Making Together: Creative Collaboration for Everyone

by

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Abstract

This thesis explores how we can design learning environments to support broad participation in creative collaboration—that is, the process of working together on the construction of an artifact. I describe and analyze the design and implementation of Collab Camp, a learning environment that supports creative collaboration among members in the Scratch online community. The design of Collab Camp is based on four intersecting goals: encourage collaboration, support making, connect to interests, and cultivate community. I use a designed-based learning approach to iteratively design, implement, and evaluate this learning environment. I conclude by reflecting on the implementations and analyses to suggest ways in which we can support everyone in making together.

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Chapter 1

Introduction

To introduce my thesis, I present two stories¹:

A young boy Erik creates his own maze game and shares his game in an online community of young creators. Soon after he uploads it, he receives a comment from another member Jessica suggesting that he add some obstacles to his maze, like a special wall that, if touched, brings the player back to the beginning of the maze. The comment excites Erik—not only did someone in the world play his game, but they gave a suggestion to make it even better. Feeling encouraged, he creates another version of his maze with special walls that not only return you to the beginning, but can also place you in a random location. To create these walls, he learns new concepts such as sensing and triggering events. After uploading his new version, Erik takes a look at Jessica's projects and sees that, in addition to creating games, she also creates visually appealing animated stories. Being inspired by her projects, he asks her if she would like to create an animated story together, perhaps something that could introduce the story and

¹These two stories are constructed by me from observed experiences of multiple members on the Scratch website (http://scratch.mit.edu), a community of young creators of computational media.

world behind his current maze game. She accepts his invitation and they begin brainstorming story arcs, characters, and original art.

Samantha decides to team up with two young people she met in an online community to create their own Pokemon game. They excitedly brainstorm new Pokemon and story twists to add to their game. However, after a few days of exchanging ideas, Samantha stops hearing from her collaborators. She leaves them comments asking if they are still interested, but after a few weeks, she gives up. Samantha soon finds another group of young people in the community creating an adventure game and decides to join their group as a "brainstormer." This group is much larger than hers with over 15 people contributing from all over the world. People come and go like her previous collaborators, but other people step up to finish the game. She also contributes in ways beyond what she originally imagined, such as providing feedback and debugging problems. After a month they complete a sophisticated adventure game with original artwork, multiple mini-games, and a story arc to tie all the elements together. This is Samantha's first successful group effort to build a game. Reflecting on her experience, Samantha decides that large groups are better than smaller ones to complete a project. If people have to leave for some reason, others can pick up their work.

In these stories, we see young people engaging in creative collaboration—that is, coming together to make a shared artifact. Through creative collaboration, they are connecting over shared interests and making together artifacts embedded within a social community. In the process, they are learning new things from one another. How they create together or collaborate can take many forms that include providing feedback, sharing ideas, and coordinating the creation of a single artifact. They may experience multiple obstacles where they may negotiate conflict, misunderstandings, and mutual disappointment. However, even with these obstacles, young people are learning valuable things

about themselves as creators and collaborators.

Children experience and engage in collaboration in many parts of their lives. In educational settings, many activities leverage collaboration such as project-based learning (Krajcik & Blumenfeld, 2006), jigsaw learning (Aronson, Blaney, Stephan, Sikes, & Snapp, 1978) and reciprocal teaching (Brown & Paslincsar, 1984). In online spaces, young people are also learning through many collaborative activities in online communities such as fan fiction (Black, 2008), gaming forums (Steinkuehler & Duncan, 2008), and virtual worlds (Kafai, 2010).

Many of these collaborative activities primarily engage children in joint sharing, problemsolving, playing, or brainstorming. In the stories above, however, we see children engaging in these activities, but they are also actively designing, inventing, and building an artifact together. As they build and design an artifact, they are also thinking about their thinking and building new ideas (Papert, 1980; Kolodner, Gray, & Fasse, 2003). While there have been efforts to engage children in the shared construction of an artifact (Ching & Kafai, 2008), children may have fewer experiences collaboratively making compared to joint sharing, discussing, or problem-solving.

Online settings would seem to be a fruitful context to support the engagement of creative collaboration, especially with over 95% of young people in the US participating in online activities (Pew Research Center, 2011) and with the growing availability and accessibility of tools to create and share their content online. But creative collaboration makes up only a fraction of young people's online activities. Their most common activities include using social networking sites like Facebook (80%), getting news and information (62%), and buying things such as books or music (48%). Sharing content is popular (38%) but much of this content is made by individuals rather than in collaboration with others. As young people grow up in an increasingly digital and connected society, being able to participate in practices such as creative collaboration will support them in becoming full participants in today's society.

This thesis explores how we can design learning environments to engage everyone in creative collaboration, or the shared construction of an artifact. In particular, I focus on creative collaboration in an online setting where children are designing and building through the computational creation of digital artifacts. I introduce the design and implementations of Collab Camp, a learning environment implemented in the Scratch online community that aims to support young people in engaging in creative collaboration, support making, connect to interests, and cultivate community. To describe and evaluate the experiences of young people who engage in the Collab Camp, I use design-based research to iteratively design, implement, and evaluate this learning environment. I conclude this thesis by reflecting on the implementations and analyses to suggest ways in which we can support everyone in making together.

1.1 Thesis Overview

In Chapter 2, I describe four themes: collaboration, making, interests, and community to inform my thesis work and discuss opportunities in bringing these four themes together to support creative collaboration.

In Chapter 3, I describe the creative setting and design goals of Collab Camp, a learning environment built on top of an existing online community called Scratch. I also describe the research design to iteratively design and evaluate Collab Camp using design-based research approach.

In Chapter 4, I present the iterative design, implementation, and evaluation of two iterations of Collab Camp. I discuss each iteration along the goals of Collab Camp to describe our challenges, our design decisions, and the resulting participation in the Scratch community.

In Chapter 5, I present case studies that describe the experiences of collaborative groups

and individual members in Collab Camp. I highlight the stories of groups and people who successfully completed a project for Collab Camp as well as groups and individuals who did not achieve their shared goals.

In Chapter 6, I reflect on the design of Collab Camp and the experiences of its participants. I discuss design implications and consider future work to support creative collaboration.

Chapter 2

Learning and Participation in Creative Collaboration

The goal of this thesis is to develop strategies and guidelines to design learning environments that can engage and support everyone in creative collaboration. To design an environment supporting the shared construction of meaningful artifacts, I take suggestions from four approaches to learning and engagement: collaboration, making, interests, and community.

Creative collaboration combines *collaboration* and *making* to suggest ways that people can learn and create together. Collaboration emphasizes learning with others, while making emphasizes learning by designing and building a physical or digital object. Many researchers and designers have looked at supporting collaboration or making, but there are relatively few efforts to combine both.

To engage participation in collaboration and making, creative collaboration must connect to learners' *interests* and be embedded within *community*. Interests can engage learners at a personal level whereas communities can engage learners with others. Many learning environments may foster making or collaborative communities, but may not connect to learners' interests. There are also communities of interests, but these activities may not necessarily foster collaboration or making together.

In this chapter, I review the current literature on these four approaches: collaboration, making, interests, and community - how each approach supports learning and how researchers have designed ways to support learners in each approach. I conclude with the opportunities in combining all four to support creative collaboration for everyone.

2.1 Collaboration

Working with others to achieve shared meanings and goals can promote many benefits for learners that include learning, social, motivational and emotional outcomes (O'Donnell, 2006). In classroom settings, collaboration has been used to help students learn concepts in subjects areas such as mathematics and learn valuable practices such as problem solving. Slavin (1990) also documented the social and emotional outcomes that include building positive relationships among peers, increasing self-esteem, and perspective taking.

Many strategies and learning environments have been developed to support others in learning through collaboration. Some of these strategies include structured interactions such as jigsaw learning (Aronson, Blaney, Stephan, Sikes, & Snapp, 1978) and reciprocal teaching (Brown & Paslincsar, 1989). Others have used the technology and networked communications to facilitate collaborative activities among learners (Stahl, Koschmann, & Suthers, 2006). Inspired by the knowledge building practices of scientists, Scardamalia and Bereiter (2006) designed the Knowledge Forum (formerly CSILE) to engage students in the practices of critique and discourse to develop deep understanding. In Amy Bruckman's MOOSE Crossing (1998, 2006), a text-based Multi-User Domain (MUD), children can create and share objects in a virtual world using computer programming and creative writing. Collaborating can support young people in learning together with others. Many of these collaborative learning environments, however, typically engage learners in joint problem solving, discussions, brainstorming, or sharing. While there have been efforts to engage children in the shared construction of an artifact (Ching & Kafai, 2008), there is still relatively less work in supporting learning environments where members design and build together. The next section describes how young people can also learn through making.

2.2 Making

While collaboration suggests how people can learn with each other, learning through making suggests how people can build knowledge as they construct a physical or digital artifact. For example, in the Learning By Design curricular activities, students can learn about forces, motion, and Newton's laws of mechanics as they design miniature vehicles (Kolodner, 2006).

Constructing working physical objects gives students the motivation to learn, the opportunity to discover what they need to learn, the opportunity to use science and to reason scientifically, and the opportunity to test their knowledge and capabilities. (Kolodner, 2006, p. 229)

Constructionism is one approach that leverages making to support learning and teaching. Constructionism argues that people learn most effectively when they are actively constructing personally meaningful artifacts while sharing and working with others in a community (Papert, 1980; Kafai, 2006). Physical and digital artifacts play an important role in constructing knowledge. Papert described a phrase "objects to think with" – as young people build artifacts, they are also thinking about their thinking and building new ideas. Many tools have also been built on top of constructionist ideas. Designers of the Logo programming language used computer programming and the programmed object, a turtle, to help learners reflect on their own thinking and learning (Papert, 1980). Since Logo, other programming environments have simplified the mechanics of programming (Kelleher & Pausch, 2006) and expanded the possibilities in making to include modeling and simulation (Resnick, 1997), dynamic LEGO constructions (Martin & Resnick, 1993), and interactive digital media (Resnick, et al., 2009).

While constructionist tools were becoming easier to use and rich in features, these tools were often introduced with activities and contexts that were not appealing to a variety of interests. For example, activities with physical construction kits with LEGO bricks, for example, are often conducted as robotics activities and implemented in the context of competitions, focusing heavily on solving engineering problems, which can be interesting for some but not for others. The next section discusses how interests can be leveraged to engage learners in their learning.

2.3 Interests

Collaboration and making both suggest what learners can do together, but connecting to interests can engage and connect to learners in a personally meaningful way. For example, when Heather Lawver was 13 she began reading the Harry Potter book series. After learning about the how other young people were connecting to the books, she began her own online newspaper inspired by the book series called the "The Daily Prophet." She invited other young people to participate and soon Heather was managing a staff of over 100 writers (Jenkins, 2004). Connecting to interests can be a strong motivator for young people to engage more deeply with their learning.

Another key idea of constructionism supports making learning personal.

The Constructionist approach to education goes beyond typical hands-on ac-

tivities in that it aims to give children more control over finding and defining the problems they work on. Constructionism places a high priority on making projects personal. It asserts that students (and teachers) who make personal connections with their projects invariably do the most creative workand learn the most from their experiences (Resnick, 1991).

Supporting interests can not only foster engagement, but supporting a diversity of interests can also engage broad participation from many learners. Papert described the design of tools to have "low floors", or few barriers to get started for novices, and "high ceilings", or many ways for learners to advance and go deeper. Resnick and Silverman (2005) extend this metaphor to connect to the multiplicity of thinking and learning styles to also support "wide walls", or a diversity of interests and styles. For example, in response to robotics activities and competitions, Rusk et al. (2008) argued robotics activities can be broadened to include narrative and artistic interests, motivated by themes rather than challenges and presented as exhibitions rather than competitions.

Using digital media and networked communication technologies, today's youth are also engaging in their interests in online and virtual settings. Gee (2004) argues that young people are forming "affinity spaces" where they gather and connect over shared interests and motivations, regardless of their background, age, and or educational level. In a three year ethnographic study of how young people are taking up digital media and online communications, Mimi Ito et al. (2008) found young people's online participation with others, especially in interest-driven communities, helped them build valuable skills, knowledge, and capacities to participate in today's digital society. With the increasing participation of young people online, Jenkins et al. (2008) describe the emergence of "participatory cultures," which they define as "a culture with relatively low barriers to artistic expression and civic engagement, strong support for creating and sharing one's creations, and some type of informal mentorship." In participatory cultures, members feel that their contributions matter and feel a strong sense of social connection to one another. These participatory cultures provide a setting in which learners all ages, backgrounds, and expertise can engage in their interests with others. The next section describes another approach to learning and engagement through community.

