

Lifelong Kindergarten: Cultivating Creativity through Projects, Passion, Peers, and Play

Mitchel Resnick, MIT Media Lab
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Beyond Rodin

A few years ago, the government of Jordan invited me to visit the country. The government had set up a nationwide network of community centers, called Knowledge Stations, where people could get access to computers and learn new job skills. But the initiative wasn't living up to expectations. Not many people were visiting the Knowledge Stations on an ongoing basis.

At the same time, the Computer Clubhouse in Amman, Jordan's capital city, was enjoying great success. The Clubhouse was crowded every afternoon, with young people working on a wide variety of creative projects. Young people kept coming back to the Clubhouse. Some came once a week, others a few times a week, and others every day. Government officials wondered: Why was the Computer Clubhouse so much more popular than the Knowledge Stations? They asked me to visit and give some advice.

I flew to Jordan and visited several of the Knowledge Stations. The differences between Knowledge Stations and Computer Clubhouses became apparent as soon as I walked through the door. In Knowledge Stations, the computers were lined up on rows of tables, all facing in the same direction, and the rows were packed close together, making it very difficult to walk between the rows. Clearly, the intention was for people to listen to instructions from a teacher at the front of the room, then work individually at their computers. There was no space for people to collaborate—or even to walk around to see what others were working on.

The Computer Clubhouse in Amman had a totally different feel. The tables with computers were arranged in small clusters around the room, making it easy for groups to work together and to check out other people's projects. The chairs all had rolling wheels, so members could easily roll over to another table for a quick conversation or longer collaboration. In the middle of the Clubhouse was a large green table without any computers on it. This table served as a type of village green, where people came together to share ideas, sketch plans, build with LEGO bricks and craft materials—or simply have a snack and catch up. On the walls and shelves around the room were large collections of sample projects, providing newcomers with a sense of the possibilities and with ideas for getting started.

Other Clubhouses around the world have similar setups. Some of the design choices might seem unimportant (or even extravagant), but we've found that the design of the space deeply influences the attitudes and activities of the participants. In particular, the design of the Clubhouse space communicates that this is a place for peer-based learning, where young people learn with and from one another. The design makes it easy for Clubhouse members to work together—and puts them in a mindset for doing so.

Throughout history, thinking and learning have too often been framed as activities done by individuals, on their own. When people think about thinking, they often think of Rodin's famous sculpture *The Thinker*, which shows a lone individual, sitting by himself, in deep contemplation. Of course, some thinking happens that way, but most doesn't. Most of the time, thinking is integrated with doing: We think in the context of interacting with things, playing with things, creating things. And most thinking is done in connection with other people: We share ideas, get reactions from other people, build upon one another's ideas.

Computer Clubhouses aim to go beyond Rodin, shifting from think-it-yourself to make-it-together. This approach is more aligned with the needs of today's society, where almost all jobs require collaborative effort, and the most important social issues require collective action.

At Computer Clubhouses, collaboration comes in many different forms. In some cases, Clubhouse members are simply inspired by what others are working on and don't work together directly. In other cases, Clubhouse members with complementary skills team up to work on a project. For example, a member with video skills and a member with music skills may work together to make a music video, or a member with building skills and a member with programming skills may team up to create a robot.

By working together, Clubhouse members can take on projects that are bigger than any one of them could handle alone. A group of nine fourth-grade girls started coming to a Boston-area Clubhouse after school. After several sessions experimenting with small projects, they decided to work together to create a "city of the future," using some of our robotics technology from MIT. The girls built and programmed elevators, buses, and even a tour guide for the city. They proudly named their creation "Nine Techno Girls City."

Recognizing the growing importance of collaboration skills in the workplace, more schools are starting to add collaborative activities in the classroom—but in many cases, the students are told what to work on and who to work with. In contrast, Clubhouses place a high priority on bringing together the principles of *passion* and *peers*, so that young people not only work together, but also work on projects that they care about. Clubhouse members aren't assigned to work on teams. Instead, teams come together informally, coalescing around shared interests and common projects. Teams are dynamic and flexible, evolving to meet the needs of the project and the interests of the participants.

