

# International Perspectives in the Learning Sciences: Cre8ing a Learning World

PROCEEDINGS of the Eighth International Conference  
for the Learning Sciences – ICLS 2008

## **Volume 2**



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Title: International Perspectives in the Learning Sciences: Cre8ing a learning world. Proceedings of the Eighth International Conference for the Learning Sciences – ICLS 2008

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Published by: International Society of the Learning Sciences, Inc.

[www.isls.org](http://www.isls.org)

Printed Proceedings Printed and Distributed by: Lulu

[www.lulu.com](http://www.lulu.com)

ISSN: 1573-4552

## About ISLS

The International Society of the Learning Sciences, incorporated as a non-profit professional society in September, 2002, unites the traditions started by the Journal of the Learning Sciences, the International Conferences of the Learning Sciences (ICLS), and the Computer-Supported Collaborative Learning Conferences (CSCL) and offers publications, conferences, and educational programs to the community of researchers and practitioners who use cognitive, socio-cognitive, and socio-cultural approaches to studying learning in real-world situations and designing environments, software, materials, and other innovations that promote deep and lasting learning.

Researchers in the interdisciplinary field of learning sciences, born during the 1990's, study learning as it happens in real-world situations and how to better facilitate learning in designed environments – in school, online, in the workplace, at home, and in informal environments. Learning sciences research is guided by constructivist, social-constructivist, socio-cognitive, and socio-cultural theories of learning.

The society is governed by a Board of Directors elected by the paid-up membership. Officers of the society include the President (chosen by the Board of Directors), Past-President, President-Elect, an Executive Officer, and a Financial Officer. Much of the work of the society is done by committees whose members are drawn from both the Board and the membership at large.

## About ICLS

The International Conference of the Learning Sciences (ICLS), first held in 1992 and held bi-annually since 1996, hosts keynotes, symposia, workshops, panels, submitted paper sessions, poster sessions, and demos covering timely and important issues and reporting research findings across the entire field of the learning sciences.

Recent conferences have had invited keynotes and sessions centered on timely themes. The 2000 conference theme focused on the complexities inherent in learning and in studying learning; the 2002 conference theme focused on diversity. The 2006 conference focused on making a difference – issues in scaling learning sciences findings for broad dissemination and impact.

Previous ICLS Conferences

- ICLS 2006 – Bloomington, IN, USA
- ICLS 2004 – Santa Monica, CA, USA
- ICLS 2002 – Seattle, WA, USA
- ICLS 2000 – Ann Arbor, MI, USA
- ICLS 1998 – Atlanta, GA, USA
- ICLS 1996 – Evanston, IL, USA
- ICLS 1992 – Evanston, IL, USA

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## Developing a Design Culture in a Computer Clubhouse: The Role of Local Practices and Mediators

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**Abstract:** This paper focuses on the development of a design culture in a Computer Clubhouse, a type of community technology center known for its emphasis on design and creative production. Drawing from theories of situated learning and cultural historical activity, we used a mixed methods approach to document, describe, and analyze local portfolio-building practices and the role of mediation that best supports more complex types of design-based technological fluencies. The study also explores aspects of the Clubhouse setting that mediated community members' participation in design activities and then discusses how these findings can be used in other after-school settings interested in implementing design cultures with racially and ethnically marginalized youth.

While schools have always been seen as a primary site for learning, after-school settings are gaining recognition for their contributions to the development of student identity formation (Gee, 1996), technology fluencies (Schon, Sanyal, & Mitchell, 1998), and traditional forms of literacy development (Hull & Schultz, 2001). More than 2,000 after-school programs and community technology centers (CTCs) have opened in the last decade, most of which have been created with the goal of providing access to safe and engaging after-school spaces along with educational games and introductory computer activities, including email communication, web surfing, and word processing (Vasquez & Duran, 2000; Zhao, Mishra, & Girod, 2000). Most well known of these after-school initiatives is the Fifth Dimension program, which was established in the 1980s as a partnership between community centers and local universities (Cole, 1998). At these sites, college students and youth play games, work on homework, and write to whimsical characters via email. Results of an extensive evaluation demonstrated that across the Fifth Dimension program contributed to gains in computer literacy, mathematical understanding and problem-solving, as well as reading, writing, and grammatical skills (Cole, 2007). A set of common local practices and mediating means for organizing activities (Kozulin, 1998; Wertsch, 1997) have been documented that support the maximization of learning and development at these after-school programs, including the use of computers, task cards, the meta-organizational maze, and a mythical figurehead known sometimes as "El Maga" (Cole, 2007). All of these deliberately constructed mediational means (i.e., the tools and artifacts) serve to regulate youths' interactions as they pursue their personal goals at the after-school programs.

