CHAPTER 1

Origins and Guiding Principles of the Computer Clubhouse

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Technology has changed a great deal in the 15 years since we started the first Computer Clubhouse. At the time, no one was carrying around cell phones. Most people had never heard of the Internet. The most popular websites today – such as Google, Yahoo, and YouTube – did not yet exist. Although technologies have changed radically, the motivations and needs that led to starting the Computer Clubhouse program have remained the same and continue to drive the program today. So we find it useful to reflect back on the ideas and issues that sparked us to start the first Clubhouse. In this chapter we tell the story of the origins of the first Computer Clubhouse and then discuss the four core principles that have guided the development of the Clubhouse program since its beginning more than 15 years ago.

How the Computer Clubhouse Started

The first Computer Clubhouse was created in response to a group of children sneaking into a museum. During school vacation week in December 1989, The Computer Museum in downtown Boston offered a robotic workshop for families, using LEGO-Logo robotics materials borrowed from the MIT Media Lab. Anyone could drop in to participate. On the second day of the week, a group of four children showed up, speaking to each other in a combination of

English and Spanish. One of the boys in the group, about age 11, picked up a small gray LEGO motor. He was shown how to plug it into power source to turn it on. The motor began to spin. He called out excitedly for his companions to come see. “Mìra, mìra! Look at this!” The children started to build a car out of LEGO materials and began to program a computer to control the movements of their car. The children came back to the museum, day after day, eager to learn more. After playing with the car for a while, they built and programmed a crane to lift the car. At the end of the week, the robotics workshop was over, and the LEGO-Logo robotics materials were returned to MIT.

The next week, the museum was very quiet. At 3:00 in the afternoon, the doors to the museum’s large elevator opened. Inside were the boy and his friends. They asked, “LEGO-Logo?” We explained that we no longer had the materials available. They wandered around the museum trying out the exhibits. However, museum exhibits are typically designed for short-term interaction, and do not offer opportunities for open-ended design. The children looked disappointed.

A couple weeks later, a museum administrator sent an email message to the staff, warning them to be on the lookout for a group of kids sneaking into the museum, and to alert security if the children were seen. It turned out these were the same children who had enthusiastically participated in the weeklong robotics workshop. Now, because they were hanging around the museum, they were beginning to get into trouble with security.

We asked around to see if there were local after-school centers where these children could participate, but there were none in the downtown area. We also investigated what technology-based learning programs were available for youth in the greater Boston area. We found community technology centers that offered children opportunities to play educational games or to take classes on basic computer skills, but no programs that provided opportunities for youth to develop their own creative projects.

The children sneaking into the museum wanted something different. They were eager to try out new technologies. Here was a group of children who wanted to keep coming back to the museum to work on projects that we knew were educationally valuable (Resnick, 2006). They were reaching out, but there was nowhere for them to go.

Creating the Computer Clubhouse Model

So we began to explore the possibility of creating a new type of learning center that would address the needs and interests of these and other young people in the area. Our goal was to create a learning space where youth could have access not just to the latest computer technology, but also access to people who could inspire and support them as they developed creative projects based on their interests. As we developed our plans, we drew on the latest ideas from educational researchers and practitioners, and on our own experiences working in experimental educational projects. We brought together advisors from

university research groups and community youth programs. We also met with local youth and put together a youth advisory board.

Out of these discussions emerged the ideas and plans for the first Computer Clubhouse. Early on, we identified four guiding principles for the Computer Clubhouse (Resnick & Rusk, 1996a). We applied these principles to set up the first Computer Clubhouse at the Computer Museum. But the principles have continued to play an important role as the Clubhouse network expanded to more than 100 sites over the past 15 years.

Principle 1: Support Learning through Design Experiences

What was the secret to the success of the LEGO/Logo workshop that sparked the idea for the first Computer Clubhouse? A key factor, in our minds, was the way that participants were actively engaged in designing, creating, and inventing things. Too many educational initiatives try to transmit or deliver information to learners. The Computer Clubhouse is based on a different model of learning and education, where the focus is on “construction” rather than “instruction.”