At Clubhouses, we try to establish a culture in which members, as they develop new skills, feel a sense of responsibility to share their skills with others. When we started the very first Computer Clubhouse, we were fortunate to have an early member who helped establish this culture. Mike Lee came to the Clubhouse with a love of drawing, but without any computer experience. He quickly learned how to use the computer to create new types of illustrations that reflected his distinctive artistic style. His projects attracted attention from other Clubhouse members, who began coming to him for advice, wanting to learn his techniques and style. Mike was generous with his time, and soon there was an entire subcommunity of Clubhouse members creating artwork in what they called the *Mike Lee style*.

When we started the first Computer Clubhouse in 1993, we had a very local vision of collaboration and peers. We thought mostly about young people working together, side by side, within the Clubhouse. For the first few years, the Clubhouse didn't have Internet connectivity, so

collaboration at a distance would have been difficult. But as more and more Clubhouses opened around the world and connectivity became commonplace, new opportunities for collaboration emerged. Today, there are 100 Clubhouses in 20 countries, connected with one another through an online network called the Clubhouse Village, so it's now possible for Clubhouse members to share ideas and collaborate on projects with their peers around the world. Indeed, when I visited the Clubhouse in Amman, Jordan, I met a teenage girl who was remixing an anime image that had been created by a Clubhouse member in Chicago.

Our ideas about peers, collaboration, and community today are very different than they were in 1993. Of the four P's of creative learning, peers has probably been the most profoundly affected by new technologies. As we'll explore in the next section, new technologies have dramatically transformed how, when, and where people collaborate—and the roles that peers can play in the learning process.

Learning Communities

In one of the final chapters of his book *Mindstorms*, Seymour Papert writes about the importance of the social side of learning. He points to Brazilian samba schools as an inspirational model. Samba schools aren't really schools; they're more like social clubs or community centers, where Brazilians come together to create music and dance routines for the annual carnival festival. What struck Seymour was the way that samba schools bring together people of all different ages and all different levels of experience. Children and adults, novices and experts, all work together to create songs and dances that grow out of the traditions and culture of the local community. As people compose, choreograph, practice, and perform at the samba schools, they are constantly learning with and from one another.

Seymour's stories of the Brazilian samba schools have had a big influence on the projects I've worked on over the years. As we set up Computer Clubhouses around the world, we tried to design them in the spirit of samba schools, creating spaces where young people could work together and learn together. As we've developed Scratch, we've tackled a new challenge: How can we bring the ideas and spirit of samba schools to the online world? Or, put another way, how can we take advantage of the new possibilities of the online world while remaining aligned with the core values of successful, physical-world learning environments like samba schools?

Many people think of Scratch as a programming language—and, of course, it is. But those of us working on Scratch see it as much more than that. From the very beginning, our goal was to create a new type of online learning community where young people can create with one another, share with one another, and learn with one another, in the spirit of a samba school. Our top priority was to provide creative learning experiences for young people around the world—and, at the same time, to help teachers, parents, designers, researchers, and others see how online technologies and online communities can support creative learning.

We designed the Scratch programming language and online community as a tightly integrated package, with each supporting the other. After using the programming language to create an interactive game or animation, a Scratcher simply can click the *Share* button to add their project to the online community. Once a project is shared, it's available for anyone in the

world to try. In the first 10 years of Scratch, young people shared more than 20 million projects in the online community.

The Scratch online community serves as a source of both inspiration and feedback. By trying out other people's projects, Scratchers learn new coding techniques and get new ideas for their own projects. One 10-year-old Scratcher wanted to make a game with a bouncing ball, but couldn't figure out how to make the ball bounce. "So I looked on the website and found a project with a bouncing ball," she said. "From another project, I learned how to add friction."

