



# From Samba Schools to Computer Clubhouses: Cultural Institutions as Learning Environments

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## Background

In this book we have considered how mathematics might be learned in settings that resemble the Brazilian samba school, in settings that are real, socially cohesive, and where experts and novices are all learning. The samba school, although not 'exportable' to an alien culture, represents a set of attributes a learning environment should and could have. (Seymour Papert, *Mindstorms*, 1980)<sup>1</sup>

**L**earning rarely takes place in isolation. The learner is typically situated in a community of practice.<sup>2</sup> In some cases, like traditional schools, promoting learning is the community's reason for being. In others, like the Vai and Gola tailors of West Africa studied by Lave and Wenger, the community's purpose may be something else entirely (like making clothes).<sup>3</sup> Nevertheless, learning is a lifelong, ongoing practice for tailors as much as students. Furthermore, in all varieties of learning communities, social practices and cultural factors play a central role in what learning does or does not take place.

Formal learning communities can often become set in their ways over time.<sup>4</sup> We might hope for continual improvement of a learning environment through iterative design based on an examination of learning outcomes. However in fact, a host of institutional, governmental, and social issues conspire to resist change. One avenue to pedagogical change is change in the communities of practice that support learning. In his book *Mindstorms*, Seymour Papert imagines that learning about and through technology might take place in environments rather like the samba schools of Brazil:

At the core of the famous carnival in Rio de Janeiro is a twelve-hour-long procession of song, dance, and street theater. One troop of players after another presents its piece. Usually the piece is a dramatization through music and dance of a historical event or folk tale. The lyrics, the choreography, the costumes are new and

original. The level of technical achievement is professional, the effect breathtaking. ...

The processions are not spontaneous. Preparing them as well as performing in them are important parts of Brazilian life. Each group prepares separately – and competitively – in its own learning environment, which is called a samba school. These are not schools as we know them; they are social clubs with memberships that may range from a few hundreds to many thousands. Each club owns a building, a place for dancing and getting together. Members of a samba school go there most weekend evenings to dance, to drink, to meet their friends.

During the year each samba school chooses its theme for the next carnival, the stars are selected, the lyrics are written and re-written, the dance is choreographed and practiced. Members of the school range in age from children to grandparents and in ability from novice to professional. But they dance together and as they dance everyone is learning and teaching as well as dancing. Even the stars are there to learn their difficult parts. (p. 178)

This of course is an idealised portrait – but an inspiring one nonetheless. Papert goes on to suggest that we might create a ‘computational samba school’ – a place where people come to learn through and about technology in a self-motivated, community-supported fashion. In this report, we explore this idea in greater depth. First, we review the published literature on real samba schools, with an eye towards highlighting features of educational relevance. Second, we compare the noted features of samba schools to an existing network of after-school computer drop-in centres we have been studying since May 2001, the Intel Computer Clubhouse Network. Similarities and differences between real samba schools and computer clubhouses suggest ways in which learning in computer clubhouses and other comparable learning environments might be enhanced.

**Method** In the first part of this report, we present an informal, secondary-source review of the literature on samba schools, *Samba, Carnival*,<sup>5</sup> and their relationship to Brazilian society and culture in general. Our main sources of information are:

- *Samba* by Alma Guillermoprieto, a Mexican-born author who lived for about a year in Mangueira, Rio de Janeiro. Her book describes, in ethnographic style, her experience of living and participating in one of Brazil’s most traditional samba schools.<sup>6</sup>
- *O Palacio do Samba*, by Maria Julia Goldwasser, is an anthropological study of the same samba school that Guillermoprieto participated in. The author provides valuable insight of the ideology behind this particular school as well as its internal organisation.<sup>7</sup>
- *The Mystery of Samba*, by Hermano Vianna, explores the history of Samba music and how it came to be recognised as an integral part of Brazilian identity.<sup>8</sup>

We also reviewed numerous articles published in English and Portuguese. This interpretive review is neither objective nor comprehensive. Samba schools are complex social institutions that vary in each instantiation and change over time. We aim not to establish generalities, but to highlight particularities. What happens in one particular place and time may shed light on cultural situations both similar and dissimilar. We consciously undertook this review with the goal of probing further into Papert's idea of a technological samba school. Other lenses would lead to quite different conclusions. In our explorations of samba schools we found many rich suggestions for the design of cultural institutions to support learning; however, it is important to note that these are merely suggestions.