2.4 Community

While the previous approaches suggest ways to learn through collaborating with others, making, and interests, community can provide a setting to situate these approaches. In a learning community, rather than building knowledge through acquiring or discovering, members learn through participation in the community's authentic activities:

The idea of a community of learners is based on the premise that learning occurs as people participate in shared endeavors with others, with all playing active but often asymmetrical roles in sociocultural activity...Learning is a process of transformation of participation itself, ... how people develop is a function of their transforming roles and understanding in the activities in which they participate. (Rogoff, 1994, p. 209)

To understand how people learn in communities, Lave and Wenger (1991) studied various groups such as Val and Gola tailors and proposed a model of learning through communities of practice. As a member engages in its community practices from unskilled, peripheral tasks to more central, substantial contributions, a member learns through observation and participation.

For individuals, it means that learning is an issue of engaging in and contributing to the practices of their communities. For communities, it means that learning is an issue of refining their practice and ensuring new generations of members." (Wenger, 1998, p. 7-8) Lave and Wenger argued that learning is a social process, where knowledge is co-constructed. Communities can provide a setting to situate that learning. For this thesis, I aim to embed collaboration and making in communities where learners can engage together in their interests.

2.5 Bringing It All Together

To support creative collaboration, I believe that combining these four approaches collaboration, making, interest, and community are essential to support and engage everyone in making together. In Mindstorms, Papert (1980) articulated a vision of a learning community called a "computational samba school," where learners of all ages and expertise can gather and make together. He was inspired by the samba schools in Brazil, where many people gather to learn dances for a yearly carnival performance.

These are not schools as we know them; they are social clubs with memberships that may range from a few hundred to many thousands. Each club owns a building, a place for dancing and getting together. Members of a samba school go there most weekend evenings to dance, to drink, to meet their friends. During the year each samba school chooses its theme for the next carnival, the stars are selected, the lyrics are written and rewritten, the dance is choreographed and practiced. Members of the school range in age from children to grandparents and in ability from novice to professional. But they dance together and as they dance everyone is learning and teaching as well as dancing. Even the stars are there to learn their difficult parts. (Papert, 1980, p. 178)

Like samba schools, this computational samba school connected to the surrounding culture, extending beyond the computing environment and schools to members' families and other social communities. While children could build creations that connected to their interests with Logo, Papert recognized that Logo was not a computational samba school because what was being done in Logo was not continuous with the culture supporting learners.

Bruckman (1998, 2006) modeled MOOSE Crossing after a computational samba school, with goals to create an environment to support people of many ages to come together and work on creative projects. In her studies of children who used MOOSE Crossing, she found that children learned best in the environment when their learning is:

- 1. From a source (either human or computational) with whom the learning has a positive personal relationship
- 2. Ubiquitously available
- 3. Richly connected to other sources of support
- 4. Richly connected to everyday activities (Bruckman, 2006, p. 470)

While MOOSE Crossing engaged children in the creation of digital artifacts, most of the creative objects were individually created by each child and then shared with others, rather than collaboratively constructing objects together.

There is relatively little work that combines making and collaboration. Many of the collaborative learning environments support young people in solving problems together or providing each other constructive feedback, but very few support learners in making an artifact together. What other capacities are learners developing when they engage in creative collaboration? How can we design a learning environment that supports learners in making together?

There is also relatively little work that tries to engage a broad audience in creative collaboration. There is an opportunity to engage a multiplicity of interests and support them through their experience within a community of learners. How can we design learning communities to support a multiplicity of interests in creative collaboration so that we can encourage participation not just to those who are naturally inclined to such activities, but to those who do not imagine themselves as creative collaborators? What new design challenges and insights can we gain by designing creative collaboration experiences for everyone?

In this thesis, I designed a learning environment that combines these four approaches of learning and participation to support everyone in creative collaboration. The next chapter describes the goals of this learning environment called Collab Camp and its online setting, the Scratch online community.

Chapter 3

Creative Setting and Research Design

In this chapter, I discuss the creative setting Scratch. I then present the results of a prior collaboration intervention in Scratch called Collab Challenge that informed the design thinking to develop Collab Camp. Finally, I describe the research design to understand the experiences of participants in Collab Camp.

3.1 The Creative Setting: Scratch

Scratch is a programming language and an online community (see figure 3-1) for young people to create and share their own interactive media such as games, stories, and animations. While many programming environments have been developed to make computational creation more accessible and engaging such as Logo and Alice (Kelleher & Pausch, 2006), the Lifelong Kindergarten group designed Scratch to be more tinkerable, more meaningful, and more social than past programming languages (Resnick et al., 2009). Since the website launched in 2007, Scratch has become a vibrant online community with over 2.6 million projects shared by over 300,000 creators, primarily between the ages of 8 and 16 years old.



Figure 3-1: The Scratch programming environment (left) and the Scratch website of the online community (right)

In addition to providing a means to share, the Scratch website offers many ways for members to interact with projects, connect with others, and engage in collaborative activities. Members can interact with projects online and download projects to see how a project was made. They can build on top of an existing project and later share their own version as a remix of the original. Members can curate projects into galleries and invite members to view their collections. Members can also connect with others by leaving comments under projects or participating in website discussion forums.

Members have also created their own collaborative activities, appropriating the features of the website to engage in member-driven activities. Some members have created coloring contests, by creating a project with a simple line drawing and inviting members to remix it with a colored version of their own (Nickerson & Monroy-Hernández, 2011). Others have appropriated galleries to engage in role-playing, creating projects to represent their character and role playing interaction and dialog in the gallery comments (Roque, Fields, Siegal, Low & Kafai, 2012).

While many members engage in these various collaborative activities, there are fewer

activities that engage members in explicitly making a project together, which is the kind of collaboration that this thesis focuses on. Members that do engage in collaborative project making have formed what they call "companies" or "collabs," groups of Scratch members that collaborate on Scratch projects together. In these collabs, members use a gallery page, naming it after their collab, explaining the roles and tasks in the gallery description, and collecting projects created by their members. Figure 3-2 shows a gallery created by members of the collab called Green Bear Productions, Inc. In a case study of this collab (Aragon, Poon, Monroy-Hernández, & Aragon, 2009), members expressed how valuable the experience was to learn more deeply about programming concepts from each other. In addition, members also noted deeper relationships with their collaborators.

ScRATCH	home projects	galleries	support	forums	about	Language 🖬
imagine • program • share	Login or Signup for an account					search
Newest Projects in Green I Sort by: <u>creator</u> <u>title</u> <u>creation d</u>	Bear Productions	S			S	
	Retio Clow Capture				Gallery Created	owner:
Claw Capture	Capture	Retro Claw Ca			Gallery This is the Bear Pro-	y description he main gallery of Green ductions.
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G	ERM					
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Figure 3-2: Scratch collab Green Bear Productions used a Scratch gallery to coordinate their efforts and collect all their collab's projects.

To support creative collaboration in the community, the Scratch design team has responded to these collaborative activities, particularly collabs, in a variety of ways. One change involved the addition of a new website discussion forum called "Collaboration," providing a space for members to connect and work together. Members take responsibility of the space, organizing their collaborations into separate threads and coming up with conventions to coordinate their work within the limitations of a discussion forum.

While the Collaboration forum has over 2,000 threads, not all members participate in the website discussion forums. Only a little over 2,600 members have engaged in the Collaboration forums, compared to the over 300,000 members who have shared at least one project¹. In the next section, I describe a larger intervention to engage the Scratch community in creative collaboration. The results of this intervention's implementation in the Scratch community were also used to inform the design of my thesis.

3.2 Prior Intervention: Collab Challenge

Together with members of the Scratch design team, which I am a member of, and researchers from the University of Pennsylvania, we designed and implemented an online collaboration event in the Scratch online community called the Collab Challenge (Kafai, Roque, Fields, Monroy-Hernández, 2011). From January to early March 2011, we invited members of the Scratch community to form "collabs," or groups and collaborate on a project together. The Collab Challenge had three requirements: (1) teams needed a minimum of two participants; (2) teams had to upload an initial draft midway through the Collab Challenge to receive feedback from the Scratch Team before submitting a final project three weeks later; and (3) teams had to integrate three unique, pre-selected images into their projects. Teams who creatively integrated these three disparate images had their projects featured on the Scratch homepage, a highly visible page in Scratch

¹In the month of July 2012, a little over 7,000 members shared a project, while about 300 members have posted in the Collaboration forum.

online community.

While the event was generally well received by the community, with over 130 Scratch members from all over the world, we found a number of issues: First, while there was a diversity of projects created, there was a lack of diversity across gender with only 27% women among the participants, compared to the 36% women across the online community. Second, we found that members, especially less experienced and less visible members of the community, had difficulty finding partners to work with. Third, for members that did find potential collaborators, many groups had trouble getting their ideas implemented. And finally, when initial and final projects were shared in the online community for feedback, projects that were less sophisticated received negative feedback from other members.

In reflecting on these issues, we discussed ways this collaboration event could be improved (see Roque, Kafai, & Fields, 2012). These reflections included developing a more compelling context, particularly one that can connect to a diversity of members' interests; facilitating the ways in which members can connect and take their ideas off the ground to build a project together; and supporting members in helping each other by providing constructive feedback. I discuss these reflections and how they influenced design decisions in more detail in the next chapter.

Together with these reflections from this prior collaboration event and the four themes described in Chapter 2, we designed a new collaboration event called Collab Camp.

3.3 Design Goals of Collab Camp

Learning from the results and issues of the Collab Challenge and drawing from the four themes described in Chapter 2, the following goals guided the design of Collab Camp to support creative collaboration.

- Encourage collaboration. Help members find collaborators and encourage them to work together.
- Support making. Enable members to design and create a Scratch project together.
- Connect to interests. Engage members by connecting to a diversity of interests, especially interests of those that may not imagine themselves as creative collaborators.
- Cultivate community. Build relationships among members and encourage members to support one another both within and between groups of collaborators. One way members can help one another is giving each other constructive feedback.

3.4 Research Design

To support the design, implementation, and evaluation of Collab Camp, I worked together with a research team that consisted of MIT Scratch Team members, education researchers from the University of Pennsylvania (UPenn), and undergraduate research assistants from MIT and UPenn. Our team worked together to discuss the design of Collab Camp, collect data, and conduct ethnographic observation of online activities.

The design and development of two Collab Camps followed a design-based research approach, a methodology from Learning Sciences where interventions are designed based on existing theories and then implemented in natural settings. The Design-Based Research Collective (2003) has identified five key characteristics of good design-based research:

- Goals of designing learning environments and developing theories or Ôprototheories' of learning are intertwined.
- Development and research take place through continuous cycles of design, enactment, analysis, and redesign.
- Research leads to theories that communicate relevant implications to practitioners and other designers.
- Research must account for how designs function in authentic settings. It must not only document success or failure, but also focus on interactions that refine our understanding of the learning issues involved.
- Research relies on methods that can document and connect process of enactment to outcomes of interest.

I used this research methodology to iteratively design, implement, and evaluate Collab Camp in the Scratch online community. This approach enables me to develop rich descriptions of the experience in designing and implementing Collab Camp while developing design principles and theories that may be relevant in other contexts (Anderson and Shattuck, 2012).

To understand the experience both from my perspective as the designer and from the perspective of learners who engaged in Collab Camp, I gathered our design notes and reflections along with observations from online participant activity during the Collab Camps. In each Collab Camp, I wrote regular memos to document the design process, reflections on the implementation, and notes from design meeting discussions. I then reviewed these reflections to understand our design decisions and thinking through each iteration.

To understand the experiences of participants in Collab Camp, I conducted observations and data collection together with the research team to document participants' online activities. These online activities include Scratch projects, comments, and forum posts. Because of the shear amount of data that could have been collected during Collab Camp, the research team randomly selected a subset of collabs and individuals to follow during the experience rather than looking at all participants and collabs. I also collected selfreported information from members such as age, gender, and location. To supplement our observations and data collection, I interviewed participants about their experience with Collab Camp and their groups, asking questions such as "Why did you decide to participate?" and "How did your group put your project together?"

With design memos and reflections from myself and the research team, along with observations of Collab Camp activities, I developed a summary of our design decisions and challenges across iterations. I present this summary in the next chapter.

With observations, online activity, and interviews, I developed case studies of individuals and groups that characterize the various pathways of participation in Collab Camp. Case studies provide a detailed and rich description of a unit, such as a person, group, or event, in a specific context over time. I believe these case studies will illustrate how some members of the Scratch community participated in Collab Camp, how they interacted with other community members, how they interacted with the structure of Collab Camp, and what they may have gained from their experiences. I present these case studies in chapter 5.