Like the Fifth Dimension, many after-school programs have focused on the development of traditional literacies and technology skills (i.e., word processing and typing), although there has been an increasing need to involve youth in creative production and a fuller range of technology fluency building activities in order move youth from consumers to creators of technologies (Peppler & Kafai, 2007). A small subset of after-school programs, most notably including those in the Computer Clubhouse Network, explicitly focuses on the development of a design culture, moving youth beyond basic computer skills and helping them to design, create, and invent with new technologies (Resnick, Rusk, & Cooke, 1998). Computer Clubhouse youth engage in applications such as Adobe® Photoshop™, Macromedia® Flash™, and Kai's SuperGoo™ that encourage skills beyond typing and general computer familiarity, allowing participants to use various design tools to develop creativity, critical thinking, and technological fluency (Gallagher & Michalnik, 2007). However, very little is known about the local practices and the role of mediation that best supports even more complex types of design-based technological fluencies, such as computer programming. We need a better understanding of how mediational means in traditional after school programs can be extended for such fluency-building activities.

A Computer Clubhouse in South Los Angeles offers a promising opportunity to explore the ways in which the local culture has developed their collective understanding of new tools for authorship and communication, particularly capitalizing on software that allows designers to use computation or computer programming (Kafai, Peppler, & Chiu, 2007). Aiming to uncover how design cultures are developed within existing community structures, we used a mixed methods approach to document, describe, and analyze (1) the local practices that underlie the larger Computer Clubhouse design community, focusing on local portfolio-building practices. We also (2) explored aspects of the Clubhouse setting that mediated community members' participation in design activities, which was important to our understanding of how and why youth get involved in design activities amidst a host of other possibilities, including video gaming and web surfing that are

predominant in youth culture. Other in-school and out-of-school settings could benefit from better understanding the critical role of mediation and local practices in the establishment of a robust design culture. These issues are of relevance to the Learning Sciences community because of the shared interest in promoting design-based activities as a tool for learning.

## Background

In this investigation we draw upon the field of situated theories of learning (see for example Lave & Wenger, 1991) and cultural historical activity theory (Vygotsky, 1978; Wertsch, 1985). This body of work builds on the notion that human learning is not just a matter of cognition but is fully embedded in the material, social, and cultural world (Lave & Wenger, 1991). Situated learning theory places importance on social interaction as being fundamental to learning. Central to this theory is the notion of “communities of practice,” which serves to support the values and behaviors to be learned (Lave and Wenger, 1991). Starting at the periphery of the community, learners begin as novices and move toward fuller forms of participation as they become more knowledgeable participants. In our study, the central activities that are being studied are design project activities and the community practices around making and sharing these projects. In these theories, social mediation plays a crucial role in participation.

Social mediation, as originally theorized by Vygotsky (1978), describes how learning is developed through social interactions with others. Through social interactions, an individual can come to learn the habits of mind and semiotic languages through which an individual derives meaning and constructs his or her own knowledge (Vygotsky, 1978; Wertsch, 1985). In this case, members of the Clubhouse community learn about the software programs, skills, techniques, and habits of mind related to creative production through social mediation. Wertsch (1985) extends this understanding by arguing that social mediation is semiotic in nature, with tools or artifacts providing the means through which an individual internalizes the higher mental processes central to social transactions in particular cultures or communities. Mediators that seemed to play a strong role in this context can include other members, mentors, artifacts, and the token economy at work in the local culture. Mediators inspired youth to use creative production as a way to position themselves within the local community.

