Beyond Access: A Comparison of Community Technology Initiatives

Robbin Chapman, Leo Burd
MIT Media Laboratory
rnc@media.mit.edu, leob@media.mit.edu

Abstract

In response to increasing concerns about the "digital divide" – the gap between those who benefit from digital technologies and those who do not – a growing number of community technology initiatives (CTIs) have emerged over the past decade, realizing the potential of digital technologies to underserved community members. Although CTIs share many common goals and procedures, there are also important differences. This paper presents a discussion of the relationship between technology and learning within the Computer Clubhouse Network and CDISP, raising important issues regarding construction or improvement of effective community technology initiatives. How will people from underserved communities become involved in developing themselves and growing a CTI culture that best serves their interests? What digital tools and policies need to be developed? Our discussion of two CTIs will provide a context for a deeper examination of these and other issues critical to the development of a more meaningful CTI learning model. We also believe detailed studies of similar initiatives would contribute to enhancement of the CTI model, as a whole.

Keywords

Community technology center, community technology initiative, collaborative learning, constructionism, digital divide, community building, telecenter.

Introduction

In response to increasing concerns about the "digital divide" – the gap between those who benefit from digital technologies and those who don't – a growing number of community technology initiatives (CTIs) have emerged to realize the potential of digital technologies to underserved community members. Generally, CTIs view access to computers – and, if conditions permit, to the Internet – as a means to educational, social, and other opportunities for its members (Papert, 1980; Resnick, 1996; Turkle, 1984). However, access alone is not enough. The

challenge is to ensure the CTI provides access to technology and structures to support creative and constructive learning opportunities for its members and their communities. A carefully configured CTI is fertile ground for seeding and cultivating individual and community development.

Although CTIs share many common goals and procedures, there are also important differences. Some focus on technical issues, others offer access to governmental, health or community-relevant information. Some focus on professional skill development, others on creative expression. Some offer classroom-style courses, others provide less structured learning environments. Some focus only on youth, others serve all members of the community. In this paper, we describe the experience of two CTIs, the Computer Clubhouse (http://www.computerclubhouse.org/) and Committee for Democratization of Information Technologies Sao Paulo (http://www.cdisp.org.br/). In particular, we describe how they support rich learning experiences for their members through relevant activities and projects. At the end, we raise issues to be considered in the construction or improvement of effective community technology initiatives.

Background

The Computer Clubhouse (Resnick, Rusk, Cooke 1998) is a network of after-school CTIs where underserved youth come to explore their own interests, become confident learners, developing technological fluency in the process (Resnick, 1996). Modeled on the constructionist theory of learning (Papert, 1980), members learn by working on projects of their own interests in an environment that fosters exploration, creativity and interaction. In Computer Clubhouse sites, there are typically eighteen high-end computer workstations and several dedicated computers for music and movie constructions. Members can come whenever they want and can stay there for as long as they wish. There they have access to computers, graphical and multimedia development tools, Internet, digital cameras, robot construction kits, and a sound studio. Adult mentors motivate members to develop their own projects – like a song, a Web site or an animation – help members get started with the different tools, and introduce them to other members who may have developed similar projects. Eventually, members start moving by themselves and, in addition to pursuing their projects, begin to provide support and encouragement to the rest of their Clubhouse community.

A Clubhouse member, whom we'll call Jay, is an African-American high-school student, three-year Clubhouse veteran and has become the resident expert in advanced 3D modeling and animation software used by professional architects and animators. He is also the designer of the new Computer Clubhouse logo. When asked how he has benefited from membership at the Clubhouse, Jay responds, "I definitely want to go to college, a regular college where I can focus on computers and get other essentials. If I hadn't come to the Clubhouse, I'd be bored. I'd be staying at home, watching TV. That would be my whole day."

Members like Jay become resident experts, in his case designing projects utilizing 3D modeling software, providing a knowledge source to other community members who need support using these design tools. This highlights a special feature of Clubhouse culture. Within the Clubhouse, there is fluidity between the roles of mentor and learner. In fact, role switching is a commonplace occurrence, fueling the learning experience through a cycle of learning by doing and learning by reflection. Learning by doing is embodied in the design process. Learning by reflection occurs via a process of teaching others a newly acquired skill and discussion of their project and its development (Lave, 1991). These dynamics are difficult to negotiate in formal educational settings. At the Computer Clubhouse, learners enter a culture that empowers them to control what they learn and how deeply they delve into any particular subject, leading to learning opportunities situated in their experiences inside and outside the Clubhouse community. The result is a Clubhouse full of bright, eager learners expressing themselves and disseminating their unique viewpoints through meaningful use of digital technologies.