In the second part of this paper, we take highlighted features of samba schools as learning environments and use them to try to better understand an institution with many similarities to Papert's idea of a technological samba school – after-school drop-in computer centres of the Intel Computer Clubhouse Network. In this section, our method is more traditionally ethnographic. More than eight members of the Electronic Learning Communities (ELC) research group at Georgia Tech have engaged in hundreds of hours of participant-observation ethnography at computer clubhouses. Detailed field notes document each visit. This fieldwork was conducted from May 2001 through December 2003. Similarities and differences between samba schools and computer clubhouses are revealing.

We note that our work should not be construed as a comparative ethnography. Our review of samba schools is based on secondary sources and aims to highlight particular characteristics we feel are important. Samba schools are unique to Brazil and the context under which they came to be created and now exist are not replicable. Our aim is not to replicate samba schools. However, by learning from them and understanding the context in which they reside, we can hope to better understand some of the underlying factors that contribute to their success. These factors could be more broadly applicable to learning environments such as the Intel Computer Clubhouse.

**Samba schools** A samba school, or *Escola de Samba*, is not really a school in the traditional sense of the word. It is a social club whose activities are centred on samba music and *Carnaval*. *Carnaval* is a week of dancing and partying whose origins lie in pre-Lenten festivities (in Christian tradition, Lent is a period of purification, penance and fasting in preparation for the celebration of the crucifixion and resurrection of Christ). Its members engage in the practice of samba with the purpose of preparing a parade for *Carnaval*. The parade includes, among other things, heavy drumming, samba dancing, original music, lavish costumes and large, intricately decorated floats. All of these are tied to a central theme, which is represented in the lyrics of the *samba enredo*. The *enredo* is a theme song that is repeated constantly during the entire parade. *Escolas de Samba* are born, and principally sustained, from popular culture. Practically every *favela*, or hillside shanty town, in Rio de

Janeiro has its own samba school. The fact that these organisations are mainly run by people of lower socio-economic status is not at all an impediment to the realisation of the grandeur of *Carnaval*.

In terms of size and membership, samba schools can range from a few hundred members all the way up to many thousands. Rio de Janeiro's *Carnaval* parade is arguably the most important and largest in the world. In Rio, the week of festivities and celebrations also hosts a competition in which the 14 most important samba schools parade within a specially built stadium officially called the *Passarela do Samba*, or the Samba Parade Grounds. The *Sambodromo*, as it is popularly called, spans nearly 800 yards along the street and can hold nearly 100,000 people. It takes up to 90 minutes for each school to parade its 5,000 dancers, singers, musicians as well as tens of floats along its length.

**Samba schools  
as communities  
of practice**

Samba schools are communities of practice in which learning is supported by social interaction. Leontev Vygotsky developed the concept that learning, as a higher order mental process, has its origins in social processes.<sup>9</sup> In other words, learning is social. This view is supported by the work of Lave and Wenger. They present learning as increasing participation in a community of practice.<sup>10</sup> This view concerns the whole person acting within a social environment and extends Vygotsky's dyads and small groups to an entire community of people. It also implies that learning occurs in places and groups which we would not normally consider educational or school-like. Learning takes place continuously through the process of becoming a full participant in a socio-cultural practice. This means that there is little observable teaching, though undoubtedly a lot of learning. The practice of the community is what creates the potential 'curriculum' of what may be learned by newcomers.<sup>11</sup>

The practice of samba in samba schools also exhibits these characteristics. For example, Guillermprieto relates:

A teenage *mestre-sala* had been practicing on the sidelines and now Delegado turned to him, pulling him into the center and dancing alongside. The boy followed out of the corner of his eye while Delegado waved his glittery baton – scolding, urging, remonstrating. [...] The kid imitated more than passably, a little frightened and a little proud, aware that the rest of the dancers in the *quadra* had gradually come to a halt, closing into a breathless circle around the magical performance. The music stopped. The crowd burst into applause while Delegado hugged his pupil.<sup>12</sup>