We are not the first to document and describe the local practices and mediational means for involvement in after-school activities. There is already a rich body of work documenting and describing the core local practices and mediating activities that create and support such a community in the Fifth Dimension after-school centers, including descriptions of the artifacts or tools that serve as mediators to participation (Cole, 1998; Cole, 2007). At the Fifth Dimension centers, tools are used to mediate participation and development at several levels: (1) they provide a context and incentive for children to master knowledge and a wide range of skills; (2) they provide undergraduates with opportunities to connect theory with practice while mentoring children; and (3) they create sustainable activity systems in a variety of settings. The Fifth Dimension has designed and documented the implementation of social mediators at their sites in order to interest youth in game play and traditional literacy building activities,

Our work serves to highlight the mediational means for youth to get involved design activities in the Computer Clubhouse setting – a very different activity system aiming to increase the development of new media literacies in addition to the traditional literacies. Most of the previous work on building design cultures has been located within the context of schools within the Learning Sciences community where students serve as a captive audience in the implementation of design-based curricula (Kolodner, Camp, Crismond, Fasse, Gray, Holbrook, Puntambekar, & Ryan, 2003). Researchers here have focused on motivational issues getting students engaged in long-term projects (Collins, Bielaczyc, & Josephs, 2001). Getting kids interested in design in the out-of-school hours is entirely different, especially given the competition from video games, television programs, and web sites. This study adds a new perspective to this body of work by drawing on well-established concepts from activity theory, including mediators and local practices, in order to document, describe, and analyze the unique after-school design cultures in place at the Computer Clubhouse.

## Methodological Approach

We used a concurrent mixed methods approach (Creswell, 2003) involving participant field notes and an analysis of a design archive stored on a central server. A mixed methods design also supported triangulation among several different sources of data and allowed us to examine different, yet sometimes overlapping, multilevel facets of the research site. We analyzed the data in two phases, based on the following research questions: (1) what practices define the Computer Clubhouse design community, and (2) what aspects of the Clubhouse setting mediated members' participation in design events? Over 40 undergraduate and graduate student field researchers took extensive participant field notes over a period of three years. We randomly pulled 20 percent of the field notes ( $n = 58$  discrete observations, which sometimes took place on the same days) from the larger field note archive ( $n = 284$  discrete observations) to use for further analyses. This database documented more than 98 youth and observations were evenly distributed across the three years of the study.

Participant field notes and other qualitative data sources were analyzed using a grounded theory approach (Glaser & Strauss, 1967; Strauss 1987) and imported into NVivo software to code the field note data and extract passages. Data was coded primarily by the first author and differences were debated until consensus was reached on 100% of the data coded. We coded field note excerpts for recurring design practices and mediational means that invited members' participation in design events.

### **Archival Analyses**

Having a folder (or a portfolio as we call them here) on the central server for storing files is a good indication of being a participant in the design culture. An analysis of the server revealed that 273 youth have folders on the server and have engaged in some sort of design activity – even if only to save pictures from the web. This represents about one fourth of the known Clubhouse community that participates in design activities. Information on the file types, name, and date created was extracted using a batch file and then imported into an SPSS data spreadsheet for further analyses. When we analyzed the file types stored on the server, we found that the most popular creative software used by youth at this Clubhouse was Scratch, a new multimedia visual programming environment (541 documents), followed by Microsoft Word (461 documents), Bryce 5 (270), Kai SuperGoo (143) and Movies/animations (78). Programs that had less than 50 documents stored on the server are not represented in this list. This list merely represents the most popular software used to create saved projects from January 2005 – December 2006. In addition to the server analyses, the youths' Scratch work—including animated stories, videogame art, and interactive or playable art using pop culture images and sound—was collected on a weekly basis and entered into an archive for further analyses. Log files were generated for each project (n = 541), including the name(s) of the known creator(s) (n > 76 unique project creators), the date created, the dates that the project was continued, and if the project was derived from another project.

### **Local Practices: Building Design Portfolios**

In this section, we take a closer look at the portfolio-building practices that were central within this design community. Clubhouse youths' desire to play a part in the participatory culture (Jenkins, 2006) often was the determining factor in their decisions to engage in creative production. The downloading of web-based images to a personal folder was the top activity of the Clubhouse. Over 10,000 images were downloaded a year and stored in the youths' folders. Although downloading images and storing them in a folder isn't necessarily a design practice, youths' interest in collecting of online media was often driven by a desire to participate in the local downloading culture, and was often a departure point for their design activities (Jenkins, 2006). Of all possible entry points into the design community, no practice was as powerful and consistently attractive as the emulation of popular texts, so there seems to be an underlying connection between these two practices. We summarize the Portfolio practices to include the multiple practices of naming, saving, and storing files in a location (either on the server, on a desktop computer, or printed and saved in a particular location), which can be easily retrieved for later reworking or for display among the Clubhouse or online community. At the Clubhouse, about 86% of youth that participate in design practices stored project files with the intent to retrieve them, rework them, and share or display them for others (Peppler, 2007). This is a purposeful and performative practice among Clubhouse members that establishes the youth's membership in the design community and positionality in the group. This practice overlaps somewhat with core Information Technology concepts, including "information organization," and also resonates with a similar practice of artists (both traditional visual artists and media artists) who collect their work in a portfolio to be reworked or later displayed. This is an important practice that is fundamental to producing creative works. In the random selection of field notes, explicit reference to this practice occurs 35 times in 15 field notes. It's one of the most heavily documented practices at the Clubhouse and warrants further attention for several reasons.