The Committee for Democratization of Information Technologies Sao Paulo (CDISP) is a Brazilian not-for-profit, non-governmental organization that partners with community centers in the construction of "Schools of Information Technology and Citizenship" (EICs). At these centers, members from underserved communities attend computer classes and use technology for their personal and community development. CDISP schools have at least five mid-range computers loaded with utility tools such as text processors, spreadsheets, Web browsers and email programs, and at least one black and white printer. CDISP schools have this configuration because they rely heavily on local used-equipment donations. Teachers are either volunteers or active community members who have been trained and hired to work at the school. In addition to taking classes and having access to computers, community members are expected to manage and maintain their own school, and participate in larger inter-community workshops and campaigns.

CDISP believes that participation in the very organization of the CTI provides people with a rich opportunity to develop their citizenship. In fact, CDISP relies heavily on volunteer work and community engagement to obtain computer donations, promote the exchange of experiences among communities, and improve the work that is already being done. In the end, CDISP functions as a catalyst of individual community strengths. Each school is a living proof of what underserved communities can achieve by working in collaboration with one another. As an example activity, at least once a month CDISP hosts a "barn-raising" party in which expert technicians and novices from all social levels get together to fix the machines that are going to be used in the new schools (Kobashi, 2001). For some, those parties represent the first opportunity to see and touch what is inside the machine. For the more experienced ones, the parties help provide a better understanding of how people perceive computers.

As a result, the parties become an important social event where everyone learn about each other and contribute toward a greater social goal.

Socio-cultural issues

Both CC and CDISP see learning, technology, active participation and collaboration as empowering tools for underserved communities. These organizations create environments where people not only have access to technology, but also learn and practice a variety of attitudes and skills that are important to their personal and social life. At the Clubhouse members create personally meaningful projects, share ideas, and support each other. Collaborations are enhanced by, among other things, the layout of the space. Most Clubhouses have a large, oval table, devoid of computers where members sit together and plan their projects. Clubhouse walls provide a venue for showcasing member projects and inspiring new projects and collaborations. CDISP schools offer courses in which people learn basic computer skills by developing community-related projects -- such as newsletters, homepages and price comparisons -- addressing locally relevant issues that range from violence to teen pregnancy, drug abuse, and professional skills development. However, it should be noticed that the two models are not mutually exclusive. Now and then, Computer Clubhouse sites organize structured workshops where members (or mentors) learn about specific tools of interest. Similarly, CDISP schools offer non-structured time slots where community members can use computers to do their assignments and develop their personal, open-ended projects.

Although the two CTIs may differ on the structure of their educational activities, they share the same emphasis on the socio-cultural development of their members. For instance, the direct exchange of experiences among people from different ages, backgrounds, and social levels is of central importance to both CTIs. In the CC approach, adult mentors introduce members to innovative ways of engaging technology and serve as role models for identity development. Mentors provide members the opportunity to see adults learning and developing projects. In the CDISP model, volunteers from inside and outside underserved communities tend to get together around themes of common interest and organize activities for the benefit of other members of the CTI. The hardware 'barn-raising' parties are one instance of that. Other examples include a Linux study group, an educational team, and a fund-raising initiative. In each group, professional volunteers merge their experience with the local knowledge provided by the other members of the team.

In addition to the education activities and the social relationships that members engage in, the kinds of relationships that members are able to experiment in relation to the environment itself are a central component of CTIs. In a way, the very organization of CTIs can be used to foster specific relationships with its members and therefore operate as a micro world where members can learn and

reflect about their place in the larger society. In our opinion, when talking about members from underserved communities, it is particularly important to let them experiment the challenges of managing a community organization (including their involvement in group decision making, priorities identification, etc.) and providing them with genuine opportunities to express their word and assume responsibilities. For instance, in CDISP, the participation of community members in the organization's decision-making process is seen as an important catalyst for the member's perception of citizenship and self-esteem. Once a year, community representatives are expected to get together to discuss the overall strategic planning of the organization. At the local level, schools are supposed to be self-sustained and self-managed. CDISP tries to provide them with all the support they need in order to achieve that.

In the Computer Clubhouse, members can participate in the Clubhouse Council and discuss issues related to the local Clubhouse organization. On a more individual level, Clubhouse mentor-mentee relationships seem to contribute to a "sense of self" and a "sense of being part of something larger" that the underserved seldom have the opportunity to experience. On mentoring relationships, both sides are seen as equal. Members are respected and are expected to respect. Neither mentor nor mentee is forced to be there. The only thing that keeps them connected is the willingness to learn and build things together. Sometimes it is a mentor teaching a member how to use a new tool, and sometimes it is a member teaching a mentor how to do something else.