Chapter 4

Iterative Design of Collab Camp

In this chapter, I present the iterative design of Collab Camp, a learning environment in the form of a collaboration event to support creative collaboration. Section 4.1 introduces the design of Collab Camp 1 and 2. The remaining sections describe the design decisions and challenges across iterations of Collab Camp. I describe these iterations and our design thinking across the four goals of Camp:

- Encourage collaboration
- Support making
- Connect to interests
- Cultivate community

Additionally, to support creative collaboration for everyone and to address the lower participation of young women in the Collab Challenge, our design thinking and implementation of these four goals included ways to broaden participation in Collab Camp.

4.1 Design of Collab Camp 1 and 2

Iterating from the format of Collab Challenge, Collab Camp also invited members of the Scratch community to form groups, or collabs, and create a project together. Collab Camp had three requirements:

- 1. Collabs must have at least two community members
- Collabs must share an draft of their project half-way through Collab Camp to receive feedback from members of the Scratch Team and the rest of the Scratch community
- 3. Collabs must create a project that was an *interactive story*, a story where people could interact with the plot and/or characters.

While Collab Camp 1 ran from August 1 to August 31, 2011, Collab Camp 2 operated from February 8 to March 31, 2012 and continued to invite members of the Scratch community to form collabs and create a project together. This Collab Camp had the same requirements as Collab Camp 1 in August 2011, but rather than making an interactive story, it asked Scratchers to create a *music mashup*, a project that expresses, visualizes, or interacts with music, such as animated music videos, interactive music, or visualizations. In addition, because Collab Camp 2 occured during the middle of the school year, we extended the duration of Collab Camp 2 to nearly 8 weeks to give members time to complete their projects.

4.2 Encourage Collaboration

In Scratch, members already use a variety of ways to connect with each other such as project comments, project galleries, and website discussion forums. Members can also add members as "friends," which enables them to follow other members' latest project activity from their homepage. Figure 4-1 shows the Scratch homepage section that shows "My Friends' Latest Projects."

With the many ways to connect to each other in the Scratch community, many members engage in a variety of collaborative activities, like remixing, or building on top of another member's project. Members also created their own "companies" or "collabs", groups that gathered together and collaborated on projects (Aragon, Poon, Monroy-Hernández, & Aragon, 2009).



Figure 4-1: "My Friends' Latest Projects" section (outlined in red) on the Scratch homepage

Inspired by these "collabs", we called on members to form collabs and create projects

together in the Collab Challenge. We were especially interested in understanding how collabs created together "in the wild" of the Scratch community, and so, we provided little structure or prescription on how they should form their groups or how they should collaborate.

To provide a central space for members to talk about the Collab Challenge, we created a forum for members to discuss the design activity, ask questions, and find partners. However, while many members used the forum for these purposes, we found that many Scratch members had difficulty finding collaborators, especially those who were new or unfamiliar with how to interact in the website discussion forums.

In Collab Camp 1, because of these challenges in finding collaborators, we introduced a separate space, called the Connect Gallery as shown in figure 4-2. We decided to create this central space in the main Scratch website rather than the website discussion forums, which engages a smaller portion (8%) of the community. Rather than bringing community members into the discussion forums, we decided to create the Connect Gallery in main site, where a larger and broader group of members are familiar with the space.

When Collab Camp began, we directed members looking for partners to the Connect Gallery. In the gallery, we asked members to create a project that described their interests and ideas for their collab. The advantages of creating a project are that the project will appear in their friends' Scratch homepages and it allows members to connect directly with the project creator through the project comments, a space independent of all the other conversations in Collab Camp. The website also notifies project creators when other members comment on their projects.

While many members came to the gallery, we still found them experiencing difficulty finding partners. Rather than creating projects, Scratch members used the gallery comments to find partners, as shown in figure 4-3. Only three projects were posted compared to over 70 attempts in the gallery comments made by members to find partners. Of those



Figure 4-2: The Connect Gallery invited members to find partners by creating projects that described their interests and their project ideas.

attempts in the comments, 51% (36 comments) turned into groups that may or may not have completed their collab project, whereas 100% of the project creators found collaborators and successfully completed projects together. Among the unsuccessful attempts in the gallery comments, we observed members posting a comment looking for a partner, but ignoring other members' comments trying to find parnters. Among members that succeeded in finding a partner through the gallery comments, we observed that members who posted comments with detailed information about their Scratch abilities or their project idea received more replies from other members.

In Collab Camp 2, in addition to continuing to support the Connect Gallery, we added a



hamsters1 11 months, 1 week ago

LittleSpice 11 months, 1 week ago

Could someone collab with me? Here is the forum: (link to forums)



I've already started on a collab. I'm already done my part, i'll post it up and have someone continue it to the end. Then they'll post it up and i'll put in the credits. Any volunteers? PS: I wont post it up until I get a response so I know what i'm dealing with.

Figure 4-3: Members looking for partners in the comments of the Connect Gallery

Connect Gallery template project, as shown in figure 4-4, to help members create projects. Inspired by the success that members had when they gave more details about themselves in the last Collab Camp 2, the template project also asked members to describe who they are, their interests, and ideas for a possible collaborative project. In addition to revising the Connect Gallery, we also decided to streamline the connection practices within the Collab Camp discussion forum, which we had observed members in Collab Camp 1 still using to find partners. Similar to a template project, we create a template forum post (see figure 4-5) that members could use to to find partners.

In this iteration, 35 projects were created in the Connect Gallery, compared to the 3 created in Collab Camp 1, and 29 members used the the template forum post to find partners.

Looking for Collaborators?
🙀 v37 🧖 🖗
COLLAB CAMP
About Me
[Edit this background and tell a little bit about yourself (e.g. what you like, your ideas for Collab Camp) or your collab]
press the spacebar for next page
Collab-Camp shared it 5 months ago

Figure 4-4: Template project for the Collab Camp Connect Gallery that members could remix and enter information about themselves, their interests, and ideas for their collabs.

2012-02-08 09:56:38		#2	
Collab-Camp Scratcher	Click the Quote button at the bottom of this post, and then type your answers.		
Registered: 2011-07-11 <u>Posts</u> : 9 IP: <u>18.111.25.213</u>	1. What's your account name / the name of your collab?		
	2. Where on Scratch can people leave comments / forum posts to get in touch?		
3. What are you looking for? (e.g. spriters, artists, a collab working on a covideo.)			
	4. Anything else you'd like to say about yourself or your collab?		
Offline	Report Delete Move Edit Q	uote	

Figure 4-5: Template post in the Collab Camp discussion forum for members build on top of to explain who they are, their interests, and their ideas for their collab.

While many more members were successful at finding partners, the most significant challenge we found in these connection spaces were groups transitioning from connecting to collaboratively making a project. For example, out of the 35 projects created by members to find partners and form collabs, none of them completed an initial project draft. This illustrates Scratch members' challenges in transitioning from finding partners to completing a project together.

We found that providing explicit and central spaces such as the Connect Gallery were useful for members to find potential collaborators that may not exist within their immediate social networks or have skills and interests complementary to their own. Such connections can promote peer-to-peer mentoring and learning (O'Donnell, 2006). These spaces became even more useful when we suggested *how* members can connect by sharing information about their interests and ideas through the template projects and posts.

However, while we were able to facilitate connections among members, many members were unable to work together. Helping members to learn how to work together remains a challenge, from brainstorming ideas and developing a shared vision to coordinating their efforts to build, test, and share their project.

4.3 Support Making

There are a number of resources in Scratch to support members in making their projects, such as the Getting Started Guide and Scratch Cards that feature how to do different things with Scratch. However, there are few resources that provide explicit support in Scratch to make a project together. Despite this lack of support, Scratch members who were interested in working together maneuvered through the features of Scratch and its website to coordinate their efforts to produce a shared project. For example, some members use project remixing to share Scratch code and exchange assets like images and music. Other collabs have used the Collaboration forum and galleries to communicate

and coordinate their efforts.

Inspired by what Scratch members were already doing on the website, we created a discussion forum for the Collab Challenge and encouraged members to create galleries to collaborate with each other. However, while there were over 50 collabs that made projects in the Collab Challenge, we saw many more collabs struggle to make a project together.

In Collab Camp 1, we developed a number of resources to help members make projects in Collab Camp in two ways: making a more accessible and engaging resource to explain how to participate in Collab Camp and a "seed" project to help members get started right away. To better explain how to participate and model how to make a Scratch project, we created an "orientation" project to explain the steps of Collab Camp through an interactive story, as shown in figure 4-6. To make the project personally meaningful to the community, we used the sprites, or the graphical objects programmed in Scratch projects, that community members added to the Collab Camp Teaser project (see section 4.5 for more detail on the design of the Teaser project). We then featured the orientation project on the Scratch homepage to increase its visibility.



Figure 4-6: Screenshots of Collab Camp 1 orientation project.

We also created a "seed project," a nearly empty skeleton of an interactive story project that members could remix to make their own project. Figure 4-7 shows screenshots from the different portions of the seed project. We invited members to remix the seed project and even built the "orientation" project on top of the seed project to illustrate how one may remix it. We designed the seed project to be simple and clear enough for less experienced Scratch members, who we felt would benefit the most from the seed project.



Figure 4-7: Screenshots of the the seed project from Collab Camp 1

At the end of Collab Camp 1, the orientation project was viewed over 600 times and the seed project was remixed over 100 times. However, not all of these seed project remixes were submitted to Collab Camp. Of the 50 projects submitted, only 6 used the seed project. Figure 4-8 shows screenshots from a few of these projects. While there were a diversity of interactive stories submitted, we found that projects made with the seed project were constrained by the structure and aesthetic of the seed, limiting the projects made with the seed to particular look and kind of interactive story. Many of the other remixes were projects made for other purposes beyond the Collab Camp experience.

In Collab Camp 2, we decided to not to implement an orientation project, which required a significant amount of time to design and develop, and instead invested in making a more friendly and appealing informational page about Collab Camp, as shown in figure 4-9. We also decided to experiment with a different approach to helping members getting started by using seedlings rather than a seed project. Each seedling project showed how to create a particular feature of a music mashup rather than suggest an entire project.



Figure 4-8: Screenshots from Collab Camp 1 projects that remixed the seed project

These seedling projects, shown in figure 4-10, included a dancing sprite, a project that responded to the sound picked up by a computer's microphone, and a project that used the timer feature in Scratch to trigger background changes.





After implementing Collab Camp 2, we found that seedlings were not as widely used as the seed project. There were no project submissions to Collab Camp 2 that contained any



Figure 4-10: The seedlings of Collab Camp 2

of the project seedlings. One reason why the seedlings were not used may be the lack of context on how they can be used. In Collab Camp 1, the orientation project, which was a remix of the interactive story seed project, provided a compelling example of how the seed project can be used. Examples that feature the use of seedlings could have added the needed context.

Resources like the seed project and seedlings helped members get started in making a project by suggesting what could be made and how they could be made. However, there are still many challenges in collaboratively making a project together as illustrated in the case studies of successful and less successful collabs in Chapter 5. In addition to providing resources, it may also be important to provide suggestions of ways that members can work together, negotiate ideas and conflict, and coordinate efforts to make a complete project.

4.4 Connect To Interests

Scratch was designed to support a "low floor," or simple ways to get started, a "high ceiling," or greater ways to advance, and "wide walls," or a diversity of interests and styles. Since Scratch launched in 2007, members have created a diversity of projects that include music videos, science simulations, newsletters, tutorial projects, and choose your own adventure games.

Even though we provided a creative constraint in the Collab Challenge in the form of three pre-defined images (see figure 4-11) that they must incorporate into their projects, collabs submitted a diversity of projects. However, we noticed a lack of diversity across gender. Among the participants of the Collab Challenge only 27% of them were female. Compared to the overall participation of women in Scratch at 36%, this participation in the Collab Challenge was significantly less.



Figure 4-11: The three pre-defined images that members were given in the Collab Challenge

In Collab Camp 1, we decided to use narrative as the creative constraint by asking members to create an interactive story. Research has found that story can be an appealing context to engage young women into computing activities (Kelleher, Pausch & Kiesler, 2007). An interactive story is a project where you can interact with the plot and/or characters. We decided to focus on themes as a constraint rather than the mechanics of a project through images like the Collab Challenge. Through thematic constraints rather than mechanical constraint like images, we believed that we could more directly appeal to interests rather than focus on the functional features of a project.