Indeed, the Clubhouse learning approach draws on an educational philosophy known as *constructionism*, developed by MIT Professor Seymour Papert (1993). Constructionism is based on two types of “construction.” First, it asserts that learning is an active process, in which people actively construct knowledge from their experiences in the world. People don’t *get* ideas; they *make* them. This aspect of construction comes from the *constructivist* theory of knowledge development by Jean Piaget. To Piaget’s

concept, Papert added another type of construction, arguing that people construct new knowledge with particular effectiveness when they are engaged in constructing personally-meaningful products. Learners might be building a sculpture, writing a poem, composing a song, or programming a computer animation. What's important is that learners are actively engaged in creating something that is meaningful to themselves or to others around them.

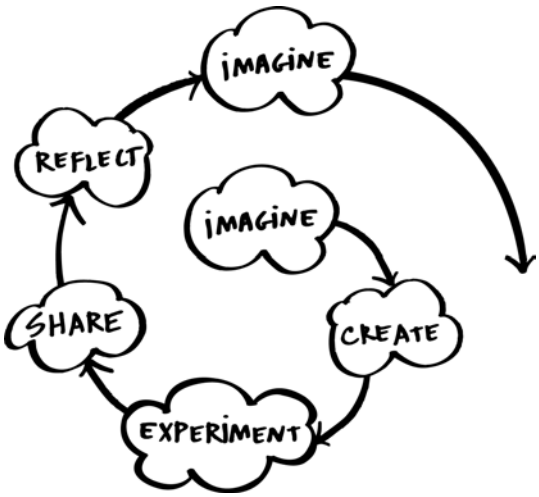
These ideas are at the core of the Clubhouse learning approach. At Clubhouses, young people don't simply interact with technologies, they design and create with technologies. Rather than just watching animations and videos on the web, Clubhouse members create their own animations and videos. Rather than playing computer games, Clubhouse members create their own computer games (see also Chapter 3).

Activities at Clubhouses vary widely, from constructing robotic inventions to orchestrating virtual dancers to writing lyrics to a song. But these varied activities are all based on a common framework: engaging youth in learning through design. To support these activities, Clubhouses provide a variety of design tools, including tools for digital music recording and editing; web publishing; computer programming and animation; image and video editing; designing and rendering three-dimensional models, and creating and controlling robotic machines. Clubhouse members often transition quickly from entry-level software to professional level tools. As Clubhouse members work with these tools, they build toward greater confidence and technical fluency. For example, a young person may start by creating images

with a simple paint program like KidPix, then shift to Photoshop to explore more advanced image manipulation and visual effects, then learn to use Scratch or Flash to animate their creations.

At Clubhouses, young people not only learn how to use these tools, they learn how to express themselves through these tools. They learn not only the technical details, but also the heuristics of being a good designer: how to conceptualize a project, how to make use of the materials available, how to persist and find alternatives when things go wrong, and how to view a project through the eyes of others. In short, they learn how to manage a complex project from start to finish.

As Clubhouse members work on design projects, the move through what we call the “creative design spiral” (see Figure 1). In this process, they imagine what they want to do, create a project based on their ideas, experiment with alternatives, share their ideas and creations with others, reflect on their experiences – all of which leads them to imagine new ideas and new projects. As youth go through this process, over and over, they learn to develop their own ideas, try them out, test the boundaries, solve problems, get input from others, and generate new ideas based on their experiences.



Young people often begin with a relatively simple design project, such as taking a photo of themselves and placing it into a scene. This initial type of project engages them in the creative design spiral over an afternoon or two. For example, they might start by imagining what kind of scene they want to create, then take a photo of themselves, edit it into a background (such as a sporting event or favorite place), experiment with visual effects, print and show it to others, and discuss ideas for further projects. After some reflection, they might decide to add more characters to the scene and continue with the next iteration of the spiral.

As young people become more fluent with various tools and aspects of the design process, they often develop bigger plans, requiring longer time scales, such as making a stop-motion animation, a sophisticated 3D model, or a collection of songs for a music album. These projects often become more complex and involve more people working together as a team.