The teenager is an apprentice *mestre-sala*, the master of ceremonies who dances at the front of the parade with the *porta bandeira*, or standard bearer. The *mestre-sala* is one of the best dancers in the school and must demonstrate the skill and quality of the *Escola's* samba. In the example described, Delegado is a 66-year-old master sambista who had been the school's principal *mestre-sala* for years. Not only does he pass on his knowledge and expertise to a younger generation, but there are also secrets to dance that he is just beginning to explore: 'Every year I come out with a new step' he said.<sup>13</sup> Delegado's relationship with the school is

one in which, despite being an expert sambista, he can still learn and experiment. At the same time, he is passing on his skills to a young student and a captive audience. His apprentice not only learns how to dance, but also how to learn and create new steps.

We also note that the existence of a community in the broad sense of the word does not imply that learning will take place. There is great importance in the particular details of the work practices in place, the processes used and even the physical layout of the work setting. For example, the butcher apprenticeship model studied by Marshall showed that apprentices rarely learned many of the full range of tasks proper to their trade. One of the many reasons is the fact that the novice butchers were not located in a space where they could observe the expert butchers.<sup>14</sup> The particular details of the environment are thus relevant in helping determine whether learning will or not take place.

We have chosen to study samba schools as a particular example of a community of practice in which learning takes place. We will explore three characteristics of this environment that we believe make samba schools successful as institutions and learning environments (see Table 1). No other learning environment can ever be just like a samba school in its unique cultural particularities; however, some of the underlying factors that contribute to the success of samba schools may be useful in other contexts.

Table 1: Characteristics of Successful Samba Schools

<b>Flexibility to outsiders</b>
<b>Existence of a public event</b>
<b>Diversity of membership (socio-economic, age, expertise, and race)</b>

### **Flexibility to outsiders**

When contrasting the fundamental differences between the LOGO learning environments he envisioned and samba schools, Papert stressed that the students of LOGO environments are a transitory population that seldom stay long enough to make LOGO's long-term goals their own.<sup>15</sup> Samba schools, being community-based, do maintain a relatively large, stable population of members. However, as organisations, they are open in many ways to the legitimate participation of outsiders. The existence of a transitory population is not an obstacle or weakness but is a characteristic that helps explain its success.

It is not difficult for an outsider, even a non-Brazilian foreigner, to participate in one of the subgroups of a samba school. These subgroups, called *Alas* and *Grupos* (wings and groups), are a basic unit of organisation of a samba school. Each subgroup presents different costumes, singing and dancing throughout the parade.<sup>16</sup> Participation in one of these subgroups can, in many cases, be as simple as signing up for a vacant slot and paying the price of the costume or *fantasia*.<sup>17</sup> These slots are usually assigned on a first-come, first-served basis and tend to fill up rather quickly.

This transitory population helps bring the experience of *Carnaval* to an

outside community. The possibility of a first-hand experience in the celebration helps breed acceptance, respect and valuation that permeates the rest of the Brazilian society.

In the case of designing learning environments, we note that it can be beneficial to design to accommodate transient populations. Our analysis of samba schools suggests that it is valuable for transient members to participate in what constitute the core values and experiences of the environment, as opposed to having a purely superficial encounter. The transient nature of these participants can help spread word of the value and importance of the learning environment. This is different from organising events or occasions in which the activities of the learning environment are staged and presented to outsiders, such as an 'open house'. In other words, it is beneficial to have mechanisms where outsiders may legitimately participate, perhaps occasionally, in the learning environment as a whole. Parading with an *Escola* is not the same as watching the parade from the stands. You are a part of samba when you parade, and that distinction is quite relevant.

