies for pen use. Another instance of this occurred with a child using the laser cutter. The parent asked a facilitator how the laser cutter could distinguish between parts of an image. They then took their understanding and helped their child sketch an image for cutting with bold lines and different colors.

Additionally, parents could be seen discussing how they could bring this technology into their homes. One parent said it would be nice to get the 3D pens for the family to use at home. However, their child disagreed, saying it may cost the family too much. Another parent discussed how they were thinking about getting the circuit stickers as their child got older in order to engage them with Computer Science as a career option.

Parents were excited by the use of the digital fabrication tools during the workshop for themselves and their children. They highlighted the possibilities for use beyond the scope of the workshop, and many mentioned hoping to attend programs like this in the future.

4.2.2 Facilitative Team During digital fabrication, the facilitators were more involved in the families' making processes. This involvement was largely due to family unfamiliarity with the digital fabrication tools. The facilitators were mediators of the technology and provided access for specific machines, such as the laser cutter and the vinyl cutter, which required a laptop to access. For example, facilitators would teach using the 3D pens, and then remove themselves from the group. However, in some cases, such as using paper electronics, the facilitators began helping the families and did not leave them for the duration of technology use. With paper electronics, the facilitator spent 10 minutes explaining parallel and series circuits and helped the family add the components to their game.

Facilitators also managed the families' requests by awareness of other facilitators' areas of expertise. For example, when one facilitator was unsure of how to start the 3D pen, they requested another facilitator come help that family. Additionally, during this portion, the games took on more of their final forms, which led to facilitators asking the families more questions about how their games worked. This meant more discussion with the participants and sometimes more influence on the final games that families made. For example, when a facilitator asked the rules of one family's game, the child began creating additional rules as inspired by the questions. Facilitators used participants' initial interest to help drive further engagement in game making. After facilitators helped them utilize the tools, many families were able to add features to their games, such as laser cut villains, circuit sticker goals, and 3D printed characters. Facilitators were able to support families in finishing their games in ways that would not have been possible without the tools.

5 Discussion

5.1 Program Structure

There are specific design aspects of this program that are meant to facilitate the making experience. The first aspect is providing the families with the opportunity to play games prior to making games. This allows them to have time to transition into an unfamiliar space and to begin to interact with some of the facilitators. Time spent here was also a valuable period of ideation, as families were able to take inspiration for the games they built, based on what they played.

The research team carefully constructed prompts for the families to think through. The goal of these prompts was to naturally encourage discussion of narrative in game ideas. This was also expected to be a moment where parents would naturally facilitate conversation within the families. As we saw, when the parent didn't lead the discussion, brainstorming didn't occur over the intended period.

Facilitators also created games themselves while interacting with the prompts that they provided to the families. In some cases, these games were able to inspire the families to continue ideation, but in other cases, this became an opportunity for remixing [18]. The example games positioned families to reflect on personal experiences to incorporate into their own making activity.

Since the program encompassed a wide range of child participants, some families with younger children were not able to participate in the making activity in the way other families were. However, they were still able to make a meaningful contribution to the space in another way. This was possible through the open format of the program and by providing and crafting materials, such as Play-Doh.

Facilitators here aimed to support both the youngest children and the oldest, as this was an experience for the whole family. As we advocate for a making experience where entire families can participate, we wanted to coordinate the experience such that parents did not need to worry about their young children being a deficit in the space, but instead felt welcomed and included throughout the experience.

5.2 Parent Facilitative Moves

During traditional making, parents facilitated brainstorming and were comfortable in their command of the traditional fabrication tools. Due to this, requests for formal facilitation were less frequent. In this way, parents supported much of the children's engagement in game making in the first half of the workshop. Additionally, by ensuring the children had tasks for creating the game, natural segues into digital fabrication tool use occurred.

Parents asked their children questions throughout the process. New questions arose during digital fabrication; for example, one parent asked, "But what can we do? How can we add to our game?" This parent, like others, was excited about engaging with the technology, and created mini artifacts with the tools. This led them to also wanting their children to experience creating artifacts.

This excitement was furthered when a project began running on the laser cutter. Children rushed over to watch it operate. Several parents later returned to the job that was running and formed a small cluster around the laser cutter to point, comment, and express their amazement at the machine. Parent excitement charged their family's excitement and helped to keep children engaged with the workshop.

During digital fabrication, parents advocated on behalf of their children for facilitator assistance, as opposed to primarily providing help themselves as they did during the traditional fabrication period. Parents were important in supporting children's frustrations across traditional and digital fabrication.

5.3 Formal Facilitative Moves

During traditional making, facilitators "stepped back" and gave families the opportunity to navigate making by themselves. In the transition to digital fabrication, however, the introduction of digital tools prompted an increase of facilitator presence. Within the transcript there were no instances of multiple facilitators engaged with a family in the traditional fabrication portion, whereas there were 11 instances of this during the latter half. As families raised more questions during this portion, more facilitators were made available for them.