Saving files served several functions for the members, and warranted a variety of practices surrounding saving and storing files. The files that youth stored in their folders are a reflection of their identities – what they value, what they like, and what they aspire to. One of the more common practices that youth engaged in was using a search engine to collect and download images, primarily of pop culture icons, song lyrics, images of sports teams or religious iconography. Youth also saved files so that they could create a portfolio of their projects to continue working on during their next visit to the Clubhouse or to show another member on what they've been working. New mentors were often greeted at the front door of the Clubhouse by youth offering to show them their work, either posted on the wall or saved in their folders. This practice was highly valued and encouraged by the Clubhouse Coordinator but was also readily embraced by members of the Clubhouse community.

Furthermore, design practices are built on the idea that youth can save and then later come back to their work, building these practices over time. However, learning to navigate the server space to store files in one's folder is not an easy task. There are consequences to forgetting to save files and there are intricate file structures to navigate in order to store work, and youth often dedicate time to managing this space so that they can efficiently find things. In the following field note excerpt, a Clubhouse youth named Mia engages in the practice

of searching and saving images to her folder, reflecting on why she chose some of the images. This excerpt begins as she and a mentor are looking up pictures that correspond with words in Mia's word search. Mia wants to know more about these words, all names of flowers, and so she goes to Google Images to learn more. Once she's there, she decides that these pictures are worth collecting in her folder.

Mia [who is in the second grade] took control of the computer and went to Google Images and typed in the word, "amaryllis." She had no problems navigating the Internet or remembering the spellings, despite the fact that these were difficult words that she had probably never encountered. She was also easily able to pronounce the words. After finding the amaryllis, Mia searched for buttercups and said, "they're pretty." She decided to download them to her folder as well... Shortly thereafter we were looking up images of all sorts of things—mostly puppies and other baby animals. Mia had found some baby hamsters that she thought were really cute and had previously stored them in her folder so she pulled up those images... She then went to her folder on the server and we looked through all of the images and then she started talking more about the pop icon images that were stored there. There was Usher, Ciara, Destiny's Child and a few others. She suggested that we look for more. "Who else should we look for?" she asked. I was at a loss and suggested Raven Symone since I knew that Kaylee liked her. Mia said, "Nahhh... how about Mariah Carey?" (05/06/05)

In this excerpt, we see that Mia, a relatively new member, has been working to build the number of files that she has stored in her file. We don't have a good feel for the purpose for these practices but they seem to be sufficient for Mia's needs, acting as a type of trading card that has increasing value the more she has stored in her folder. At this point in time, the images that Mia collects are there because they're "pretty" and she likes them, not because she intended to use them anywhere else, such as in a Scratch project. However, this shifts in a field note written a month later, where she shows the mentor the pictures stored in her folder, ultimately giving her the idea to import these images into Scratch and sing a song by Destiny's Child ("Mia's Girl Song," 06/02/05.) Here we see that Mia's practice of saving files to her folder provides a foundation and inspiration for creative production. Finally, because portfolios are often an amalgamation of personally meaningful material and are reflective of many hours of work, they are formally designated as private spaces – akin to school lockers. In the following field note excerpt, Kaylee shows her folder to one of the mentors but pauses before she opens one of her SuperGoo files to decide whether it would be appropriate to share this particular file with the mentor. Kaylee's sense of ownership and privacy is reflective of the Clubhouse norm of dedicating folder spaces as private spaces that need warrant permission before files are viewed by anyone else at the Clubhouse.