We observed a higher participation of young women in Collab Camp 1, making up over 39% of the participants. While it is difficult to tease apart the reasons for this increase, I reflect on the possible ways our design decisions, including our decision to use interactive stories, may have influenced this increased participation in chapter 6. Additionally, while there was a general increase in participation in Collab Camp, we observed some negative backlash from community members who expressed disappointment in the choice of stories as the creative constraint. These dissatisfied members were generally interested in

making games and saw the constraint of stories as limiting and exclusionary. However, the definition of interactive stories did not explicitly exclude games and many Collab Camp project incorporated game elements, such as choose your own adventure games and digital stories with mini-games.

In Collab Camp 2, we chose music mashups, projects that express, visualize, or interact with music. Music mashups could include projects like music videos, animated dance parties, interactive instruments, and games influenced by music. We believed that music could an appealing theme for many interests. Originally, we had chosen animated music videos as a theme, but chose music mashups instead to broaden the theme.

We did not observe any negative backlash in this iteration. However, we did find generally lower participation across the community. Compared to Collab Camp 1, which had 153 participants, Collab Camp 2 had 114 participants, a 25% decrease. There was also a decrease in young women participating at 33%, compared to 39% in Collab Camp 1. We believe that this decrease may be a result of Collab Camp 2 occurring during school time or the novelty of the collaboration events wearing off.

In designing the creative constraint as a context to engage various interests such as narrative or music, we found that some contexts may be appealing to some, but may exclude others. One of the challenges in designing contexts for creative collaborations will be not only to identify which aspects appeal to which groups, but also to think about ways in which we can bring together youth across different interests and provide meaningful collaborative experiences.

4.5 Cultivate Community

Inspired by Papert's samba schools as a model of learning and community (Papert, 1980), the Scratch online community was designed to support many people of diverse backgrounds and interests to come together and share their Scratch projects. At the end of the Collab Challenge, a subset of projects was featured on the Scratch homepage to showcase some of the projects to the rest of the Scratch community. However, a number of the projects, particularly those that were less sophisticated, received a number of negative comments (see figure 4-12).



Figure 4-12: Negative comments on a project in the Collab Challenge

While Collab Camp sits on top of the existing Scratch online community, we created a setting within Collab Camp to highlight the shared experience of its participants and to situate the project making that they were doing together. We changed the name from Collab Challenge to Collab Camp, feeling that "challenge" evoked a tone of competitiveness. We especially wanted to emphasize a supportive environment, where members are not only helping each other within their groups, but also helping each other across groups. After observing negative comments appear in the projects of Collab Challenge participants, we decided that one way to encourage members to help one another was supporting them in giving each other constructive feedback on their projects.

To start building a shared community experience, we created a "Teaser project" that announced when Collab Camp would start and invited members to spread the word about Collab Camp by remixing the project. I designed the teaser so that members could easily remix the project and add a character, particularly an avatar representing themselves, running through Collab Camp in the project. In the act of adding a representation of themselves, we hoped to emphasize the collective nature and shared experience of the event. We also designed a visual aesthetic that was warm and welcoming and evocative of images of real summer camps, utilizing images of bight blue skies, trees, and green grass. Figure 4-13 shows screenshots from the original teaser project and screenshots from remixies that Scratch members made.



Figure 4-13: Screenshots of the original Teaser project (top) and screenshots of remixes from Scratch members (bottom)

To provide increased support for members to give and receive constructive feedback from their peers, we included community members in the feedback process. While Scratch Team members continued to give feedback, we asked five Scratch members, who have been respectful and helpful members of the community, to provide constructive feedback to Camp projects. We recognized these Scratch members by giving them the title of "Collab Counselors." To prepare Collab Counselors, we created a private discussion forum for them to ask questions, discuss giving feedback, and communicate about Collab Camp. Scratch Team members also gave feedback on Collab Camp projects. This participation demonstrated to Counselors and other Scratch members how they could give constructive feedback. Finally, to help Counselors think of things to comment on in projects, I created a feedback guide, shown in figure 4-14, that broke down the elements of a project, like an interactive story, and what questions they may consider when reviewing a project.

	Elements of a Project				
Type of Comments	Story (Plot development, Characters' motivation and development)	Interaction	Understandability or Usability (Instructions, Where to click or press a key,)	Media (Graphics, Music, Sound Effects)	
What did you like about the					
How can they improve the					
Can they add something to the					

Figure 4-14: A feedback table for Collab Counselors to use when giving feedback.

In addition, whenever Collab Counselors or Scratch Team members provided feedback, we ended our messages asking Camp participants to pass on the spirit of giving feedback by reviewing each other's initial drafts and providing them feedback. We prompted their feedback by asking participants to think through two questions: "What did they like about the project?" and "What can the creators do to improve their project?"

Out of the 153 members that participated in Collab Camp 1, 14% (22), not including Collab Counselors, left a total of 74 positive or constructive comments on 50% (26) of the initial project drafts. Of these constructive comments, 66% (49) were simply positive comments, with comments like "Great project!" or "Cool!" rather than constructive.

In Collab Camp 2, we decided to continue the collective and supportive spirit of Collab Camp, which included using the outdoor aesthetic of Collab Camp 1 and using the Teaser project strategy that invited members to "add themselves" to Collab Camp. We also decided to increase the number of Collab Counselors, from 5 to 9 members. While we found a great increase in the amount of feedback being given among participants, we still found that many participants were not giving feedback. Out of the 114 members that participated in Collab Camp 2, 48% (55), not including Collab Counselors, left a total of 97 positive or constructive comments on all 41 of the initial project drafts. Most of these comments were primarily positive (80%) rather than constructive.

The Collab Counselors still participated in giving constructive feedback, but there was generally less traffic in the Collab Counselor forum, despite the increase in the number of counselors on the team. Since Collab Camp 2 was implemented during the school year, counselors may have had less time to engage in Camp. Another difference we observed in this round was less camaraderie and cooperation among the counselors, than in Collab Camp 1. For example, in the Collab Camp 1, counselors created a sample project together based on the interactive story theme. Counselors in Collab Camp 1 not only discussed topics related to Collab Camp in their discussion forum, but they also shared stories about themselves and events from their personal lives. We believe such socio-emotional interactions help build a sense of community among the counselors themselves and set up friendships that further motivated them to participate as Counselors.

Facilitating and providing constructive feedback among members was a promising way to create further engagement and community. However, there is still room within Collab Camp to make providing constructive feedback a major part of participating in the experience. Members are primarily focused on making a project together, but other iterations could continue to consider ways to encourage feedback, such as making an announcement on the Scratch homepage or notifying all Collab Camp participants to give feedback.

This chapter presented the iterative design of Collab Camp starting from the results of the Collab Challenge to Collab Camp 2. To understand how Collab Camp impacted Scratch members, I present case studies of collabs and individual participants in the next chapter. In particular, I focus on how they worked with others and how they experienced the

structure of Collab Camp, such as the finding partners in Connect Gallery or receiving feedback on their initial drafts.

Chapter 5

Experiencing Collab Camp

In this chapter, I present case studies of participation in Collab Camp 1 and 2 from the perspective of collabs and individual members. Each case study describes how they worked together to create a project and how they experienced different features of Collab Camp. We randomly observed about four dozen collabs during Collab Camp 1 and 2. I selected three collabs to highlight the different ways in which members successfully collaborated and selected another three to highlight how collabs struggled to achieve their goals. While these six collabs illustrate their particular experiences, I found similar experiences and patterns of interactions in the other groups we observed across Collab Camp 1 and 2. However, these case studies are not meant to be representative of all experiences in both Collab Camps.

The final three case studies highlight the individual trajectories of participants across multiple collabs and Collab Camps. Two of these individuals participated in the group of collabs we observed. These individuals were chosen because they participated in more than one collab and the case studies describe the ways they adapted or how they evolved as collaborators across these collabs. The last case study features a Collab Counselor and her experiences giving feedback in both Collab Camps.

5.1 Case Studies of Successful Collabs

These case studies present three collabs who successfully completed a project together during Collab Camp 1. In the Collab Challenge, we observed three groups with distinctive collaborative styles who successfully completed a project together (Kafai, Roque, Fields & Monroy-Hernández, 2011; Kafai, Fields, Roque, Burke & Monroy-Hernández, 2012). These ways of collaborating emerged and were not prescribed by the Scratch Team. I describe three collabs from Collab Camp 1 that displayed styles similar to the ones we observed in Collab Challenge. While these collabs are from Collab Camp 1, I also observed similar styles in groups that successfully completed a project in Collab Camp 2.

5.1.1 The Benevolent Dictator (Collab Camp 1)

Before the theme of interactive stories for Collab Camp 1 was announced, Sam, a 13-yearold boy from the mid-western part of the United States, had already formed a collab to create a project which he said, "combined the power of story with advanced programming." He had imagined a story of a hero Jack, who had lost his memory and went on a quests with a magical dragonfly named Gi. Seeing this as a good opportunity to get feedback and complete his project, he decided to participate. He called his collab "Dragonfly Meadow" after the name of his game. Sam described Dragonfly Meadow in the website discussion forums and invited anyone to join as long as they were willing to contribute.

Sam's project idea soon attracted 9 members. Each time someone asked to join, he immediately gave them a task based on what they were interested in doing. For example, David, a young boy from the United States, wanted to contribute by programming and described his portfolio of game-related projects. Sam responded by asking him to create the scrolling feature, where a player could infinitely move through the story world. Cassie, a young girl from the mid-eastern part of the United States, offered multiple skills including graphics and music. Sam asked her to develop the dialog between the characters Jack and Gi. He also asked her to create musical loops for the game and begin sketches of the main character.

Sam checked the website discussion forums at least once a day to review the latest activity from his teammates. To keep track of tasks and who was doing what, Sam maintained a "To Do" list in the first post of the collab's forum thread, which he had created and had the power to edit as the forum post creator. Each time any member returned with a completed task, Sam immediately gave them detailed constructive feedback. For example, when David returned with a project illustrating infinite background scrolling and how the characters Jack and Gi moved through it, Sam responded with positive comments, noting how much he loved the scrolling. Sam also added that Gi, the magical dragonfly who followed Jack, should move at varying speeds. Sam explained that this kind of movement would feel more natural.

In addition to communicating frequently with his collaborators, he also actively participated in the various aspects of the project development. He helped artists find images to inspire their artwork. With programmers, he remixed their projects to fix bugs or integrated their projects into the main project file. He regularly reminded his members to post their updates in the forums to keep everyone in sync with their latest work and avoid issues such as members duplicating tasks.

After almost two weeks since the start of Collab Camp, when it came time to submit an initial draft, members were curious what others might think. The responses were generally positive, including comments like "I love the movement of the dragonfly around Jack" and "The quests and the story sound awesome." A number of comments offered suggestions, some of which were already planned. All of these comments made the group more confident in their progress. One Scratch Team member suggested more casual conversation between Jack and Gi so that people can get to know them as characters in addition to learning about what to do and where to go in the game. Sam had originally planned to develop these characters later in the game, but the suggestion made him reconsider whether to include such conversations earlier in the project.

Not all members were as active as Sam and participation varied. Some only contributed a component to the project, like David, who after completing the scrolling feature for the project only sporadically communicated in the forum. Some members had to leave for external commitments like family vacations. Others, like Cassie who contributed many graphic elements, only worked within the role that they were assigned. A few others worked closely with Sam to program many parts of the project and also provided detailed constructive feedback to other members of the group.

Two weeks later, as the final deadline approached, Sam saw they still had many elements to complete from detailed features like the title screen to large components like the final boss battle. Those who could contribute helped as much as they could. In the end, they submitted an incomplete project with promises in the project notes to finish the rest of the project over time. What they had completed still impressed the community and their project was included in the subset of featured projects on the Scratch homepage. During the writing of this thesis, nearly a year after they began their collab, many of the original members are still finishing the development of the project.

The Dragonfly Meadow collab illustrates a traditional style of collaboration with a central leader providing the vision and coordinating the efforts of the collab. He began his collab with a strong and clear vision for the project, describing his ideas immediately in the first post in the forum. Sam opened his collab to anyone willing to contribute and he assigned tasks right away once they showed interest. Early on, he also tried to develop a group identity, a way to develop commitment among his teammates to their projects, using strategies like asking his members to use a common banner in their forum post signatures during Collab Camp.