Principle 2: Help Youth Build on their Own Interests

In schools of education, the focus is usually on methods of teaching, not motivations for learning. Many courses for educators emphasize how and what to teach, but seldom examine why students might want to learn. When the issue of motivation is addressed, the emphasis is often on extrinsic motivators and incentives, such as grades and prizes based on performance. Why? Many people assume that learning is inherently boring. To motivate students to learn, some educators assume that they need

to offer rewards, or turn the subject matter into a competitive game, with prizes for those with the best scores.

Yet if you look outside of school, you can find many examples of people learning – in fact, learning exceptionally well—without explicit rewards. Youth who seem to have short attention spans in school often display great concentration on projects that they are truly interested in. They might spend hours learning to play the guitar or perform tricks on a skateboard. Indeed, many of the most successful designers, scientists, and other professionals trace their involvement and success in their fields back to a childhood interest. Clearly, youth interests are a great untapped resource.

When youth care about what they are working on, the dynamic of teaching changes. Rather than being “pushed” to learn, youth work on their own, and seek out ideas and advice. Youth are not only more motivated but they also develop deeper understandings and richer connections to knowledge.

At first, some youth interests might seem to be trivial or shallow, but youth can build up large networks of knowledge related to their interests. Pursuing any topic in depth can lead to connections to other subjects and disciplines. The educational challenge is to find ways to help youth make those connections and develop them more fully. For example, an interest in riding a bicycle can lead to investigations of gearing, the physics of balancing, the evolution of vehicles over time, or the environmental effects of different transportation modes.

Clubhouses are designed to support youth in developing their interests. While youth from high-income households generally have many opportunities to build on their interests (for example, music lessons and specialty camps), the youth who typically come to Computer Clubhouses have had few such opportunities. Many have not had the resources and support to identify and explore potential interest areas, let alone to build on them.

Clubhouse participants are encouraged to make their own choices. Just coming to a Clubhouse involves a choice: all of the youth at Clubhouses have chosen to be there, and they can come and go as they please. Once inside a Clubhouse, participants continually confront choices on what to do, how to do it, and whom to work with. Clubhouse staff and mentors help these youth gain experience with self-directed learning, helping them recognize, trust, develop, and deepen their own interests and talents.

Helping youth develop their interests is not just a matter of letting them do what they want. Young people must be given the freedom to follow their fantasies but also the support to make those fantasies come to life. On the walls, shelves, and hard drives of Clubhouses, there are large collections of sample projects, designed to provide participants with a sense of the possible and with multiple entry points for getting started. In one corner of each Clubhouse is a library of books, magazines, and manuals filled with more project ideas (and a sofa to make reading more comfortable). Many youth begin by mimicking a sample

project, then work on variations on the theme, and soon develop their own personal path, stemming from their personal interests.

This approach works only if the environment supports a great diversity of possible projects and paths. Young people have a wide variety of different interests, so Clubhouses need to provide a wide variety of different activities to match those interests. The computer plays a key role here. The computer is a type of “universal machine,” supporting design projects in many different domains: music, art, science, and mathematics. At any time, a pair of youth might be using a computer to create a graphic animation, while at the next computer another participant might be using a similar computer to program a robotic construction.

Clubhouse projects often require expertise in a variety of different domains. For example, creating a music video involves recording in the music studio, shooting and editing video, designing an album cover for the CD, creating a website for the group. Such projects allow Clubhouse members with different interests to work together and learn new skills from one another.

Sometimes, people misinterpret this guiding principle. When they hear that Clubhouses encourage youth to build on their own interests, they assume that adults need to get out of the way, and let Clubhouse members do everything themselves. For example, we once heard someone propose to lead a workshop for Clubhouse members, helping them learn to create animated comic books. Another person initially dismissed the idea, explaining: “We don’t do workshops at the Clubhouse. We let Clubhouse members

follow their own interests.” But that’s not what is intended by this guiding principle. It’s important for young people to have choice in what to explore, but they often need a great deal of support in identifying and pursuing their interests. We would advise against a Clubhouse organizing a mandatory workshop where all Clubhouse members were required to learn about animated comic books. But as long as members have the choice of whether or not to participate, we think it’s a great idea to offer workshops for Clubhouse members. Such workshops can help Clubhouse members discover what areas that they are (or are not) interested in, and help them learn new skills that will be useful in pursuing their interests.