When Scratchers share their own projects on the site, they get suggestions and advice from other community members. "With Scratch, I can make projects that I'm excited about, then share the projects with a community of people who share my excitement," explained one Scratcher. "This had been a problem before. I had been trying to program some things, but I couldn't really go anywhere with it. Now I can share my projects and get feedback. That has really driven me to continue."

Within the Scratch community, young people are constantly inventing and exploring new ways to collaborate. Compared with collaborations in traditional school classrooms, Scratch collaborations tend to be more fluid and organic, with people coming together based on shared interests or complementary expertise, much as in a samba school. But unlike a samba school, Scratch brings together people from all over the world, opening possibilities for collaborations that are larger and more diverse.

Here are a few of the ways that young people have been collaborating with one another in the Scratch community.

Complementary Pairs

A teenager with the Scratch username nikkiperson2 loved to create and share animations in Scratch. One day, while browsing the Scratch website, nikkiperson2 was attracted by a series of projects that focused on a character named Heroine Lisa, created by Scratcher kris0707. nikkiperson2 noticed that the Heroine Lisa projects contained only static images, not animations, so she left a comment on one of the projects, offering to collaborate: "Can I try to make moving sprites of your characters? We could work together to make this animated if you want. But only if you want to. Thanks. (I like these drawings you do.)" kris0707 responded positively to the suggestion, and the two girls collaborated for more than a year on a series of 10 episodes of Heroine Lisa. Through the collaboration, kris0707 learned more about programming with Scratch, and nikkiperson2 learned more about aesthetic expression with Scratch.

Extended Teams

Thirteen-year-old Sarah and her ten-year-old brother Mark both love Halloween, so they decided to collaborate on a Scratch project for Halloween. They posted a message about their project on the Scratch forums, and other Scratchers volunteered to help. They decided to create an interactive project in which players navigate a spooky old mansion. Some Scratchers worked on the plot, others on the programming, others on the music, and others on the artwork. In all, more than 20 Scratchers contributed. The final product, called "Night at Dreary Castle," included 59 characters and 393 programming scripts. "One thing I've learned is how to help keep a group

of people motivated and working together,” said Sarah. “I like Scratch better than blogs or social networking sites like Facebook because we’re creating interesting games and projects that are fun to play, watch, and download. I don’t like to just talk to other people online, I like to talk about something creative and new.”

Subcommunities

The Scratch website includes “studios” that contain collections of projects. Nancy, a middle-school student, decided to create a studio dedicated to anime and manga, her favorite forms of art and animation. She hoped to not only gather inspiring examples of anime projects, but also create a space where anime lovers could meet one another, share ideas, and learn from one another. Before long, hundreds of Scratchers were submitting anime projects for the studio and posting comments in its forum. Many of the projects were tutorials, showing how to draw eyes, bodies, and hair in an anime style and how to animate anime characters. As one contributor wrote: “There are a whole bunch of people on Scratch with AMAZING anime potential, and they just need a little guidance or tips!” Nancy organized three dozen Scratchers to help curate the studio. Within a few months, the studio had more than 250 projects, 1,600 comments, and 1,500 followers.

Feedback Studio

Isabella, a 14-year-old, loved getting comments and suggestions on her Scratch projects. She noticed that some projects on the Scratch website weren’t getting any comments, and she worried that people might get frustrated and leave the community. Isabella decided to start a Feedback Studio: The idea was to connect Scratchers who wanted to receive feedback on their projects with other Scratchers who enjoyed giving feedback. “People can comment on the projects and share what they liked or ways that they can improve,” explained Isabella. “It makes me happy that people are taking advantage of having such an amazing online community.” Within days, more than 60 people signed up to curate the studio and give feedback on projects.