Sam is an example of "benevolent dictator." He worked hard to create a cooperative environment, encouraging his teammates in their contributions, brainstorming features

together, and giving each other feedback. However, when it came to providing vision and making decisions about the overall direction, Sam had the final say. Additionally, he implemented many strategies seen in other successful collabs, such as those observed by Luther et al. (2010) in Newgrounds¹, a Flash animation and game creating community. For example, he created a joint and central space for the collab to coordinate and communicate around their efforts. He used the first post in the collab to carefully maintain the latest tasks, which provided a clear way for members to understand what needed to get done and who was doing it. His frequent communication in the forum and his constant feedback on members' contributions helped maintain momentum as they worked together to realize Sam's vision for Dragonfly Meadow.

5.1.2 A Distributed Collaboration (Collab Camp 1)

Team Gaia began after the Collab Camp 1 Teaser project was shared and remixed throughout the Scratch community. Kevin, a 15-year-old member from the United States, saw the teaser and decided to form a collab. He began by creating a project that advertised the kinds of people he was looking for, which included brainstormers, programmers, and artists. He also actively recruited people who he had seen on the website and had found their work interesting. After his open and active recruitment efforts, Team Gaia grew to include 15 members from all over the world, who had never worked together before, including members such as Grace from Canada, Julie from France, Elena from Romania, Aaron from the southeastern United States, and Max from the United Kingdom. He created a forum thread in the Collab Camp forum to help their group communicate.

Inspired by the international nature of their team, they called themselves "Team Gaia." Elena, who had just joined the Scratch website a week before Collab Camp began, also came up with an idea to incorporate their different locations into their project in the form of mini-games set in each of their countries. Once the theme of interactive story

¹http://www.newgrounds.com/

was announced on August 1, Elena suggested a story where the Scratch Cat, the mascot of Scratch, gets kidnapped and the player needs to save the Scratch Cat by playing their various mini-games across the globe. Members excitedly agreed to pursue this idea and each member committed to producing a mini game representing their location. To help members share their various projects and other assets like sounds and images, Max created a DropBox, a file hosting service, account for the team.

Members soon added drafts of their mini-games into their shared Dropbox folder. Grace created a maple leaf catching game for Canada. Elena created a similar game where you had to catch flying bats from Romania. Max, a soccer fan, created a game where you had to block the soccer balls from entering the goal line. Julie created a game where you had to eat the stinky cheese as fast as you can by clicking on the cheese. Everyone played each other's game and gave each other feedback on what it was like to play it, sometimes reporting bugs for the creator to fix. Once they were in the DropBox, Aaron integrated the different games into one project. Others, like Grace, asked how they could help and he showed them how they can merge projects into one.

They submitted their initial draft after two weeks and got lots of feedback from the community. The feedback was generally positive, which the team found both exciting and encouraging such as "This project is very creative! The mini-games are not too hard, but not too easy." Some suggestions from the community included adding sound effects, adding more countries, and developing the background of the antagonist more deeply. For example, one member participating in Collab Camp said, "This is awesome, with great plot, but the programming could be fixed to be more smoother, like maybe you can't go back to a country once you're done." Team Gaia continued to work on the project, fixing bugs that others had reported and refining graphical elements like adding a title screen.

When it came time to submit the final project, they decided to create a credits page, listing all the group members who contributed to the project. Using a formula he developed to measure "activity," looking primarily at the number of forum posts, Aaron posted a ranking of all the members. This ranking caused a series of negative reactions from members who appeared at the bottom. For example, Julie, who was ranked at number 8, reminded her teammates that she contributed a mini-game. Aaron responded by apologizing and adjusted his formula to raise her ranking. Seeing the negative feelings emerging, Kevin responded by asking everyone to forget about the rankings and declared that everyone should be included in the credits.

After submitting their final draft, they continued to receive positive feedback and gained visibility when their project became featured on the Scratch homepage. Aaron and Grace responded to most of the positive comments from community members and asked for more specific feedback. They also answered any questions and updated the project notes to help people play their various games.

Even though Collab Camp was complete, they decided to continue working as a team and begin a new project. They invited new members through an open programming challenge, and with the visibility that they gained in the Scratch community, many people participated. They began managing the large response and brainstorming new project ideas.

In contrast to the centralized leadership in Dragonfly Meadow, Team Gaia's model was more distributed, as they collectively assumed responsibility and ownership over the group's vision and project coordination. This distributed model and collective spirit was facilitated by the approaches of its creator Kevin, along with the collective attitudes and approaches of its members. For example, rather than defining a vision on his own, Kevin called on Team Gaia to brainstorm and develop an idea together, helping them create a shared vision using the international nature of their team. Their collective spirit can be seen throughout their process, from the way they modularized the project into minigames to their decision to call themselves Team Gaia. Even in a moment of conflict, for example in the ranking of members by Aaron and the resulting backlash, Kevin stepped in and declared that everyone contributed to the project. Their interactions and decisions connects to a model proposed by Scardamalia (Zhang, Scardamalia, Reeve, & Messina, 2009) of "collective responsibility" where members understand "conditions in which responsibility for the success for a group is distributed across all the members rather than being concentrated on the leader" in addition for taking on responsibility "for knowing, what needs to be known, and for insuring that others know what needs to be known" (p. 2). Members consistently stepped up their individuals efforts to realize their project vision together, going above and beyond their original intentions for participation. For example, despite signing up to just be a brainstormer, Elena created a mini-game and gave feedback on multiple projects. In the end, their collective efforts, and sense of responsibility, led them to complete a compelling project that they were all proud of.

This case study along with Dragonfly Meadow presented collabs that consisted of many members and the structures that emerged to manage the complexity of multiple personalities, motivations, and attitudes. The next case study features a close partnership between two creators and the development of both their project and relationship.

5.1.3 A Friendly Partnership (Collab Camp 1)

To find a partner for Collab Camp 1, Andy, a 13-year-old from Canada, went to the Collab Camp Connect gallery. He was curious to know what it would be like to work on a Scratch project with someone else. In the Connect Gallery comments, he posted a message saying that he was looking for a partner, adding that he was a decent programmer and can be creative and artistic. Another Scratch member Steve, a 13-year-old from the United States, saw Andy's comment and replied right away. While they connected on the Scratch website, they decided to communicate and coordinate entirely through email so they could create it without having the rest of the community see what they were up to. They started by brainstorming ideas and converged on a story set in the world of "Dimension Land." A hero tries to save his brother, who had been kidnapped by a sorcerer and taken to Dimension Land. The hero must play several mini-games that test his knowledge about Internet memes, ideas that spread widely across the Internet.

Andy set out to create a few animated scenes to develop the story in between the minigames that Steve programmed. They emailed frequently, sharing their latest work for the other person to provide feedback on. They found this way of working useful in helping their project become the way they envisioned.

When the deadline came to submit an initial draft, they decided to submit the first part of their project where the story and characters are set up. They found the comments very encouraging, as each reviewer gave them compliments on their story set up and music selections. The reviewers also encouraged ways to push their story as well as ideas to make it more interactive. For example, one reviewer said:

Cool start, I can tell that the story is going to be interesting. I wonder who the villain of Stickland is and why they're taking away the brother. Nice drawings and sound effects. It will be cool in your final project to see what kind of world the stick man has fallen into. Mini-games are a cool idea to make your story interactive. Another idea is to include parts of the scene which you can click on or interact with.

These suggestions and positive comments motivated them to continue working hard on their project.

As the final deadline approached, they came to rely on each other heavily to finish their project. While they had not known each other personally when they started collaborating, Steve and Andy ended their Camp experience as collaborators and friends. Reflecting on both of their experiences, they found that building trust and learning to trust played major roles in their collaboration: Trust is a big part of collaborating. You have to make sure that both your partner and yourself will be willing to put their trust on the other, especially if we don't know each other in person.

While we did not limit the number of people a collab can have, most of the collabs consisted of only two members, like Andy and Steve's collaboration. Their coordination was much simpler than Dragonfly Meadow's and Team Gaia's, who had 9 and 15 members respectively. Andy and Steve simply exchanged a project back and forth. Email was sufficient rather than setting up a file sharing service like Team Gaia or maintaining a central space for communication in the forums like Dragonfly Meadow. However, Andy and Steve also needed to develop a working partnership, listening to each other's ideas and developing trust in each other. Because they worked so closely together, they not only built a project, but also a growing friendship.

5.2 Case Studies of Less Successful Collabs

The past three case studies featured collabs that were able to achieve their goals. These next three case studies present collabs that ran into challenges and looks closely at how such challenges constrained or sidelined their efforts. While we saw similar patterns and challenges in other collabs, these case studies are meant to illustrate some of the ways collabs were unsuccessful, and they are not representative of all the ways collabs ended prematurely. One challenge in studying less successful collabs is how members can easily leave the online environment. It is difficult for us to know why they leave, because even if we followup with them, some members can simply ignore our messages or become inactive all together.

5.2.1 False Starts (Collab Camp 1)

Bill, an 11-year-old from the United Kingdom, knew exactly who he wanted to ask to be his partners when Collab Camp 1 began: Zach and Tim, two members he had met in the Scratch online community. They were not only great at making fun and interesting games on Scratch, but they had been giving him helpful feedback on his own projects.

Zach was flattered to see Bill's comment and thought it would be fun to participate. However, he was currently having computer issues and said he would get back to Bill when they were fixed. The other possible member, Tim, had not heard of Collab Camp or what collabs were and asked Bill to explain what was involved.

While Bill waited for Tim to reply and waited for Zach to fix his computer, he created an initial draft project so that his partners can understand his idea. He thought it would be neat to incorporate Collab Camp right into their project by building an interactive story of themselves giving a "tour" of Collab Camp. He was not sure exactly what the larger story arc would be yet, but thought this idea would be enough to spark some brainstorming among his partners.

Once he uploaded the project, he shared links with Zach and Tim. Zach replied saying that he still had computer problems and perhaps could not participate. Bill hoped that Tim could continue the project with him. After waiting a couple of weeks for Tim to respond, Bill decided to give up on participating in Collab Camp, despite his excitement around the event.

This collab was a common story among members who tried to participate in both Collab Camps. Enthusiastic members would contact their friends or post messages in the Connect Gallery, but they could not form a collab or get started on their project. While the Connect Gallery had 35 projects submitted by members looking for partners, none of those connections led to the submission of an initial draft. Their efforts stalled for a variety of reasons. Sometimes the members were unreliable, like Tim who was not getting back to Bill. Sometimes it was for reasons beyond their control, like Zach with his broken computer. Bill was full of enthusiasm at the beginning of Collab Camp, so much that he left thoughtful messages to his collaborators and got started on an initial draft to show them a potential vision for their project. This was not enough, however. It is a missed opportunity for someone as motivated as Bill to engage in creative collaboration with other creators.

The next case study presents another less successful collab. This collab got started on brainstorming, but they were unable make a project together.

5.2.2 Detoured by Disagreements (Collab Camp 2)

Vivian, a 12-year-old from the United States, enthusiastically recruited members for her collab at the start of Collab Camp 2. She had members volunteering to do graphic design, create music, and program the project. She had tried to collaborate once before in the Collab Challenge, but she was fairly new to Scratch then and had trouble finding enough collaborators in the Collab Challenge discussion forum. In Collab Camp 2, nearly a year after the Collab Challenge, she decided to create a project with a fun song to recruit partners. The project had a overwhelming response with over 60 comments.

While her partners were ready to get started, Vivian instructed all of them to wait until a number of steps were accomplished: first, they had to decide on a song, then develop the story, followed by artwork, and then programming of the project. However, there was little agreement about the song and the story. Codie, also from the United States, suggested an idea of a young boy that falls asleep and wakes up in a dream that happens to be a music video. Vivian and Codie went back and forth with possible music ideas. Vivian finally suggested one song, "Moves Like Jagger" by Maroon 5, that a few others agreed on. This agreement was enough for Vivian and she called on the graphic designers, which included Jessie, to begin creating the characters. Codie, who signed up to become a programmer, asked what he could do, but Vivian asked him to wait until the graphics were done.

Despite the momentum after choosing a song, a few negative reactions emerged that stalled the group. Jay, a 13-year old from the United States, who had been inactive for a few days, openly disagreed with the song choice and asked his teammates to use another song called "Dream On" by Led Zepplin. Jessie, however, pushed back, especially since she had already created the graphic content for the Maroon 5 song. In addition, Codie and other members who volunteered to program, who had been waiting for over a week to get an assignment from Vivian, decided to leave the collab out of frustration.

Vivian tried her best to respond to the negative reaction and conflicts. She told Jay and Jessie to cool things off and take a break from the forum. In her reply to the programmers, she told them that she felt sorry about their departure, but wished them goodluck.

After two weeks of inactivity, Vivian declared the collab a failure. She blamed the graphic designers for not finishing their work quickly enough.