In our society, especially with the underserved, it is rare to have occasions when people of different ages, backgrounds or levels of expertise can work together for long periods of time out of shared interests and can see how each other learn and solve problems in different ways. How often does this happen in traditional schools, or even within families that share the same house?

Considerations of CTI Technologies

By facilitating certain practices and providing access to certain perspectives in detriment of others, together with other socio-cultural and developmental elements, technologies may affect our interactions with the world and influence our understanding of reality. Different tools can shed new perspectives of the self, enable new kinds of relationships, facilitate the development of certain activities, and allow new perceptions of the context (Turkle, 1984; Kaptelinin, 1996; Burd, 1999; Bers, 2001). For this reason, the repertoire of tools available play an important role in determining which direction a CTI will evolve.

In some cases, the terminology and the concepts used by the tools are foreign to the culture and the interests of the community served by the CTI. Even though the use of icons and the direct manipulation interface has facilitated computer access to many people, in our opinion they are still too much business-oriented and text-dependent. For instance, if a person mistypes the name of a file –

something that is common, especially if your level of literacy is low – it becomes very hard for her to find where specific notes or recipes have been stored. A common complaint at CDISP is that, rather than providing a metaphor that would be more concrete and relevant to community members, existing tools require instructors to spend a great deal of time trying to help people understand what generic files, folders and documents are. Using perhaps "boxes" rather than folders, or specific objects such as "price comparison table", "member's directory", "announcements", or "projects" instead of files, the activities of the CTI could be more focused on community issues. In addition to that, people wouldn't feel that technology only benefits those who belong to the office world.

The kind of functionality provided by the technology is another element that affects the CTI. For instance, most of the projects that members develop at the Clubhouse do not involve much writing. Although one could say that writing is difficult, or that writing is not as socially attractive as making multimedia animations, it is important to note that the great majority of tools available at the Clubhouse do not emphasized the power of expressing ideas in words. On CDISP schools, the situation is the opposite. Although most classes focus on popular text processors and presentation managers, the computers are not powerful enough and the tools used do not allow for an easy integration of other media. There is no meaningful connection between what predominant tools promote and the development of literacy skills required for people to live well in our society (Committee on Information Technology Literacy, 1999). Perhaps, if the two CTIs had more tools to facilitate the creation of stories, newspapers or poems, combining text and other media in different ways, the situation would be different. In addition to having a balanced access to different media, it is important for CTI members to be able to use computer tools in conjunction with other, non-digital materials. In order to benefit from technology, community members have to identify technology as something to be integrated into their lives. Not as something, that is "better" or that precludes the use of things that they already have, but as a means of leveraging what works for their communities. Unfortunately, this hardly happens at CC and CDISP. Often, tools that are available, such as LEGO's Mindstorms Robotics Kits (http://www.legomindstorms.com), are underutilized, primarily, due to the scarcity of mentors with tool-specific experience. This results in the tools being excluded by members from their projects. More importantly, members don't readily see the relevance of using these tools to their everyday lives, especially those tools not seen as promoting their computer skills. In our opinion, it would be great if kids could build, for instance, a physical steering wheel to drive software models of their cars, a sensor monitoring the amount of light outside their windows at night, or a musical instrument. The challenge is to develop low-threshold, contextual activities that kids can envision as relevant to their own projects.

Finally, it is worth mentioning that, in both CTIs, the majority of software being used was pre-built. Members did not have the feeling of constructing their own tools. At the Computer Clubhouse, members do not play computer games unless

they have designed the games themselves. Even so, there needs to be a stronger sense of this "building your own tools" dynamic throughout other activities in the Clubhouse. Again, mentor expertise and support is critical in introducing these ideas and practices into the Clubhouse culture. In a society where access and manipulation of personally relevant information is increasingly important, and in which computers are associated with personal status, the ability to mold digital technology to fit ones needs or desires is very empowering. However, currently there are not many examples of people developing programs for their own benefit, nor are there many easy-to-use programming environments that facilitate this idea. Professional programming languages are usually too technical and complex too use. Other languages, like Logo, Agentsheets (http://www.agentsheets.com/) or Squeak (http://www.squeakland.org/), try to give non-technical users access to the potential of modern computers without the hassle of more professional programming languages. However, they still do not seem to be easy enough to learn or directly applicable to social development or other specific goals that a CTI may have.

The Power of Human Connections

Both the Computer Clubhouse and CDISP believe that, especially for social development, everything comes down to people and their connections. People are inspired by other people, people learn by explaining and interacting with others with different perspectives and backgrounds, and communities leverage each other by working together.