Kaylee starts to look through her folder and then says, "In this folder I have...all these pictures of Chris Brown." I asked her about one of her SuperGoo files and she said, "You can't see that...Wait, oh you can see that..." and she opens the file. She points to the girl in the image with Chris Brown and said, "I didn't like that girl. I was sooooo mad that she was right there, so I messed up her face." I laughed because she used SuperGoo to stretch and elongate her face – it was a fitting (and very expressive) use of SuperGoo. When I asked her who that was, Kaylee told me, "She's a Teen Vogue Model." (08/24/06)

### **Multiple Mediators: Reasons and Inspiration behind Participation**

In the following passages, we take a look at three types of mediators—artifacts, people, and a token economy—that were important to drawing the kids into the design culture and conclude this discussion with some negative cases that were uninterested in working in Scratch, even when presented with the same opportunities for participation, in order to learn more about why some members may conscientiously decide not to participate. It's important to note that this section only takes a closer look at the multiple mediators, rationales, and inspirations behind youths' involvement in design events (a sub-selection of the activities that take place at the Clubhouse) and does not explore why youth come to the Clubhouse in general or the role that multiple mediators play in this process.

### **Artifacts as Mediators: Dang, that was tight!**

In the first type of mediator, youth appropriate project ideas or materials from other projects that are displayed at the Clubhouse. This type of mediation occurred four times in the random selection of field notes. In the following field note excerpt, Arnold viewed Alicia's Scratch project that featured knights beheading two dragons and decided that he would like to use the idea in his first Scratch project:

[Alicia's] dragon program had 2 dragons and 2 knights in a lava background. The project displayed 2 dragons breathing out fire then one knight dodging of the dragon's flame and coming around it to chop off its head. When the head was chopped off you could see its progression until it hit the floor (meaning you could actually see the movement of the head being chopping off and falling to the floor)... It even inspired one of the members, Arnold to invest in making a project. After he viewed Alicia's product he exclaimed, "Dang, that was tight! I gotta make myself one of those! Can someone teach me?" Halvor and Sarah both decided to assist Arnold. (05/16/06)

Observing what others have done in Scratch can be an exciting way to stimulate project ideas. In the next few days following Alicia's showcasing of her scratch project, five more dragon-and-knight-themed projects showed up in the archive. Yet when we analyzed the files, none of the projects used an existing Scratch file project to build from. Instead, it seems that youth preferred building their own from scratch when they were repurposing ideas from another project.

### **Social Mediators: The Role of Friends and Mentors**

Social mediators also played an important role in creating the design culture. Youth seemed to be drawn into design practices via their drive to be social in the Clubhouse space. Youth were eager to work with mentors and other members toward some end goal, oftentimes to collaboratively produce design texts. Towards these ends, mentors also sought out youth that wanted to work on projects. In our previous work, we found that mentors engaged in work in Scratch, on average, 20% of their sustained mentoring interactions (Peppler, Kafai, & Chiu, 2007). We also found that mentors and members equally initiated design projects, commonly asking one another "Do you want to work on a project?" In this sense, the desire to work collaboratively with others provided strong motivation for creative production. In fact, youth in absence of this collaborative support structure were less willing to engage in design practices, waiting to be redirected by others in the community, particularly mentors. In the following field note excerpt taken from the same field note, Alicia was found aimlessly spinning in her chair when her time to participate in the gaming community had expired. In the weeks preceding this field note, Alicia eagerly engaged in creative production and had made the dragon and knight project. Alicia was then redirected to working on her project (and actually continuing the project mentioned in the previous excerpt) by a mentor acting as a social mediator:

After I came down from jotting more notes about the Clubhouse, I noticed that Alicia was not playing video games on the TV anymore and just spinning around in a chair at the green table. I went up to her and asked why she wasn't playing video games anymore. Alicia smiled and said "Because you only get one hour to play and you can only play more if you make a project." (OC: It was not Alicia's choice to discontinue playing video games, but standard placed by the Clubhouse.) (5/16/06)

In this excerpt, the mentor plays a strong role in redirecting Alicia, which has ripple effects on the rest of the community as we saw in the previous excerpt where her dragon project inspired others to make Scratch projects as well. However, another concern surfaces in this excerpt, which highlights the tension between certain community practices and resources. Ashley wanted to play videogames, but was redirected to make a project in order to earn more game playing time. Peers also acted as social mediators but oftentimes through the presentation of the artifacts mentioned in the previous section. In addition, because of the restrictions at the site where researcher were first and foremost mentors, interactions almost always involved some combination of mentors and members. How the youth related to one another in the absence or in the presence of mentors is under-documented because researchers were not allowed to simply observe and take notes at the site. Rather they had to be actively involved in the Clubhouse activities. Therefore, there is not enough field note data to say much about peers acting as mediators. However, we do know that membership at the Clubhouse is very much mediated by youths' existing social networks at home and at school. For example, youth pull in fellow classmates and neighbors to join the Club.