Here is how I wanted the plan to go... the Graphic Designers would create sprites, the Sound department would get sound. And at the end, once the sprites where done, the Programmers would program it... I'm sorry, but really, now I can't participate in Camp Collab.

Like Bill, Vivian began her collab full of enthusiasm and energy. However, she and her collaborators were unable to move ahead because they could not agree on a vision for what they would do together. When a few of them agreed on a song and began moving forward with the project, one member Jay pushed back on the song choice and stirred arguments within the group. While Vivian asked them to cool off, their momentum slowed and the rest of the group became less active.

In addition, there was a clash of styles within the group. Vivian wanted to have all the media assets done, like the music and the visual look of all the characters, before the group moved onto programming interactions and dynamics. She wanted to develop the context of the project first. However, some group members, particularly those who signed up as programmers, wanted to begin building interactions once an idea was developed. The programmers felt that waiting for the visual and musical elements was unnecessary and decided to leave.

In contrast to this collab, the next case study presents a collab with very few disagreements in ideas and ways of working together. However, even with such shared personalities and interests, they were still unable complete their project.

5.2.3 Where Good Intentions Are Not Enough (Collab Camp 2)

Annie and Nancy, both 12-year-old girls from different parts of the United States, met on the Scratch website and became friends over their shared love of horses. They first collaborated in Collab Camp 1 and successfully completed a project together about two girls and their horses. Seeing the announcement for Collab Camp 2, they decided to collaborate again, but this time they decided to invite more people. Annie invited three more of their friends who also enjoyed creating horse related projects. After a more couple of days of active recruitment, they had over 7 members signed up.

To start, Annie created a very rough draft, with simple drawings and storyboards of music video, using an upbeat song about horses called "Pony It's Ok." The music video began with a cloud passing through and a hand reaching out to it. In the next scene, a rider and her horse moved in circles. The scene ended abruptly with a message from Annie calling on her collaborators to fill in the rough parts and finish the story.

Priya, a 13-year-old member from the United States, remixed Annie's project by creating a new look for the cloud at the beginning of the story, using GIMP, a free image editing
application. Her partners were so impressed and praised her artwork. However, despite the new progress, the group became stalled for a week when some confusion emerged as to who was drawing the main character. The other members debated if Priya or Nancy were going to do it, but they did not hear directly from either to confirm. Finally, a week before the rough draft deadline, Nancy shared a remix with a horse and rider. Annie finished up the existing scenes and shared their latest draft a few days after the initial project deadline, a month after Collab Camp 2 began.

After sharing their first draft, the team received many positive comments, complimenting them on their artwork and its precise timing with the music. Other members of the collab, who had become unresponsive, also commented on the project, apologizing for not being around and asking what they could do. Annie assured them that they help the team in multiple ways, such as being supportive.

Hallie: Sorry for being so useless. What exactly should I do? I know I was already told. I'm still confused. I don't want to ruin it for everyone.

Annie: You're doing fine! The most important part of a collab is that we support each other, and you've done more than your share in that sense! If you want to help work on this, though, I need some help with smoother animation.

While Annie provided her team with generous amounts of encouragement and support, no one remixed the most recent project that Annie created. Annie, herself, became busy with school and time passed by quickly. Soon the final deadline approached and they had not made any new progress. While this group missed the Collab Camp deadline, they decided to keep in touch and finish the project together at another time.

Unlike Bill's and Vivian's, this collab began with shared interests and enthusiasm, supported by the friendships they had developed among each other in the Scratch website. However, their collaborative interactions missed some features that more successful groups like Team Gaia exhibited. For example, members in this collab were not open about what they were doing or what their current availabilities were. Members were willing to offer ideas and support, but they were not stepping up to complete parts of the project that Annie had outlined in the initial base project.

However, despite missing the deadline, they still maintained a positive attitude about their collaboration and their future efforts. To this collab, the deadline was merely an external motivator to push them to complete a project together. To Annie, who led and set the tone for the collab, the most important thing in their collab was supporting each other and pursuing their interests, rather than completing a project.

5.3 Case Studies of Individual Participation

The last six case studies primarily focused on the interactions between members in their collabs and the ways they worked together. The next three case studies focus on the individual trajectories of members who contributed across multiple collabs or the two Collab Camps. These case studies highlight the different roles they assumed and varying challenges they encountered. The section ends with the experience of a Collab Counselor, who although did not participate a collab, connected with so many members and their collabs through the constructive feedback she gave in both Collab Camp 1 and 2.

5.3.1 The Adaptive Collaborator (Collab Camp 1)

Cassie, a 12-year old from the United States, had already been helping with another collab, Dragonfly Meadow, in Collab Camp 1. In Dragonfly Meadow (see section 5.1.1), Cassie played a specific role as a graphic designer, creating graphical assets and sometimes contributing in other ways like finding relevant musical loops and giving feedback on her teammates' work. When Collab Camp 1 was announced, Cassie decided to join another collab with her sister Stacy and their friend on Scratch Lee. She was also interested in how a subset of projects would be featured on the homepage. She had missed all the attention she had received since her last project got featured on the homepage a few months ago. However, whether or not she would get featured, she was excited to meet and work with other members in the Scratch online community, an online space she has grown to love since she signed up nearly two years ago.

At the start of Collab Camp 1, Cassie initially contributed where she could in Dragonfly Meadow, but when the other graphic designer on the collab left for school, the rest of the team became more reliant on her to complete the artwork. While she worked really hard on every task they gave, she found that her teammates had a lot to say and suggest about her work. The suggestions ranged from changing the size of different components to completely rethinking the look of a character. Sometimes her teammates went ahead and made the changes themselves. These criticisms and changes to her work initially annoyed and upset her. Rather than express her anger, something she would typically do in-person, she decided to step away from the computer and cool off. Once she felt okay again, she would reply to their messages and make the changes they suggested. Over time, through this routine of cooling off when she got upset, she learned constraint in her emotions and practiced acceptance of other people's ideas and suggestions.

Meanwhile, her collab with her sister and their Scratch friend Lee had its own challenges. The collaboration started off well, with them converging on an idea that Cassie suggested: a choose your own adventure game. Cassie immediately started an initial draft, but got into arguments with her sister that were left unresolved when her sister left for sleepaway camp. Although Lee was still available, Cassie decided to take on most of the work, telling Lee to only do sounds, while she does all the art and story development. Cassie believed that separating the work this way would help make the project "feel" consistent, rather than a mix of opposing styles and ideas. Despite the greater workload, she did not mind because she enjoyed being in control of the project. Reflecting on her experience with her two different collabs in Collab Camp 1, she enjoyed the variety of challenges in each one.

It was challenging at some parts, like having to organize the graphics and do the art and put the scripts. But it was more fun than challenging and I really liked it! It was the amount of hardness that makes it fun.

While she didn't have much control over the direction of the project in Dragonfly Meadow, she learned to accept other people's ideas and ways of doing things. She also learned from the more advanced Scratch members in Dragonfly Meadow. Even though she primarily created graphics for the project, she was able to learn new techniques such as infinite scrolling, by observing her partners program the project. In the meantime, in her other collab, she had near total control over the story, the characters, and the art. She could implement the ideas she believed in. Cassie only asked for help from Lee whenever she needed a sound effect. At the end of Camp, both of the projects she contributed to became featured. Encouraged by her experiences in her two collabs, she decided to join three more collabs at the end of Camp 1.

Cassie's way of collaborating across two collabs at the same time illustrate how she adapted to the various group dynamics to accomplish two projects. In one collab, where she was a contributor, she learned to accept her other partners' ideas and criticism while also learning from her more advanced partners through legitimate peripheral participation (Lave & Wenger, 1991). In the other, she was a primary force in shaping the dynamic, as she took control of the project.

Some would say that Cassie was successful in her collab with her sister in Lee, especially since their project was featured on the Scratch homepage. She salvaged a project that would have been stalled after her sister's inactivity. However, by taking full control with little input from Lee, others might say her process was less successful, as she did not

resolve issues with her sister and she excluded another member from taking on more responsibility in the collab. When looking at both the process and product of collaboration, success is not as simple to define as a completed outcome.

5.3.2 The Growing Collaborator (Collab Camp 1 and 2)

After reading the explanation for Collab Camp 1 on the Scratch homepage, Grace, a 11year-old girl from Canada, became excited at the idea of working together with other Scratch members. She had tried to start a collab once before and recruited some partners, but was not able to accomplish anything with her team. By searching through the Scratch website for other collabs, she found Team Gaia (see section 5.1.2), which had just started to recruit members. She joined as a brainstormer, together with members from all over the world that included Romania, France and the United Kingdom. Together they developed a project idea that was inspired by the international nature of their team: a global mini-game playing adventure trying to rescue the Scratch Cat from a kidnapper.

Once she shared an initial draft of her Canadian themed mini-game, her teammates began to send her feedback to help make it more enjoyable to play. She had not gotten such detailed comments on her project before and really appreciated the thoughtful feedback. Iterating on her project and fixing the bugs her teammates found, she shared her project again and a team member integrated her mini-game into the main project.

Once she finished her game, she started giving feedback on her other teammates' projects, sharing ways they could improve it too. As the deadline for submitting an initial draft approached, she decided to help out in other ways such as helping fix bugs in other projects and integrating mini-games into the main project. She soon found herself to be one of the most active members of the team.

When they got their first round of feedback, Grace found it useful to get feedback from the rest of the community and the Scratch Team. They gave comments and ideas that she and her team had not thought of before. It was interesting to see what people liked, what people found easy, and what others thought could be improved. People also found bugs she had not noticed before. Grace also explored the drafts submitted by other collabs participating in Collab Camp 1. Because she liked the detailed and thoughtful feedback she received from other members, she also tried to make her comments useful and left many collabs suggestions for what they could do next.

To finish the rest of their project, Grace did what she could. She found that even though people in her team signed up for specific roles, people did whatever needed to get done and everyone did a little bit of everything. Some people became less active, but others would step in to fill in what was missing. When the Camp finished, she was excited to submit the final project for the team, which became one of the featured projects. Reflecting back on her experience, she found that having a large group of people, with many different skills and who were willing to work hard, helped their experience. Having a deadline and the possibility of being featured also helped to motivate her and the rest of the team. Personally, she had not experienced a deadline on Scratch before and it was exciting to finish a project together with other members. Finally, she enjoyed getting feedback, so much that when the project was featured on the Scratch homepage, she replied to any comments and asked them to give even more feedback.

Now that I've done Collab Camp, I tend to give more constructive comments because my earlier comments were just like "cool" or "I love this game," and now I know how annoying it is when not enough people give constructive comments.

Having enjoyed her last experience with Collab Camp 1 in August 2011, Grace was excited when Collab Camp 2 began. She decided this time she would try to lead her own collab. She created a project for the Connect Gallery that explained the kinds of help she needed. Whenever someone left her a comment, she asked them what role they wanted and for a sample project. For some members, they did not respond to her requests at all. Others responded to her message and she examined their projects. Grace used these responses to decide who to accept in her collab. She was especially interested in members who were more experienced, ignoring messages from those who she felt were too inexperienced in Scratch. While she got many responses, she was disappointed that most of the responses came from Scratch members, who in her opinion, had less experience than she preferred.

Once she found a few collaborators, she created a forum for them to coordinate and called her collab "Team Raspberry," after her favorite fruit. However, only two of them communicated in the forum: Eric, a 14-year-old member, and Chris, a 15-year-old member, both from the United States. Eric and Chris were already in other collabs, but wanted to contribute to more than one.

Once in the forum, they brainstormed possible songs and ideas but did not converge on a vision. She imagined a musical game project, perhaps using the computer microphone input to make it interactive. Chris and Grace went back and forth on possible songs, but they could not agree on which song to use. After a week, they had still not decided on a direction and Grace became nervous with the inactivity. Eric asked what he could do, but rather than assigning him a task, Grace told him to wait while she completed a base project to build their work on.

After a month passed, Eric checked up on Grace again. She replied to him, and blamed the inexperienced members who failed to contribute. Her experience was not what she had hoped for—a far cry from her last experience with Team Gaia. She decided then to never lead a collab again.

The problem is that there are a lot of people who are inexperienced and joined without actually planning to collab on anything. It's too hard to get them going. I'm sorry. Next time I won't lead a collaboration team - it's doomed to failure. Like Cassie, Grace experienced working in two collabs, but these two spanned across time. Most studies that explore how young people collaborate are limited to one group experience. However, following a learner across multiple collaborative experiences across time presents an opportunity to understand how a learner evolves in their collaborative practices. We first learn that Grace had tried to lead a collab before, but was unsuccessful. Still, she was interested in the idea of working with others. She was able to experience that and much more with Team Gaia in Collab Camp 1. She learned new programming techniques, developed relationships with other members in the community, and evolved her practices of giving and receiving feedback. Confident in her positive learning experiences from Team Gaia, she set out to lead a collab again in Collab Camp 2. However, she did not experience similar successes and ended that experience determined never to lead a collab again.