Another example of a community with explicit mechanisms for outsider participation is described in *The Cathedral and the Bazaar* by Eric Raymond. Raymond explains his experience in a successful open-source software development project.<sup>18</sup> In most traditional software development situations, developers and users are separate communities. In the 'bazaar' model of development, users are frequently treated as co-developers through a distinct outsider role called the beta-tester. Beta-testers are people who use preliminary and unfinished versions of software. They generally detect and report errors and problems so that they may be fixed. Technically capable members can even send their own fixes which, if accepted, can be added to the release versions of the software being developed. This distinction is interesting because it is representative of a flexibility to outsiders that is consciously a part of the design of this community, and in the words of its creator, important to its success. Raymond describes his experience with beta-testers as one in which he grew his beta list by adding anyone who ever contacted him and by treating these outsiders as if they were his most valuable resource.

It is unfortunately quite rare for communities to maintain policies and structures that are welcoming to outsiders while simultaneously engaging them in activities that are of critical importance to the community. In most cases, outsiders participate as volunteers in charge of menial labours and tasks such as moving equipment, handing out flyers and cleaning up. This is in contrast to the case of samba schools where outsiders can form an integral part of the *Carnaval* parade. This openness to outsiders allows for the learning environment to both have a constant influx of new members as well as help spread the word of the positive experience that participation entails.

**Existence of a public event** Samba schools exist to samba, and the epitome of a public presentation of samba is the parade. This event is integral to the existence of samba schools. The visual grandeur of the floats and costumes may mislead one

into thinking that *Carnaval* is something that must merely be observed. The truth is that the event is more than a mere showcase of visual splendour; it requires the enchantment of good samba.<sup>19</sup> In order for a school to succeed it must *passar bem*, or flow well. This means that a samba school's parade must motivate the crowd not only to admire it, but also to start dancing and singing during the duration of its performance.<sup>20</sup> This public performance serves not only to show what samba schools do, but also to convince the public that they are worthwhile and interesting. Samba schools identify with community as well as help create community.<sup>21</sup>

Traditional constructionist learning environments have stressed the importance of an audience (or notion of audience) for a learner who is engaged in the construction of personally meaningful artifacts.<sup>22</sup> In particular, the existence of an audience positively impacts the quality of commitment and consideration given to the tasks being carried out. It also forces critical thinking, personal judgement and deep involvement.<sup>23</sup>

These findings are also apparent in samba schools, but at another level. What we can learn from samba schools is that having an audience is just as important to the learning *environment* as it is to the individual. Not only does the learner learn better when there is a final audience but the educational environment improves when it has an audience with whom it can interact. Having an explicit audience for whom the entire samba school must prepare is a way to focus the objectives and activities of the school. After all, the reputation of the entire school is at stake! There is a dialogue between samba schools and their audience. Each year, samba schools must strive to achieve a delicate balance between the music and visuals, competition and celebration, repetition and innovation. Additionally, the schools must put on a spectacle that is entirely original. This spectacle must somehow strive to innovate. However, to be successful with the public and accepted immediately by other samba schools, the innovation must be compatible with some sort of precedent. There is some basic structure or elementary matrix of meaning, without which the parade is no longer a parade.<sup>24</sup> The existence of a cyclical event forces the schools to evolve for their own sake, yet they must do so in a controlled manner that is harmonious with their surrounding culture. The schools have to create something new, but not so 'new' that it won't be accepted or understood by its audience.

### **Diversity of membership**

Samba schools exhibit pluralist qualities in their membership at all levels of the organisation. For example, samba school membership cuts across all ages. As Papert pointed out, members of the school range in age from children to grandparents. The social club aspect of samba schools makes them places where both adults as well as children go to 'hang out', play, dance, and have fun. The age diversity can be explained in part because it is a place where entire families go and participate. Guillermprieto's account is quite revealing of this:

Almost everyone in the household was going to parade: Ceci's teenage daughter Neuci came out as the youngest member of the *baianas*; Elania paraded with Guezinha, Dona Neuma marched with

the directorate; Chininha's son and Neuci's daughter, both toddlers, were mascots for the baby school; Iracema worked on the costumes she, Ceci and Chininha would wear in Chininha's wing.<sup>25</sup>