Consulting Services

One of MyRedNeptune’s first Scratch projects was an interactive Christmas card, featuring a collection of animated reindeer playing musical instruments. MyRedNeptune discovered that she especially enjoyed making animated characters (called *sprites* in Scratch), so she created a Scratch project with nothing but sprites. In the project notes, she encouraged other Scratchers to make use of the sprites in their own projects—or to submit requests for other sprites. One Scratcher requested an animation of a cheetah, so MyRedNeptune created a cheetah animation based on a National Geographic video that she found online. For another Scratcher, named Carl, MyRedNeptune created an animated bird with flapping wings. Carl appreciated the sprite, but followed up by asking MyRedNeptune how she had made it, because he wanted to start making animated sprites on his own. In response, MyRedNeptune posted a Scratch project detailing the process that she used to create the bird animation.

Our MIT team explicitly designed the Scratch website to encourage collaboration, so we expected young people to interact and work together on Scratch. Still, we’ve been continually surprised (and delighted) by the level and variety of collaboration on the Scratch site. Or, at

least, I personally have been surprised. Having grown up in the pre-Internet era, I find that I'm not nearly as creative in developing (or anticipating) new forms of collaboration as my MIT students—or the kids in Scratch community. I expect that future generations of kids could become even more creative in the ways they share and collaborate, if we provide them with the right tools, support, and opportunities to do so.

Teaching

In 1997, the Computer Clubhouse won the Peter F. Drucker Award for Nonprofit Innovation. As part of the award, the Drucker Institute produced a video featuring interviews with Clubhouse members. Francisco, one of the earliest Clubhouse members, discussed how much he had learned from his interactions with Lorraine Magrath, a Clubhouse mentor. “Working with mentors is very exciting. They’re fun, and they’re funny too,” said Francisco. “They’re not like teachers. Teachers just tell you: Do this, do that. With a mentor, you feel more friendly, more relaxed to talk to.” Francisco went on to describe how Lorraine had provided guidance and advice as he created projects with software packages like Photoshop and Premiere.

Every time I watch the video, I smile when Francisco describes the important role that Lorraine played in his learning experiences at the Computer Clubhouse. It's exactly what we had hoped for when we started the first Clubhouse. From the beginning, we saw mentoring as a core component of the Clubhouse approach. On the other hand, I cringe every time I hear Francisco say “Teachers just tell you: Do this, do that.” It makes me sad to consider what Francisco's interactions with teachers must have been like, to lead him to think about teachers in this way.

Unfortunately, Francisco's views on teachers and teaching are shared by many others. As students go through school, they often experience teaching as the delivery of instruction (“Do this, do that”) and the delivery of information (“Here's what you need to know”). As evidenced by Francisco's remarks, this approach to teaching can be de-motivating for many learners. What's more, this approach steers learners away from the types of creative experimentation that is so important in today's world, leading them to imitate rather than innovate. Psychologist Alison Gopnik discussed this problem in an op-ed article in the New York Times in 2016. “When children think they are being taught, they are much more likely to simply reproduce what the adult does, instead of creating something new,” Gopnik wrote. “The children seem to work out, quite rationally, that if a teacher shows them one particular way to do something, that must be the right technique, and there's no point in trying something new.”

Clearly, there are big problems with the traditional teaching strategy of delivering instruction and information. So what's the alternative? Some people go to the opposite extreme, arguing that children are naturally curious and can figure everything out on their own. They often refer to Jean Piaget's famous quote: “When you teach a child something, you take away forever his chance of discovering it for himself.” Some people interpret this to mean that the best way to help children learn is simply to stay out of their way.

Too often, teaching strategies are viewed as a dichotomy. *Option 1*: Deliver instruction and information. *Option 2*: Leave children alone and let them learn. When new mentors start working

at Computer Clubhouses, we often see examples of these two extremes. Some new mentors try to act like traditional classroom teachers, delivering instruction to Clubhouse members. Others stand back and get involved only if Clubhouse members specifically ask for help.