It's interesting to note that Team Gaia and Team Raspberry had different ways of collaborating. Team Gaia had a collective spirit, with a shared vision and ownership of the project, whereas Team Raspberry resembled a centralized model, with Grace directing her teammates. She gained experience as a collaborator in Team Gaia and observed her partners stepping up and taking on leadership roles to push the project forward. She also took on more responsibility to help finish the project. However, in Team Raspberry, she set a tone where she was the decision maker, and her partners followed, waiting on her to tell them what to do. For example, she declared she would start a base project and asked her partners to wait, but she never completed it and her teammates were left with nothing to do. In Team Gaia, members invited each other to share ideas and, because they modularized the project, members were also responsible for creating major components of the project. Team Gaia gave each other permission to step up and lead.

While Grace was able to recruit experienced Scratch members, there were still gaps in all of their experiences: Grace in her experience as a leader and in her partners' experiences as collaborators. Her partners could have stepped up and implemented their ideas, rather than suggest them. In addition, they lacked the frequent and open communication of Team Gaia, practices that maintained momentum and kept group members informed. Grace still had much to learn to lead a collaboration, but her experiences in Team Gaia suggest that she is capable of doing so. Unfortunately, her Team Raspberry experience left her feeling less confident in her capabilities. While she was self-aware of what she learned in Team Gaia, she was not able to see that she could also learn from a less successful experience.

5.3.3 The Collab Counselor (Collab Camp 1 and 2)

When she was asked to become a Collab Counselor for Collab Camp 1, Jessica, a 17-yearold from the United States, was more than happy to take on the role. Since she began participating in the Scratch online community over three years ago, many people have helped her along the way and she looked forward to helping people through this role. As a Collab Counselor, her primary responsibility would be giving feedback to initial and final projects.

When she began to give feedback on initial project drafts, she was reminded about her early experiences giving and receiving positive, constructive feedback in the Scratch online community. Back then, she mostly left short, positive comments such as "Cool!" or "Awesome!" At some point, she began to receive really detailed and helpful comments on her projects from other members of the community. She was not only excited that someone left comments on her project, but that the comments were helpful suggestions to make her project even better. She reciprocated the comments by checking out the commenter's projects and leaving them constructive comments on their projects. Soon, she started leaving constructive comments on projects she found from other creators on the website, even though they had never interacted with each other before. Over time, she found that the more comments she gave, the more she got from other members.

When giving feedback on Scratch members' projects for both Collab Camps, she modeled

her comments from these early experiences. She started by giving a positive comment, describing something she liked in the project. She then offered suggestions to improve the project or ideas that the author might like to try. She ended her comments with another positive comment, to end it on a good note. As a fan of mathematics, she refined this "formula" for giving feedback throughout her feedback-giving experiences.

One challenge in giving feedback in Collab Camp, compared to her past experiences, was giving feedback on a diversity of projects. In the past, whenever she gave feedback on a project, she selected projects that she was also interested in, with genres and styles she was familiar with. While she did not have to give feedback on all the Collab Camp projects, she personally felt compelled as a Collab Counselor to comment on as many projects as she could.

Projects represented a broad spectrum of the online community that included new to experienced members, music video to game-making interests, and young to old Scratch members. She enjoyed catering her comments to match the collaborators' experiences and abilities. To understand the members she gave feedback to, she would read the project notes and find hints about what the creators cared about in the project. For example, creators would talk about how much time they put into graphics or how they produced their own music. Other times, she would look through the creators' projects to learn about their interests and their Scratch experience level. Expert Scratch members were a challenge because their projects were so well-developed, she did not know what more she could say. To help her come up with feedback for such projects, she would pull ideas from other projects she had seen on Scratch as well as her own projects.

She particularly enjoyed giving feedback to new Scratch members, feeling that they had the most to gain from her feedback. In her experiences giving feedback in Collab Camp 1 and 2, she saw the many challenges new members encountered in order to participate, such as finding partners or learning how to collaborate on Scratch for the first time. She also found that they appreciated her feedback the most. She loved it when they enthusiastically thank her for her feedback and remixed their project to incorporate her suggestions, especially when they made something beyond what she originally suggested. For example, one group had a simple project with Pokemon characters dancing to fun and upbeat music. Jessica encouraged them to make the project more interactive, such as having characters do something special whenever someone clicked on them. After the final deadline, she observed that they not only had the Pokemon jump and spin after they were clicked on, but the project also had dialog among the characters.

Jessica hoped that with her comments, members would not only find them helpful, but they would also be motivated to leave constructive feedback on other projects. Just like feedback from other community members helped her appreciate constructive feedback and later motivated her to do the same for others, she hoped she could share the same feeling with other members. However, she did not see the domino effect she had hoped for in both Collab Camps and continued to think ways to spread the "warm fuzzies" of constructive feedback throughout the community.

I wish more Scratchers would see Collab Camp (and Scratch in general) as an opportunity to collaborate with the whole community instead of just their own team ... Somehow we need to convince Camp participants that leaving feedback makes you feel warm and fuzzy inside and if we help each other out a bit, we'll all benefit.

While Jessica had already been generously helping her peers by giving them constructive feedback in the community, becoming a Collab Counselor helped her expand her interactions and views of the community. She learned to give feedback on a diversity of projects by a wide range of creators. She challenged herself to give positive and constructive feedback on as many projects as she could. Her role also enabled her to think about the larger community and what effects constructive feedback can have on community interactions, beyond what was occurring in Collab Camp. In particular, she was interested in how to encourage members to help each other and in how to spread the "warm and fuzzy" feelings of giving feedback.

Chapter 6

Looking Back, Looking Ahead

In designing Collab Camp, we created four goals: encourage collaboration, support making, connect to interests, and cultivate community to design a learning environment that engaged members in creative collaboration. We set out to achieve these goals in the iterative designs of Collab Camp 1 and 2. In our experiences designing these events and by understanding participants' experiences, we learned many lessons along the way about what worked and what didn't as well as insights into how members collaboratively make a project. At the same time, as we examined case studies of participation, even more questions and ways to improve Collab Camps have also emerged.

In this chapter, I reflect on the lessons we learned and the insights we gained as well as future directions in design and research. While I share reflections that emerged from this particular context of Collab Camp and the Scratch online community, I believe some of these lessons and insights can contribute to ongoing discussions about creative collaboration in other settings. These reflections may be most applicable to learning environments that allow young people some freedom in the groups they form, what they design, and how they build their artifacts together.

6.1 Reflecting on Designing Collab Camp

6.1.1 Stimulating Community Through Collaboration Events

In a deeper investigation of Papert's samba schools, Zagal and Bruckman (2005) analyzed the characteristics of samba schools and highlighted three features: flexibility to outsiders, existence of a public event, and plurality of members. In many ways, the Scratch community already supports these features, enabling members to connect and collaborate in many ways. With Collab Camp, we designed a collaboration event to encourage community members to collaboratively make projects together. This event especially helped community members that may not have been aware of or interested in collaborative project making. For example, Andy and Steve, who met each other in the Connect Gallery, had heard of collabs before but did not attempt to collaborate until Collab Camp.

Collab Camp also enabled members to interact with an audience. While the Scratch website enables members to share a project with a community of creators, they may not have a social experience with their shared project. The median number of views that a project receives in the Scratch community is 6 and the media number of "love its," a measure of how much people like a project, is 0. Additionally, less than half of all projects (45%) in Scratch have at least one comment. However, through the structure of Collab Camp, members have an explicit audience who can not only view their projects, but also interact with it through feedback. These interactions can support connection and help members reflect on their creations as they design for others (Magnifico, 2010).

We also designed the Collab Camps to be a cooperative event rather than a competition. While a competition can also trigger action in a community, we felt the nature of competition can deter from the community connections that we hoped this event would foster. However, our decision to only feature a subset of projects still led some members to perceive Collab Camp in a competitive light, which may have had positive or negative effects in motivation. Cassie, for example, was somewhat motivated to participate by the possibility of getting featured. Future iterations may consider removing this constraint to further encourage a cooperative spirit rather than a competitive one in the event.

6.1.2 Facilitating Connections

After seeing members struggle to find partners in the Collab Challenge, we decided to facilitate connections, especially since we since we left it up to members to form their own groups. Seeing members struggle to find partners in the Collab Challenge prompted us to create a central space called the Connect Gallery and a template project to help members learn about each other. These supports were especially helpful to members who were less connected in the community or unfamiliar with how to build a connection with a person they never met person.

Members were also able to connect to each other over their shared interests. Annie, Nancy, and the rest of their collab were brought together over the shared love of horses. In the template Connect Gallery project, we encouraged members to share their interests as a way to connect with others.

6.1.3 Designing to Engage Everyone

Seeing the low percentage of young women in the Collab Challenge (only 27%), we set a priority in the design the Collab Camp to increase participation among young women and, more generally, to attract a more diverse range of participants. In Collab Camp 1 and 2, we saw the participation of young women increase to 39% and 33%, respectively. It is difficult to tease apart the reasons for these results, especially since both Collab Camps were implemented "in the wild" of the Scratch online community and we were changing multiple features across iterations. However, we feel that a number of decisions may have influenced the participation of young women and other members who may not have been aware of or interested in creative collaboration. First, we designed Collab Camp to be a more cooperative environment than the Collab Challenge. We changed the name from "Challenge," which evoked a sense of competition, to "Camp," which evoked a sense of community. We tried to cultivate that community by encouraging members to help each other through constructive feedback. As illustrated by collabs' experiences, like those of Team Gaia and Andy and Steve, feedback was not only helpful in their project making, but it also provided members with encouragement from the community. Members that gave feedback, like Jessica and Grace, were also able to see how their feedback helped others.

Second, we worked to connect more broadly in the larger website, especially moving into spaces where more young women were present. We explicitly set up the Connect Gallery in the main website, where a larger and more diverse community of people in the community hanged out. We also spread word about Collab Camp through visible announcements on the homepage and through social networks via the remixed Teaser project.

Third, we also focused in providing additional support to help members connect and collaborate. These efforts included creating "seed" projects to help members get started and more engaging to help people understand how to participate. Unlike the Collab Challenge, which explained the structure in a single webpage filled with text and provided no suggestions for how to connect and collaborate, we believe these more accessible resources benefited members who were less familiar with collaboratively making projects.

Finally, we changed the project constraint to a more appealing context, using thematic (e.g. interactive stories and music mashup) rather than mechanical constraints (e.g. three images). With interactive stories, we hoped to attract members who were interested in narrative, which has been found to be an appealing context for young women (Kelleher, Pausch, & Kiesler, 2007). However, we observed some negative reactions towards interactive stories in the community, especially members who wanted to make games. While we did not intentionally mean to exclude interests in games from Collab Camp 1, it was perceived by members that way.

All together, these design decisions explored ways in which structure and resources could be implemented to promote broad participation. We learned how important it is to think about what features, from visual looks to project themes, can attract or exclude certain interests and what features can bring people of differing interests and backgrounds together into meaningful collaborative activities. Some feature can benefit everyone who participates, such as a central place to find collaborators or more engaging support resources. Other features can be appealing to particular groups, in which case, we especially focused on connecting to less dominant or less represented groups in this activity.

6.2 Reflecting on Participation in Collab Camp

6.2.1 Learning to Make Together

As members make together, they are also building knowledge and skills together. For example, Cassie in Dragonfly Meadow learned how to implement infinite scrolling by observing her teammates. Grace from Team Gaia learned new techniques in integrating multiple projects and sprites into one project. As they worked on their projects together with others, they were able to improve on their own capabilities, while seeing what multiple people can accomplish together. As one Collab Camp participant put it, bringing in people with different abilities enables the project to be "excellent in all ways, not just programming or graphics."

We also found some members learning to make together. In addition to learning new programming techniques, Cassie learned to accept and be open to others' ideas and criticisms. Grace learned how useful feedback can be to improve a project and how giving feedback can be helpful to her teammates and others beyond her collab.

However, we found many more who were unfamiliar with collaboratively making to-

gether. In designing activities that support collaboratively making, it is also important to support learning how to work together on their projects. In her study of groups collaboratively solving math problems, Brigid Barron (2003) argued the need to also support young people in learning how to collaborate.