Although samba schools are traditionally associated with the lower socio-economic segment of Brazilian society, there is also pluralism in this respect. This diversity can be understood by exploring the intertwined histories of *Carnaval* and samba. The early days of *Carnaval* were completely unrelated to samba in that they were formal parades controlled by the bourgeoisie and inspired by European traditions. However, the non-bourgeoisie also wanted to participate. The streets began to see throngs of 'invading' black-dominated groups that threatened to 'Africanize' the yearly European-inspired festival with other music and rhythms. These were the early days of samba when the general populace associated it with vagrancy, thievery, and debauchery.<sup>26</sup> The European-inspired festival also began to change from within since, simultaneously, a nightlife culture began to expand and attract more 'bohemian' white men of elite and developing middle classes.<sup>27</sup> To them, the lure of samba, considered the music of poor people of color, was irresistible and helped spread the fire. It is from this mixture of social classes that samba and *Carnaval*, as it is currently understood, were created. The poor people of colour, the middle-class workers and the white elite all mixed together and played a role in establishing modern *Carnaval*. Samba schools reflect this by harbouring a cross-section of social classes.<sup>28</sup>

Samba school members also come from a diversity of racial backgrounds. Traditionally, samba schools members have been predominantly black. In the last 30 years there has been, in the eyes of many 'old timers', an invasion of whites. It is closer to the truth, however, that racial integration has been a slow but gradual process. Guillermprieto explains:

More than an invasion, it sounded like a gradual bleaching process: whereas in the 1960s middle-class white had been a rarity at rehearsals, by the 1970s they were accepted members of many samba schools, and in *Mangueira* in 1988 there were all-white wings with white chiefs, white chiefs of wings with majority black membership, and black chiefs of the most expensive wings that principally attracted whites.<sup>29</sup>

This is not to say that there is no racial and social tension. However, this tension is diffused by the importance that the *Escola* holds over all other issues. In *Mangueira*, despite the gradual white takeover of the school, no one seemed to take particular notice of their presence, partly because so many of the newcomers were fervent in their loyalty to the school, and largely because it seemed enormously important to the *Mangueirenses* to deny that they were 'racist'.<sup>30</sup>

**Cultural significance** We have seen three special characteristics that are present in samba schools and explain how a *Escola* relates to the culture and society within which it resides:

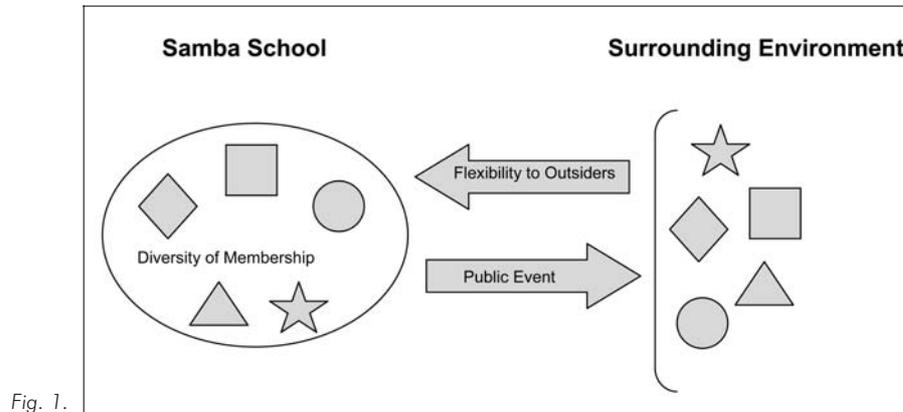


Fig. 1.

- Flexibility to outsiders
- Existence of a public event
- Diversity of membership (socio-economic, age, expertise, and race)

As shown in Figure 1, we note that all the characteristics are tied to the relationship between a samba school and its surrounding socio-cultural environment.