Principle 3: Cultivate “Emergent Community”

A typical computer lab for 30 children is set up with 30 computers on tables in straight rows facing the front of the room. This setup is designed for children to face the teacher at the front of the room and to work alone. In contrast, we designed the Clubhouse space with an explicit goal of encouraging and supporting collaboration.

In a typical Computer Clubhouse, each table with a computer has two or three chairs to facilitate youth working together. The tables are placed in small clusters around the edges of room, leaving more space for circulating around the room. The chairs in Clubhouses all have rolling wheels, allowing members to interact with others more easily, by rolling over to see what is on another computer. In the middle of each Clubhouse is a large

green table without any computers on it. This table acts as a type of village common, where people come together to share ideas and to work on plans, drawings, crafts, and building projects – or simply to have a snack and catch up.

The Clubhouse space is designed to have the feel of a creative design studio, a combination of an art studio, music studio, video studio, and robotics lab. Some of the design choices might seem unimportant (or, even extravagant), but we have found that the design of the space deeply influences the attitudes and activities of the participants. As soon as youth walk into the Clubhouse, the setup of the space suggests possibilities. They can see tools and examples to spark their interest and imagination. At one new Computer Clubhouse, the director remarked with surprise that the behavior of the young people changed dramatically for the better when track lighting was installed. And many Clubhouse staff have noted that the rolling chairs, though sometimes a distraction, make it much easier and more likely for Clubhouse members to share and collaborate with one another.

Projects at Clubhouses are not fixed entities; they grow and evolve over time. At Clubhouses, no one is assigned to work on any particular team. Rather, communities “emerge” over time. Design teams form informally, coalescing around common interests. Communities are dynamic and flexible, evolving to meet the needs of the project and the interests of the participants (Resnick, 1996).

To support these evolving collaborations, Computer Clubhouses recruit a culturally diverse team of adult mentors—professionals and college students in art, music, science, and technology. Mentors act as coaches, catalysts, and consultants, bringing new project ideas to their Clubhouses. Most mentors volunteer their time (see also Chapter 8). On a typical day, there are two or three mentors at a Clubhouse. For example, engineers might be working on robotics projects with Clubhouse participants, artists on graphics and animation projects, programmers on interactive games. For youth who have never interacted with an adult involved in academic or professional careers, this opportunity is pivotal to envisioning themselves following similar career paths.

In this way, Clubhouses provide more than just access to technology. Youth in low-income neighborhoods need access not only to new technologies but also to people who know how to use technology in interesting and creative ways. Clubhouses take advantage of an untapped local resource, providing a new way for people in the community to share their skills with local youth.

By involving mentors, Clubhouses provide inner-city youth with a rare opportunity to see adults working on projects. Mentors do not simply provide “support” or “help”; many work on their own projects and encourage Clubhouse youth to join in. John Holt argued that children learn best from adults who are working on things that they themselves care about. As Holt wrote: “I’m not going to take up painting in the hope that, seeing me,

children will get interested in painting. Let people who *already* like to paint, paint where children can see them" (Holt, 1977).

At Clubhouses, youth also get a chance to see adults *learning*. In today's rapidly changing society, perhaps the most important skill of all is the ability to learn new things. It might seem obvious that youth, in order to become good learners, should observe adults learning. But that is rarely the case in schools. Teachers often avoid situations where students will see them learning: they don't want students to see their lack of knowledge. At Clubhouses, youth get to see adults in the act of learning. For some Clubhouse participants, it is quite a shock. Several of them were startled one day when a Clubhouse staff member, after debugging a tricky programming problem, exclaimed: "I just learned something!"

For example, two graduate students from a local university decided to start a new robotics project at one of the Boston-area Clubhouses. For several days, they worked on their own; none of the youth seemed particularly interested. But as the project began to take shape, a few youth took notice. One decided to build a new structure to fit on top of the robot, another saw the project as an opportunity to learn about programming. After a month, there was a small team of people working on several robots. Some youth were integrally involved, working on the project every day. Others chipped in from time to time, moving in and out of the project team. The process allowed different youth to contribute to different degrees, at different times—a process that some researchers call "legitimate peripheral participation"

(Lave & Wenger, 1991). As youth become more fluent with the technologies at Clubhouses, they too start to act as mentors. Over time, youth begin to take on more mentoring roles, helping introduce newcomers to the equipment, projects, and ideas of the Clubhouse.