My findings underscore the need to shift from a purely instrumental view of collaboration as a tool for learning to a view that foregrounds learning to collaborate on intellectually challenging activities as a fundamental human competence...Becoming a better co-learner may be one of the more important things we help students to do. (pg. 355)

6.2.2 Styles of Collaboration

After studying how men and women approached computing without any prescriptions on how they should program, Turkle and Papert (1990) found people engaging in and thinking about computing in many different ways. They argued that in order to support many learners, learning environments and communities must support an epistemological pluralism, or multiple ways of knowing and thinking. Dragonfly Meadow, Team Gaia, and Steven and Andy's collaboration illustrated the diversity of doing things, particularly a collaborative pluralism, or many ways of interacting and working together. When we did not prescribe how young people should form groups, coordinate, communicate, or co-construct together, we found a diversity of styles of collaborating emerge that varied across many dimensions of leadership, roles, attitudes, and motivations.

As young people engage in collaborative activities, they will also engage in many collaborative experiences that differ across these dimensions as illustrated by Cassie's and Grace's experiences in multiple collabs. Cassie was a contributor in Dragonfly Tree, participating in the specific role of a graphic designer, but she was a centralized leader in her other collab. She also had to be flexible as her sister became less active in her collab, taking on more responsibility to complete their project. Grace's experience with two collabs, one where she was a successful contributor and another where she was less successful as a leader, also illustrate how we must support learners in adapting to and thriving in multiple ways of collaborating.

6.2.3 Challenges and Persistence

In a case study of a pair of students jointly solving algebra problems together, Sfard and Kieran (2001) cautioned against claims that learning mathematics is best done through interaction. "The road to mutual understanding is so winding and full of pitfalls that success in communication looks like a miracle" (p. 70). While the two students in their case study were solving mathematics problems through conversation, the challenges faced by the less successful collabs in Collab Camp can also raise some caution. There were many ways that collabs like Bill's, Vivian's, and Grace's collabs struggled, which included difficulty finding partners, factors beyond their control such as broken computers, unreliable teammates, unresolved disagreements, and clashing work styles.

Despite these challenges, a number of collabs were able to succeed, developing strategies and practices that overcame similar challenges. In the three case studies of collabs, members communicated frequently and displayed dedication to completing the project. Team Gaia and Dragonfly Meadow were some of the collabs that had the most posts in their forum threads, which they used to communicate and coordinate. For teams like Team Gaia and Dragonfly Meadow who had teams of 5 or more, having a shared vision and plan helped to coordinate members. All three collabs were also supportive of each other, providing feedback on their contributions, helping with debugging, and chipping in when other things needed to get done. And when collabs ran into conflicts or disagreements, members in the collab listened and tried to negotiate a path that most members could be happy with. Many of these factors have also been found in collabs within other creative communities (Luther, Caine, Ziegler, & Bruckman, 2010).

6.2.4 Appropriating Tools and Networks to Collaborate

While the Scratch website was designed to support collaborative activities such as remixing, it was not explicitly designed for members to work on a project together. To make projects together, many collabs, both successful and less successful, had to actively appropriate the website and the programming environment. For example, galleries were designed to enable members to curate a collection of projects. In collabs, members used galleries as a central point of communication and coordination, using the gallery to collect project versions and the gallery comments to interact. They also pulled in external resources like Dropbox when needed. At times, their strategies violated the community of guidelines of Scratch. For example, Andy and Steve exchanged their email addresses to work together privately. However, Scratch community guidelines state that members should keep personal information private.

In addition, we observed members also connecting and interacting in ways that leveraged the networked setting of Collab Camp and Scratch. For example, when recruiting collaborators, members created projects that advertised their collabs. These projects would not only appear on their personal Scratch pages, but more importantly it appeared on their Scratch friends' homepages, spreading their recruitment project to their social network.

These significant appropriations and manipulations of the website informed the design of the Collab Camps and also prompted the Scratch Team to consider features for the next version of Scratch 2.0. For example, a new feature called the "backpack" makes it easy for members to easily move assets like images and Sprites across projects. In the next section, I also reflect on Collab Camp and Scratch extensions (section 6.4.2) such as enabling co-authorship and supporting explicit spaces for collabs, which are inspired by these appropriations, to better support members in creative collaboration.

Observing these appropriations also highlighted members' dispositions to appropriate, reconfigure, and remix multiple technologies and take advantage of our networked com-

munities. Santo (2011) calls these sets of practices hacker literacies and argues that "we must be prepared to provide not just guidance and tools but, most important, must trust that young people have the potential to work with and appropriate these tools to become creators of their own future." Some collaborative experiences or activities can be overdesigned or too structured, with set ways of working together and doing things, leaving little room for learners to appropriate the tools and activity to fit their ways of working together. In designing learning environments to support creative collaboration, we should also consider how these dispositions can be enabled and fostered.

6.3 Limitations

Many of the experiences we observed were limited to the time period of each Collab Camp. We miss opportunities to observe the entire trajectory of a member's collaborative experience, as they evolve as creators and collaborators. Grace's case study allowed us to see how one collaborator evolved across collaborations in two Collab Camps. However, we cannot see how their digital and real-life experiences interact from the perspective of the online community.

Furthermore, the experiences we observed were limited to the structure of Collab Camp, with its deadlines and other requirements like creating a project based on a pre-selected theme. We must also consider that the structure of Collab Camp had some influence on the experiences we observed. For example, creating a music mashup like an animated music video required different design strategies than an interactive story like a choose your own adventure game. In animated music videos, members were constrained by the timing of the song, whereas choose your own adventure games gave creators more control in the timing of the game. Such differences can create different dynamics among group members.

Finally, a limitation with online settings compared to in-person settings is how easy it is

for members, especially those who struggle, to leave the website. In classroom settings, for example, when you see a learner struggle, they remain in the room and you can work together to overcome his challenges. However, in online settings, a learner can struggle and decide to leave the online setting all together.

6.4 Future Work

Reflecting on the iterative designs of Collab Camp and the case studies of participation, I discuss future directions for Collab Camp and Scratch, exploring ways to improve its design and to investigate new research possibilities.

6.4.1 Directions in Research

Explore the Benefits and Complexities of Giving Feedback

In working with Collab Counselors to give feedback, we observed how giving feedback can be beneficial. Collab Counselors were able to refine and develop how they give feedback. For example, by pushing herself to give feedback on as many projects as possible, Jessica learned how to give feedback on projects that she was less familiar with. In addition, Counselors were also able to build deeper connections and understandings about the community. Jessica realized that when members help each other, such as giving each other feedback, the whole community can benefit. Future work could continue to explore the benefits for learners who engage in giving feedback.

We were also able to observe the complexities of giving feedback. Members must learn to take on the perspective of the creators, understanding their vision and providing feedback that is relevant to what the creators might want to do. Members providing feedback must also be aware of how their feedback might affect the motivation and vision of creators. Scratch Team members and Collab Counselors with explicit and visible roles in the community must be aware that what they say has influence, as some members could perceive them as authority figures.

Investigate Engagement in Less Successful Collabs

The case studies of less successful collabs illuminated the ways in which members could not achieve their collaboration goals. Future studies could investigate the benefits as well as the negative effects that such an experience could have on creators. For example, even though members experience obstacles in experience, they may pick up lessons along the way that they may implement in a future attempt. For example, Vivian was unable to participate in the Collab Challenge because she could not find collaborators, but in Collab Camp 2, she created an appealing recruitment Scratch project that had an overwhelming response. Other members, like Grace, come to negative conclusions about themselves. After failing to lead a collab a second time in Collab Camp 2, she decided that she could never lead one again. These studies into less successful collabs could provide insight into where and how collabs struggle and inform the design of ways to support them.

6.4.2 Directions in Design

Support Reflection on Collaboration

To help creators learn how to collaborate, one approach can enable members to reflect on their process of collaboration, also called "group processing" (Bertucci, Johnson, Johnson, & Conte, 2012). Embedding reflection in the activity can help learners unpack their interactions among group members, sometimes helping to resolve conflicts, manage communication problems, and develop better interactions. In Grace's story, after struggling to lead a second collab, she decided never to lead a group again. She attributed the group's struggles to herself, but through some reflection on her collaboration, she may have seen other challenges at play, such as the inexperience of her partners in collaboration.

Build in Constructive Feedback

Future efforts can explore ways to embed the encouragement of constructive feedback within the infrastructure of the Scratch website. These designs can get inspiration from writing and fanfiction websites, where giving and receiving feedback are not only major practices in the community (Black, 2008), but also designed into the websites. For example, in Figment¹, an online community where young writers can share their work, project pages have a section for comments and an equally prominent, but separate section called "reviews," where members can give feedback on the writing work.

Enable Co-Authorship

Many online creative communities only recognize a single creator. Scratch extends this a bit further in its remixing functionality. When someone remixes a project from the Scratch community, the website automatically attributes the original creator under the project byline. However, only one explicit creator is recognized. Scratch members have tried to work around this constraint by creating new accounts for their collaboration, using their collab's name as account name. To support and encourage members to recognize each other as collaborators, the infrastructure should support co-authorship, recognizing that there can be multiple authors in the creation of a project.

Create Central Spaces for Collabs

Collab often created central spaces for their members to coordinate and communicate in galleries and forum threads. These appropriations were often awkward and required a high level of familiarity and expertise to create these central spaces. Future iterations of Scratch could create a specific space for collabs, taking inspiration from successful collabs' practices. Features in these pages can include ways to organize tasks, send messages to all members, and manage projects and assets. However, in designing spaces for collabs,

¹http://figment.com

we must consider how these features overlap with other pages on the website, such as gallery pages, forum threads, and member profile pages.

Expand to Other Collaborative Activities

When we designed the Collab Challenge, we were inspired by the member-driven "companies" and collabs that already existed in the Scratch website. We created the Collab Challenge and the succeeding Collab Camps to support this particular activity, where members form groups and create a project together. Future explorations could consider expanding the structure of collabs, which are typically small teams. For example, activities could consider more open and large collaborations. In the World Museum Project, Miyata et al. (2012) invite people to create sprites based on a particular theme. These sprites are then integrated into one project called the World Museum.

Engage Newcomers Meaningfully

Newcomers, members who were either relatively new to Scratch or collaboration in Scratch, were some of the most enthusiastic participants in Collab Camp—they were excited to connect with other Scratch members and to collectively build projects that neither of them could have done on their own. However, newcomers were also some of the members who struggled the most. As the case studies illustrated, there are many challenges to negotiate to successfully create a project together. In some ways our design of Collab Camp may have biased towards more experienced Scratch members. We were inspired by collabs "in the wild," which consisted of fairly experienced and savvy members of the Scratch community. Some newcomers, like Elena in Team Gaia, were fortunate to enter a collab consisting of members with mixed experience. More experienced members helped those who were less experienced with Scratch, but newcomers were also valuable in brainstorming ideas, giving feedback, and looking for bugs. Designing ways for less experienced members to participate meaningfully and connecting them with members of mixed expertise and interests can help engage them in more successful experiences in creative collaboration.

Bridging Online and In-Person Settings

Collab Camp brought people together in the virtual setting of the Scratch online community, but there are also opportunities to bring people together across in-person and online settings. In Collab Camp 1, I hosted a Collab Camp Meetup for Boston-area participants to meet at the MIT Media Lab to share their latest drafts and work together on their projects. This event occurred near the initial draft deadline, halfway through the Collab Camp experience. I met a young boy there, who was meeting other Scratch creators like himself for the first time. Other than the online community, creating with Scratch did not exist in the other settings of his life. He was having a "worlds colliding" moment as what he experienced online—sharing, connecting, and creating—became tangible experiences in person. However, why should online and offline experiences be worlds apart? Future iterations of Collab Camp could take inspiration from Scratch Days, an international network of in-person events to enable Scratch community members to meet each other, share their creations, and learn new things. Even though collaborations may spread across countries, members may find others participating in their local communities.

Additionally, there are rich opportunities in in-person learning environments like afterschool clubs or classrooms. Kafai, Fields, and Burke (2011) examined the experiences of after-school club members and how they engaged in the Collab Challenge. An interesting exploration could take members in an in-person setting, like an after-school club, and have them collaborate with members of the online community rather than constraining their collaborations within the walls of their physical environment. Encouraging such collaborations can support young people in engaging in creative collaboration across settings, as they navigate, leverage, and merge their multiple learning communities. Being able to create, connect, and collaborate across settings is becoming more important today as young people grow up in an increasingly networked, complex, and digital world—and supporting young people in such experiences can help them become full participants in our society.

Chapter 7

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