However, it is interesting to note that, in most cases, neither organization applies technology directly to support collaboration. Up to now, technology is used mainly as a medium of personal expression. For historic or economic reasons, member collaboration happens locally, with little digital mediation. Any available collaborative technologies, such as mailing lists, are used primarily by managers. However, to expand and enhance their respective models, the two CTIs are widening their focus to include digital tools to promote member collaborations. This is where the existing applications fall short. For instance, Clubhouse tools don't support collaborative development of multi-media projects. Members need an easier ways to find collaborators, join projects, and exchange media. Likewise, Internet technologies are not an affordable solution for CDISP communities. Such technologies are seen as critical for CDISP schools to exchange of experiences among themselves and participate in strategic-planning process. Moreover, face-to-face interactions and member sense-of-connectedness to their community is still a critical element of the CTIs' perceived effectiveness. Neither organization wants to lose this at the expense of expansion.

Both CC and CDISP are in the process of creating their own intranet solutions. CDISP is currently raising funds for bringing phone lines to its communities and for implementing a system that will facilitate the access to governmental and

health information, as well as the exchange of information inter and intra communities. The Computer Clubhouse is currently developing an online Computer Clubhouse community, called the Clubhouse Village, where Clubhouse members worldwide can meet and interact electronically, establishing an international community. On the Village, members will be able to exchange information and communicate through e-mail and discussion lists, collaborate on design activities, exhibit their projects, and share how-to design information with one another.

Distributed and connected CTIs garner opportunities for members to share their differing experiences and may help CTIs think about doing things in different ways. Of course, to optimize the benefits of being connected, the development of more tools targeted specifically to the needs of CTIs is needed. An example is a project currently under development for the CC Village, called Pearls of Wisdom (POW). The POW project will leverage technology by providing a digital tool to support Clubhouse members in having richer project designs experiences. The goal is to develop a network-wide community that values the contributions of the expertise of individuals and facilitating the asynchronous sharing of this communal knowledge. Content for this knowledge repository is contributed by members of the community. POW supports discussion of individual Pearls by the community, resulting in the design-reflection cycle so important to rich learning experiences. This tool, specifically targeted to supporting and enriching communities, is but one of many tools desperately needed to support CTIs and their members.

Conclusion

CC and CDISP each address the digital divide issue but with different emphasis. This is reflected in the way they organize the environment provided to community members and the way the community members interact with their environment. Even with their differences, like number of computers; kinds of applications are used; emphasis on classes vs. open-ended activities; the presence of mentors; level of integration with the surrounding community, both CTIs face similar challenges of leveraging technology for the enrichment of their communities. After all, there is more to be gained at these CTIs than merely computer skills. They each serve as learning micro world for the larger society. People from underserved communities need a space to develop their ideas. Their CTI should help them develop not only technical skills, but also attitudes and values that are important to them. With activities centered on issues important to members and their communities and promoting the importance of human contact, the CTI movement will see members assuming responsibility for their learning and the evolution of their CTI.

References

Bers, Marina U. (2001). Identity Construction Environments: Developing personal and moral values through the design of a virtual city. Journal of the Learning Sciences, vol. 10, no. 9

Burd, Leo (1999). Desenvolvimento de software para atividades educacionais [Development of software for educational activities]. Unpublished M. Sc. thesis. UNICAMP, Brazil.

Committee on Information Technology Literacy (1999). Being fluent with information technology. National Academy Press, Washington, D.C. (available at http://www.nap.edu/books/030906399X/html/)

Kaptelinin, Victor (1996). Computer-mediated activity: functional organs in social and developmental contexts. In: Nardi, Bonnie A. (ed). Context and consciousness: activity theory and human-computer interaction. Chapter 3, pgs.45-68. MIT Press.

 Kobashi, R. Y. (2001). Information technology 'for and by' low-income communities in Sao Paulo. Proceedings of "Development by Design, 2001" (Cambridge, MA, June 2001). To be published.

Lave, J., and Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge University Press. Cambridge, UK.

Papert, Seymour (1980). *Mindstorms: children, computers and powerful ideas*. BasicBooks.

Resnick, M. (1996). Towards a Practice of "Constructional Design." In *Innovations in learning: New environments for education,* edited by L. Shauble and R. Glaser. Lawrence Erlbaum. Hillsdale, NJ.

Resnick, M., Rusk, N., and Cooke, S. (1998). The Computer Clubhouse: Technological Fluency in the Inner City. In Schon, D., Sanyal, B., and Mitchell, W. (eds.), *High Technology and Low-Income Communities*, pp. 266-286. MIT Press.

Turkle, S. (1984). *The Second Self* . Simon and Schuster.