Indeed, one of the biggest challenges in setting up a new Computer Clubhouse is helping the staff and mentors develop a more nuanced understanding of the teaching process, steering them away from the two extremes. As I see it, good teaching involves playing a variety of different roles, all in the service of helping others learn. Good teachers and good mentors move fluidly among the roles of catalyst, consultant, connector, and collaborator:

- **Catalyst.** In chemistry, catalysts provide the “spark” that accelerates a chemical reaction. Similarly, teachers and mentors can provide the spark that accelerates the learning process. When learners get stuck in the early stages of a project, a teacher might show sample projects to spark their imaginations and provide a sense of what’s possible. Often, the best way for a teacher to provide a spark is to ask questions. At Clubhouses, we encourage mentors to ask questions, such as “How did you come up with that idea?”, “Why do you think that happened?”, “If you could change one part of your project, what would you change?”, or “What was most surprising to you?” By asking the right types of questions, a teacher or mentor can catalyze exploration and reflection, but the learner remains that active agent, in charge of the activity.

- **Consultant.** There’s an old saying that a teacher should be a “guide on the side,” not a “sage on the stage.” Clubhouse mentors can serve as guides or consultants in several different ways. Some mentors might be viewed as technical consultants, offering tips and advice on the use of new technologies. Other mentors serve as creative consultants, helping Clubhouse members iteratively develop and refine their ideas into projects. Sometimes, mentors provide emotional support, helping members to overcome their doubts and cope with their frustrations. In all cases, the goal is not to “deliver instruction” or “provide answers,” but to understand what Clubhouse members are trying to do and figure out the best way to support them.

- **Connector.** Teachers and mentors can’t single-handedly provide learners with all the support they need. So an important part of their job is to connect learners with other people who they might work with, learn with, and learn from. As a mentor and later coordinator at the flagship Computer Clubhouse in Boston, Jackie Gonzalez was constantly looking to connect Clubhouse members with one another. “A good day for me is just getting young people to help other young people,” she said. “If I see a teen who needs help with Photoshop for a project they’re working on, I’ll look for another Clubhouse member who can help. My goal is to create a community of shared learning.”

- **Collaborator.** Clubhouse mentors don’t simply provide support and advice to Clubhouse youth. We encourage mentors to work on their own projects and invite youth to join in. For example, two graduate students from a Boston-area university decided to start a new robotics project at a local Computer Clubhouse. 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, a small team of people was 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 and at different times.

At Computer Clubhouses, we're always trying to blur the boundaries between teaching and learning. As teenagers spend more time at a Clubhouse and become more embedded in the Clubhouse culture, we encourage them to take on mentoring responsibilities: sharing their experience and expertise with other members, and introducing newcomers to the ideas, activities, and technologies of the Clubhouse. Our hope is that, over time, Clubhouse members will learn to serve as catalysts, consultants, connectors, and collaborators within the community, helping others learn while also continuing their own learning.

At the same time, we encourage adult mentors to see themselves as lifelong learners—not just for their own sake, but as a model for youth. One of our top priorities at the Clubhouse is to help youth develop as great learners. By observing adult mentors in the process of learning, youth can learn strategies that they can apply to their own learning. Too often, adults try to hide what they don't know. At Clubhouses, we try to create an environment where mentors feel comfortable acknowledging what they don't know, and talking openly about their strategies for learning new things. Just as aspiring carpenters learn through apprenticeship with master carpenters, we want Clubhouse youth to have the opportunity to observe and work with master learners.

Of course, the framework of catalysts, consultants, connectors, and collaborators isn't specific to Computer Clubhouses. The same strategies can be applied in all learning environments, from school classrooms to online communities. Some people expect that new technologies will reduce the need for teachers, as learners gain access to computerized tutors that can provide advice whenever it's needed. I expect the opposite: New technologies will greatly expand the number of teachers—if we think about teaching in the right way. In an online community like Scratch, everyone can become a teacher, serving as a catalyst, consultant, connector, and collaborator for others in the community.