Additionally, tiilt facilitators attempted to mitigate participants' frustrations by providing immediate one-on-one support, whether with a parent or child participant. For example, when a child struggled to use the 3D-printing pen and the parent wasn't able to help, facilitators came alongside the child, determined the source of the problem, and modeled how to troubleshoot the issue.

The identities and distributed expertise of the facilitators in this space played a role in how they interacted with the participants. For example, one facilitator worked with young children frequently, and as such engaged often with the two-year-old and family. Another facilitator brought her experience of playing Sorry! with her family*: "I feel like I always say sorry, like sorry I won,"* and acknowledged that the family playing had different rules.

Facilitators also drew on the distributed expertise of the group by knowing whom to ask when they did not know the answer to a question. For example, when using the 3D printing pens, a facilitator first tried to solve the problem on their own before asking another facilitator who had more experience with the tool. Another example is when tiilt facilitators utilized the camera in the laser cutter to scan a child's image to be cut. While this process did not produce a successful vector image, the tiilt facilitators' attempts to retain the authenticity of the child's drawing demonstrates their intention to support and value the child's making practice.

5.4 Language

While our research team had a member who spoke Spanish, our initial recruitment form did not ask families to indicate whether they spoke other languages, and if so, whether they preferred one over another. Identifying multilingual participants could inform future preparations for the program to either include multilingual facilitators and translators for data processing and analysis. We found that families felt comfortable speaking to each other in another language within the space, which was either a reflection of the open-ended, inclusive environment, or possibly a signal for deeper collaborative efforts that lie beyond the scope of this paper.

5.5 Implications

Through this study, researchers identified various elements of the program and facilitation strategy that supported authentic intergenerational participation. First, formal facilitation played a crucial role in ushering families into and through the different elements of this program. From the design of the activities, to creating demonstrations and showing participants how different technologies work, the facilitators were drivers of the overall interaction. Furthermore, the facilitators helped model efficacious pedagogical strategies that the parents later used within their respective families. In this way we see that the role of formal facilitator goes beyond merely content knowledge, or actually helping participants, but also in modeling facilitation practices. Across traditional and digital fabrication, the facilitators shifted their involvement, paying attention to the participants prior experiences.

In addition to taking up the facilitation strategies modeled by tiilt facilitators, parents added several key practices that supported student participations. First, parents helped to mediate student engagement by connecting the activities to their child's interests. They were also more adept at identifying when their child expressed boredom, and they had a host of strategies for re-engaging them in the workshop. In traditional making this looked like assigning tasks, and in digital fabrication this was modeling tool use. Second, parents modeled excitement and engagement in ways that encouraged their children to feel comfortable being excited and engaged. In these ways, parents enacted facilitative moves that supported their child's participation.

6 Conclusion & Future Work

People of all ages can engage in maker projects, and this should be encouraged and supported. We move to support children, and more broadly, families, through intergenerational making programs. Understanding the role of facilitation in supporting a diverse space, whether it be age, race, ability, gender, or language, not only helps us create programs that can include all backgrounds, but also informs the intentional design of a program, as well as the training for facilitators. By creating experiences for peoples' varied backgrounds, we acknowledge and value the prior knowledge, skills, and existing identities that participants contribute in the space.

Future iterations of this intergenerational making program seek to implicitly facilitate intra-family collaboration. This includes hosting the program across multiple sessions and examining how facilitative roles change as the participants gain confidence with the technology and in the space. With programming across a longer period, we plan to provide the opportunity for self-directed exploration of the tools and increased time for game planning. Within this model, participants are less dependent on the facilitators, which subsequently promotes inter- and intra-family interaction.

This study prompts us to reflect on facilitator training and the process of onboarding multilingual participants. Future work seeks to deepen the examination of roles that emerge or are taken up during a hands-on making activity for parents and children. We are additionally interested in the shifting roles of parents or children during a making activity with traditional fabrication tools and then digital fabrication tools. We seek to highlight the way materials and tools drive collaboration and making for multigenerational groups, such as families, and the potential for meaningful making.

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Selection and Participation of Children

Families were recruited through fliers and word of mouth. Families were informed that they could participate regardless of whether they wore the data collection technology and were given the option to withdraw from their data being analyzed at any time. All parents and children signed participation and consent forms. Facilitators explained how and why the data was being collected verbally to ensure the families understood. Participants were given a fanny pack that held a Pozyx location tag for tracking location in the room. Participants were instructed to wear their fanny pack in any way that was most comfortable for them (e.g. as a sling, or around the waist). Two families in the study consented to wear the Empatica wrist watches

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