Abstract
Technologies that support creativity, learning, and tinkering can engage learners to create and express themselves in new and empowering ways. However, creativity and learning is also a social process and support from peers, teachers, and other adult caretakers can help to encourage learners’ interest and to open up opportunities that deepen learning. Parents can play many roles in scaffolding learning, sharing expertise, collaborating on projects, and providing resources. In this workshop position paper, I discuss the design lessons that I learned through the iterative and collaborative design of Family Creative Learning, a workshop series that engages children and their families in learning how to use creative technologies such as Scratch and MaKey MaKey. I discuss how these lessons can connect to the design of other learning environments. When designing technologies that support creativity and learning, it is just as important to consider the design of the contexts, activities, and social environments that will use these technologies.

Introduction
Today, there are creative technologies that make it easy for people to create, invent, and build things in new and empowering ways, such as programming languages like Scratch, digital fabrication tools like 3D printers, and microcontrollers like Arduinos. And as children create and build things they care about with these tools, children can also engage in the powerful ideas and design perspectives that underlie much of the technological platforms, infrastructures, and devices that we use in all parts of our lives.

However, leveraging the benefits from these technologies depend on the context of where and how they are used. Creativity and learning is a social process and the support from others such as peers, teachers, and other adult caretakers can support youth in pursing their interests and new opportunities [3]. Parents can play important roles that include scaffolding their experience, providing resources, and collaborating on projects [1]. Some work is already underway to create environments that welcome and support children and their families to engage with creative tools such as MAKESHOP, a makerspace within the Children’s Museum of Pittsburgh [2].

In this paper, I will discuss the lessons learned by Family Creative Learning team in designing and implementing workshops that engaged whole families in creative technology workshops [5]. Through a series
of two-hour five workshops, held once a week in a
community center, families learned to work together on
design projects using the Scratch programming
language and the MaKey MaKey invention kit. With
Scratch, families learned to program their own
interactive media such as games, animations, and
stories. With MaKey MaKey, families created their own
physical interfaces to computers using everyday
materials such as aluminum foil and Play-Doh. Using
these two tools together, families designed their own
physical and digital creations. The workshops
culminated in a community showcase, where families
could share their creations with friends and other family
members.

**Designing Family Creative Learning**

From 2012-2013, I iteratively and collaboratively
designed five implementations of family workshops,
which led to the current design of Family Creative
Learning. These workshops were designed together
with community partners, volunteer facilitators,
educators, and researchers in the Family Creative
Learning Team. As a design team, we collaborated and
reflected on the design, iterations, and documentation
of the workshops and responded to feedback from and
interviews with participating families. I discuss our
design lessons in the context of the ways we designed
the environment, the activities, and the facilitation.
During the IDC workshop, I will elaborate on how we
developed these strategies across our iterations.

**Environment: Arranging physical and emotional space**

In designing the environment, we wanted to
communicate to families that they were entering a
communal and collaborative space. Often, computer
rooms are designed as a row of computers. However,
we wanted a space that made it easy to see, hear, and
interact with each other throughout the activities.
Rather than rows of computers, we created pods of
tables that learners could sit around or pushed the
computers against the walls so learners could see what
others were up to. We also provided a communal table
that people could use to eat around, discuss ideas, and
use as extra workspace.

In addition, to the physical space, we recognized an
emotional space and wanted to make sure that families
felt safe and comfortable to be creative and open to
expressing their ideas. During the workshops, we
engaged families to think about how we can co-create a
"safe space" and developed a community code to use
throughout the workshop. A community code described
ways we wanted to interact, such as being respectful,
giving our attention to someone when they speak,
committing to coming to the workshops on time, and
giving each other positive and constructive feedback.

**Activities: Creating spaces of their own**

Every workshop in Family Creative Learning, except for
the last workshop which was the community showcase,
was split up into four parts: Eat, Meet, Make, Share.
Before diving into the design-based activities, we
invited families to first connect and interact with
facilitators and other participating families in "Eat.”
Every workshop began with a meal. We found that
allowing families time to connect within and across
families allowed families to ease into the experience
with something they were familiar with: eating
together. This shared meal also allowed families to
focus on developing relationships first before
developing their projects.
In addition to creating spaces where families were together, such as sharing meals, we found it was important to create spaces for family members to be apart. In particular, we separated parents and children to meet briefly with their peers in “Meet”. This became an important space especially for parents, who did not have many opportunities to connect with other parents who had children with similar interests, to discuss their anxieties around technology, and to share strategies to support their children.

We extended this separate space in “Make” as well. In the first two of the five workshops, parents and children created their own Scratch and MaKey MaKey projects before they worked on their family projects. These separate projects allowed each family member to learn the basics of the tools on their own and at their own pace, without worrying about the other family member.

We brought families back together at the end of the workshop, where they talked about their progress and projects with the whole workshop in “Share.” Sharing allowed families to time to talk about their project and get feedback on their ideas.

Facilitation: Reflecting on facilitation as a practice
In contrast to the central instructor, directing the activities and the learners, we created a team of facilitators, people that included community center staff, local volunteers, college students, and FCL researchers. Facilitators played important roles as guides, co-learners, co-creators, and even cheerleaders, in supporting families to surface their interests and to carry out their project ideas.

As a team, reflecting on our practice of facilitation and supporting families was as important as reflecting on the workshop itself. Through our reflections on practice, we developed a set of guidelines for facilitators, listed below, to support others in creative learning environments.

- Build trust and relationships
- Ask questions rather than answers
- Encourage exploration and risk-taking
- Be a connector
- Express authentic enthusiasm
- Use technical words cautiously
- Put yourself in their (unique) shoes
- Hold the tools as a last resort
- Surface their interests
- Welcome mistakes and failures

Discussion
When considering contexts to support uses of these creative technologies, I have observed two extremes in learning environments. In one extreme, learners follow along step-by-step through a handout, through a central instructor, or both. Learners develop very similar, if not the same, project. In another extreme, there is little to no structure and learners are on their own with the technologies. However, in our design iterations, we tinkered with a different structure and experimented along the dimensions of environment, activities, and facilitation. Petrich, Wilkinson, and Bronwyn [4] also discuss the structure of the Tinkering Studio, a making space in the Exploratorium, along these dimensions. They emphasized that these
dimensions were dependent and interacted with each other rather than ideas that could stand on their own.

These workshops became opportunities for children and their families to appreciate the creative potential in each other in the context of computing — an area that was often fraught with anxiety and complications for families [6]. As technologies permeate many aspects of family life, parents must negotiate the mixed messages they receive about technology and the roles that they can play to support their children. In Family Creative Learning, we designed an experience where family members could experience first-hand designing and learning with technology together. As we design technologies and technology-based experiences for children, we must consider the ways that we invite the important people in a child’s life to support them as active facilitators rather than as passive observers.

Finally, in our iterative process, design became a process of inquiry for our team. Design became a means to answer questions and generate knowledge. The design process was an important tool both to understand family learning dynamics and to clarify our goals as designers and researchers and develop future design and research directions. In this position paper, I share our design lessons, but designing, the process by which we made decisions, negotiated challenges, revisited our goals, and discussed and considered next steps, was important in developing these lessons. In this workshop, I am interested in how we can capture and share this process, which at times can be messy, emergent, and lead to changing priorities, so that this process may also be a source of learning and knowledge for designers, practitioners, and researchers.

Acknowledgements

This position paper draws on the Family Creative Learning chapter for an upcoming book called Makeology, edited by Kylie Peppler, Erica Halverson, and Yasmin Kafai.

References