Principle 4: Create an Environment of Respect and Trust

When visitors walk into a Clubhouse, they are often impressed by the artistic creations and the technical abilities of Clubhouse participants. But just as often, they are struck by the way Clubhouse youth interact with one another. The Clubhouse approach puts a high priority on developing a culture of respect and trust. These values not only make the Clubhouse an inviting place to spend time, but they are essential for enabling Clubhouse youth to try out new ideas, take risks, follow their interests, and develop fluency with new technologies. Indeed, none of the other guiding principles can be put into practice without an environment of respect and trust.

There are many dimensions to “respect” at Clubhouses: respect for people, respect for ideas, respect for tools and equipment. Mentors and staff set the tone by treating Clubhouse youth with respect. Right from the start, participants are given access to expensive equipment and encouraged to develop their own ideas. “You mean I can use this?” is a common question for youth to ask when they first visit a Clubhouse and find out about the resources and options available to them.

Even with all these options, youth won't take advantage of the opportunities unless they feel "safe" to try out new ideas. In many settings, youth are reluctant to do so, for fear of being judged or even ridiculed. At Clubhouses, the goal is to make participants feel safe to experiment and explore. No one should get criticized for mistakes or "silly" ideas.

Youth are given the time they need to play out their ideas; it is understood that ideas (and people) need time to develop. One new Clubhouse participant spent weeks manipulating a few images, over and over. But then, like a toddler who is late learning to talk, but then starts speaking in full sentences, she started using these images to create spectacular graphic animations.

Clubhouse youth are given lots of freedom and choice. One participant explained why he liked the Clubhouse more than school: "There's no one breathing down your neck here." But with this freedom come high standards and high expectations. Clubhouse staff and mentors do not simply dole out praise to improve the "self-esteem" of the youth. They treat youth more like colleagues, giving them genuine feedback, and pushing them to consider new possibilities. They are always asking: What could you do next? What other ideas do you have? Many Clubhouse youth are learning not only new computer skills but new styles of interaction. Clubhouse youth are treated with respect and trust—and they are expected to treat others the same way.

The Evolution of the Guiding Principles

Over the past 15 years, these four guiding principles have continued to provide a framework of shared values for the expanding network of Computer Clubhouses. But the principles are not static. As new Clubhouses have opened around the world, the guiding principles have evolved to fit changing contexts.

When we first talked about “emergent community,” for example, we were thinking about the community of staff, mentors, and members within an individual Computer Clubhouse. As time went on, the idea of “community” evolved. Clubhouses began reaching beyond their walls to develop collaborations with their local communities. And as more and more Clubhouses opened, Clubhouses began to focus on another type of community: the extended community of Clubhouses around the world. Just as new ideas emerge through interactions among members, mentors, and staff within each individual Clubhouse, new ideas also emerge through interactions among the worldwide network of Clubhouses.

The Clubhouse guiding principles need not be limited to Clubhouses themselves. In recent years, a growing number of schools and community organizations have expressed interest in the Clubhouse learning approach. One aspect that has received attention is the role of mentors collaborating with youth on creative projects, which differs from the typical one-on-one tutoring in many after-school programs. Hirsch and Wong (2005), in the *Handbook of Youth Mentoring*, describe the Computer Clubhouse approach as a promising direction for mentoring in after-school centers.

A key challenge for the years ahead is to provide support and connections among educators and program staff interested in applying the Clubhouse guiding principles in their local settings. With increased access not just to creative applications of technology but also to a dynamic and supportive learning community, more young people around the world will have opportunities to develop as capable, confident, and creative thinkers.

Notes

Portions of this article previously appeared in Resnick, Rusk, & Cooke, 1998; Resnick & Rusk, 1996a; and Resnick & Rusk, 1996b.

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