A samba school maintains a tight-knit dialogue with the society and culture in which it resides. This dialogue helps samba schools maintain their importance to Brazilian culture over time. In fact, samba schools and samba have become an integral part of Brazilian national identity. In the words of Roberto DaMatta, 'It was not Brazil that invented Carnival; on the contrary it was Carnival that invented Brazil'. In the same way that 'Uncle Sam' represents the USA, *Carnaval* bears a metonymic relation to the Brazilian nation.<sup>31</sup> The twentieth century saw the formation and growth of modern samba schools. This process began early in the century and is intimately related to the growth in importance of *Carnaval*.<sup>32</sup> More importantly, samba schools appeared and grew as samba itself became accepted and better regarded within Brazilian society. The legalisation of the *Escolas'* participation in *Carnaval* in the 1930s led them to become, along with samba and *Carnaval*, critical elements in the conventional discourses and imagery of Brazilian national culture. Together, they stand as 'one of the most persuasive emblems of a cherished vision of Brazilian identity, linked through Carnival to a myth of social leveling which, though confined to the few days of the festival, still forms part of a unifying national spirit'.<sup>33</sup> Samba schools are a significant part of Brazilian culture.

The success of samba schools as community organisations is thus intricately related to, and to a great degree dependent on, the *cultural significance* that they have to Brazilian society. Similarly, the success of a learning environment, when related to its external environment, is highly dependent on the degree of cultural significance that its activities have to the culture in which it resides.

The success of school sports in the USA can be understood in the context

of the broader importance of sports to US culture. Another example can be seen in the popularity of the robot soccer competition called RoboCup. RoboCup is a competition in which teams of robots play soccer against each other. The robots play on a specially designed field and are not controlled by humans while competing. It is no mere coincidence that RoboCup is most popular in Japan and Italy, countries that are well known for their cultural appreciation of robots and soccer respectively.<sup>34</sup>

Rich cultural connections are necessary, but not sufficient to achieve cultural significance. As Papert pointed out, this poses an interesting challenge for designers of learning environments. The theme, purpose, educational goals, curriculum, types of activities etc, must all be aligned with something that is significant to the culture in which it resides. Furthermore, if we are to understand culture as dynamic and constantly changing, there is an implication that a learning environment's relationship with its surrounding culture must constantly be asserted, negotiated and adapted. After all, cultural significance is a two-way street. Our analysis of samba schools has highlighted some of the specific characteristics that help them maintain a discourse with their surrounding communities and also perpetuate their cultural significance.

### Technological samba schools?

LOGO environments are not samba schools, but they are useful for imagining what it would be like to have a 'samba school for mathematics'. Such a thing was simply not conceivable until very recently. The computer brings it into the realm of the possible by providing mathematically rich activities which could, in principle, be truly engaging for novice and expert, young and old. I have no doubt that in the next few years we shall see the formation of some computational environments that deserve to be called 'samba schools for computation'. There have already been attempts in this direction by people engaged in computer hobbyist clubs and in running computer 'drop-in centers'. (Papert, *Mindstorms*, p. 182)

Having examined some characteristics of real samba schools, we now step back and return to Papert's original question: is it possible to create a kind of 'samba school for computation'? The Intel Computer Clubhouse Network is a collection of 'computer drop-in centers' that share some characteristics with Papert's vision.<sup>35</sup> We will describe the clubhouse network, show ways in which it is similar to samba schools, and highlight ways that insights gained from understanding real samba schools might be helpful in refining the clubhouse learning model.

### The Intel Computer Clubhouse Network

In 1993, researchers at the MIT Media Lab (led by Mitchel Resnick) and The Computer Museum (now part of the Boston Museum of Science) opened a drop-in centre for less-advantaged youth to use computers after school for free. Resnick comments that 'the Samba school was an indirect (not direct) influence'; however, Papert's ideas about learning were of central importance to the Clubhouse's conception and design.<sup>36</sup> In 2000, with funding from Intel and other sponsors, the concept was expanded to become a network of clubhouses around the world.<sup>37</sup> As of

June 2004, there are over 75 clubhouses in 18 countries and more are planned.