### **The Mediating Token Economy: Pulling in Gamers**

Finally, we examine the role of the token economy in enticing youth to become involved in design events. In 2006, the local Clubhouse Community resumed the practice of giving youth “club bucks” (i.e., play money) in return for their time spent designing projects, like those done in Scratch. There was a lot of speculation about the negative effects of the token economy on youths’ participation in the collection of field notes. Overall, we can’t substantiate these claims because during this time creative production climbed to an all time high without any perceptible impact on the quality of work being produced. We focus this discussion on one of the positive impacts that the token economy seemed to have on the local culture. As previously mentioned, youth at the Clubhouse formed various smaller communities of practice—two communities that operated in different spaces of the Clubhouse, yet played an important function in the day-to-day activities—the gamers and the designers. The activities in which these two groups engaged were at times entirely separate from one another and the practices that they engaged in were not necessarily valued in the other community. Making meticulous artistic decisions about the color of the background, for example, is not a highly valued practice in the gaming community but would be a highly valued in the design community. Instead, gamers valued the ability to quickly create a project and exchange it for club bucks.

Although it’s outside the scope of this paper to discuss the practices of the group of gamers that used creative production for reentry in gaming community, we felt that it was important to note that the token economy can act as a mediator for involvement in the design practices – regardless of where we might situate these members of the spectrum from peripheral – to full participation. In the following field note excerpt, one of the members who is consistently found playing games at the Clubhouse asks one of the mentors to make “a real project” using Scratch so that he can earn club bucks.

We opened up the scratch program because he said he wanted to make a scratch project. We both had no idea what to do. I asked him what he had in mind to create. He didn’t give me a clear answer. All he kept saying was that he wanted to make “a real project, a real one.” I, of course, had no idea what he meant by this. (I thought, “Aren’t *all* projects real?”) He went on to say that he wanted to make a real project to get club bucks. But my questions about what he wanted to create were futile.” (02/08/06)

Clearly, club bucks provided a strong rationale for working in Scratch. Whether this had a positive impact on the local culture is debatable. One of the positive effects of the club buck economy includes drawing in youth from the gaming communities to use production as a means to further participate in gaming activities. However, youth responded differently to these types of mediators. In the following field note excerpt, Jorge responds to another member that he is disinterested in earning club bucks for his project: “At some point a [member] asked Jorge, “Wow, you’re going to get a lot of club buck for this project!” Jorge replied, “I don’t do it for the club bucks. I do it because I enjoy it.” (02/10/06).” In this excerpt we see that Jorge, who is an active gamer at home, comes to the Clubhouse not to play games but to make them. He tells us that it’s really for personal enjoyment and me makes projects because he enjoys it. This maps onto what we know about Jorge, an older member that comes to the Clubhouse almost exclusively to work in Scratch or to occasionally do homework.

Before we move on to discuss implications of our findings, we should note that a small group of youth ( $n = 3$ ) conscientiously chose not to work with Scratch. Although numbers were small, it’s worth taking a look at these events to look at the rationale for not participating in popular design activities. One club member, Jose, objected first and we identified several reasons for his conscientious objections, including that his older brother, Jorge, had received a lot of attention for his work. There are a few other cases that have a similar rationale and it seems that not having an explicit and guided introduction to Scratch may have left them feeling like they needed to know more in order to be successful with this software. Once they learned more, however, most cases became interested in using Scratch as a tool for creative production. Some youth did not use Scratch because they already have an in-depth knowledge—and are accustomed to the controls and functions—of another type of software, such as Macromedia Flash.

## Discussion

In our discussion, we return to the pivotal role of local practices and mediators in creating and sustaining a design culture. In sum, we found that several of the local portfolio-building practices at the Clubhouse, such as image gathering and file storing, were natural springboards into design practices. In fact, these leading activities can be seen as emergent design activities. Although these activities differ from those of the Fifth Dimension, they share several similarities to the role of leading activities. Similar to the Fifth Dimension’s task cards, finding and storing images on the computer provides a structured entry point into the larger community. However, unlike leading activities at the Fifth Dimension, we found that most design activities appealed to cross-age and cross-gender groups and was the same across youths’ developmental stages, from elementary to high school.

Membership in the design community was largely defined as having multiple design files stored on the server, creating work and saving files for later reworking, and engaging in the practice of creating work with

other members of the community. Scratch was also found to be the most widely used creative software at the Clubhouse, which was somewhat surprising since previous efforts to instill a programming culture had not previously taken root (Kafai, Peppler, & Chiu, 2007). Similar to the Fifth Dimension, the computers were strong mediators in literacy building activities. In the former, the idea of a mythical persona which one emails readily engages young children in print literacy building activities in addition to some levels of technology fluency building, including navigating the internet, typing, and maintaining an email account. However, the youth at the Clubhouse engaged in activities that promoted a wider range of technology fluency building activities, ranging from typing to computer programming to other forms of creative production. In the course of these design activities, Clubhouse youth expanded beyond multiple literacies found in the Fifth Dimension to include media literacy (Jenkins, 2006; Peppler & Kafai, 2007), visual literacy (Barton & Hamilton, 2000; Peppler, 2007), and more comprehensive technology fluency (Resnick, Rusk, & Cooke, 1998; Kafai, Peppler, & Chiu, 2007).

Three types of mediators seemed to play a particularly important role in this process: artifacts, people, and the token economy. Other artifacts, such as sample Scratch projects, images on the wall, Scratch cards, and drawings all seemed to capture youths' attention and lead them to ask themselves, "can I make one too?" Similar in function to task cards and the meta-organizational maze at the Fifth Dimension, these artifacts served to provide inspiration, structure activities and provide assistance as needed. In addition to these artifacts, peers, mentors, and coordinators played a strong mediating role in creative production. Oftentimes youth would engage one another or ask a mentor if they wanted to work collaboratively on a project, and working collaboratively seemed to provide a context for exploration, effectively lowering the risk associated with working in new software environments. Finally, we noted the role that the local token economy can have on creative production. Despite having mixed reviews by several mentors, the token economy successfully drew in members from previously disinterested groups, like those solely engrossed in video game play, into the design culture. Just as the Fifth Dimension was conceived as a partnership with UCLinks, so too was this initiative reliant on the role that University mentors play at the site. And despite the strong role that mentors play in promoting a design culture (Kafai, Desai, Peppler, Chiu, & Moya, 2008), when the token economy was in place, we saw some of the highest amounts of creative production over a two-year period – all of which took place in the absence of mentor support. Unlike the Fifth Dimension sites, Computer Clubhouses continue to serve the local community throughout the year regardless of whether University mentors are present.

A key question to be considered is whether the success of the Computer Clubhouse design culture can easily translate into other settings. There are surely things that we can take away from the Clubhouse setting, for how to best organize and mediate participation in design activities in classrooms and other after-school settings. Using a theory of Constructionism (Kafai, 2006) to guide the organization of the space seems to be a key consideration. Youth should have access to computers for multiple purposes – not just design activities – so that they can see how these experiences build upon one another. Web surfing for materials, learning how to download, save and retrieve files is really a foundational portfolio-building practice, which more elaborate forms of creative production are built upon and should be given substantial treatment in the classroom. Of note, what to download leads us to another important point: one of the key factors that promoted design activities included the ability to use popular media in their work. The sharing and displaying of work drawing on these types of references resonated with their peers. It remains an open question, especially in school settings, what other media aside from popular images and text we can use to attract youths' interest and participation in design cultures.

Designing learning environments in after school settings that promote diversity, access, and participation in the new media culture can be a challenging and complex undertaking. This paper provided a richer description of what such a culture of design looks like, specifically exploring the portfolio practices that are so integral to this community and mediational means that promote and sustain long-term involvement. While this is only one case of building a design culture, we think that a better understanding of how design cultures are structured and sustained can provide insight for designing the next generation of learning environments.

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## Acknowledgments

This work was supported by a dissertation year fellowship from the Spencer Foundation to Kylie A. Peppler as well as a grant from the National Science Foundation (NSF-0325828: Resnick, Kafai & Maeda) to Yasmin B. Kafai and was conducted in collaboration with Mitchel Resnick's research group at the MIT Media Lab. The views expressed are those of the author(s) and do not necessarily represent the views of the supporting funding agencies or the University of California, Los Angeles.