Each clubhouse 'is about 1,100 square feet, with 15–25 workstations in clusters of two or three, an office and storage space. The Computer Clubhouse also includes: a digital music studio; a video editing area; a communal, computer-free space for socializing, and creating artwork; a reading area; an area for building robotics and models; and, a display area for work created at the Computer Clubhouse.'<sup>38</sup>

Learning at clubhouses is unstructured. Professional-quality software and hardware are made available, and members are free to work on whatever they like. Resnick and Rusk write that 'at the Clubhouse, young people become designers and creators – not just consumers – of computer-based products. Participants use leading-edge software to create their own artwork, animations, simulations, multimedia presentations, virtual worlds, musical creations, Web sites, and robotic constructions.'<sup>39</sup> Members come from less-advantaged backgrounds in the local neighbourhood of each clubhouse, and are generally ages 10–18. Volunteer mentors are available to support the members' projects. Several members of the Electronic Learning Communities research group at Georgia Tech have been volunteering as clubhouse mentors since summer 2001. While volunteering, we have also been observing the learning taking place, doing participant-observer ethnography.

Observations that follow come from our detailed field notes, as well as publications about the computer clubhouse network. Field notes document over a hundred visits to three clubhouses ranging generally from one to three hours in duration. Visits were made starting in May 2001 through December 2003.

**The Computer Clubhouse as a technological samba school**

In what ways are computer clubhouses like samba schools? Like samba schools, clubhouses are located in less-advantaged neighbourhoods.

The initiative for the creation of new clubhouses comes from members of the local community. These community-based organisations apply for funding, equipment, and assistance in getting the clubhouse started. As in samba schools, the organisation and management involves a complex relationship between a local community-based organisation and an overarching organising body.

In samba schools and computer clubhouses, members of the local community drop-in to engage in creative and intellectual work in a playful atmosphere. Learning is self-motivated. Attendance is voluntary, and projects are both initiated and completed on a voluntary basis. There is no curriculum. The Clubhouse Network staff provide examples of projects, and mentors make suggestions, but there is no required set of projects or activities. The emphasis is on making the environment as different as possible from traditional school.

To date, the clubhouses have been a modest success. An evaluation of the network conducted by the Center for Children and Technology (CTC) at the end of year two found that older children and children who arrive

with specific interests and skills are more likely to complete substantial projects.<sup>40</sup> Day-to-day observations show that many attendees complete only simple projects. For example, it is popular for a kid to take a photo of him/herself with a digital camera, and paste his/her head on the body of a celebrity athlete using photos found on the web. Many kids never progress beyond simple projects of this nature. Popular projects of moderate complexity include making simple animations in Flash or web pages on public sites like blackplanet.com. While some kids do complete more substantial projects, this is the exception rather than the rule. Furthermore, even the most accomplished members rarely do any real computer programming.

It is important to note that our observations are based primarily on our field work in particular clubhouses. Conversations with others working in the Clubhouse Network suggest that many of these phenomena are consistent across clubhouses in the USA. However, each clubhouse is unique, and locations in other countries differ most markedly. A comparative study among clubhouses in the network would be revealing.

**Public event, diversity and flexibility to outsiders**

We identified the importance of flexibility to outsiders, diversity of membership and a public event have to samba schools. The application of this lens to the Computer Clubhouses reveals significant differences. First, clubhouses lack a public event in which their activities are actively promoted and shown to the general public. Secondly, clubhouses serve the less-advantaged youth of a particular neighbourhood. This simple decision effectively eliminates all diversity. Clubhouse members are from a narrow range of ages. Each clubhouse draws from a local neighbourhood. These areas tend to be homogenous in race, ethnicity, and socio-economic status. In contrast to the rich diversity of samba schools, most clubhouses tend to lack any diversity at all.

One factor that contributes to the diversity and broad membership of samba schools is the easy path to participation for outsiders. At clubhouses, there is no equivalent to simply buying a costume and dancing with the school. Newcomers are welcome to drop by and are provided with equipment to use, but there typically isn't an ongoing activity they can join. There is no easy way for an outsider to initiate a process of legitimate peripheral participation.<sup>41</sup>

**Cultural significance: the clubhouse music studio**

Each clubhouse has a closed off area defined as a music studio. It has specialised equipment including a keyboard-synthesiser, mixing table, microphones and a computer with music processing and creation software installed. The music studio stands out as different from the rest of the clubhouse. In clubhouses we have observed, the music studio is in constant use, with members often competing for studio time. Members work to create original music, including recording vocal tracks, creating all the instrumentation synthetically, and mixing the final result together. They may also create original art and web pages to go with the music, and distribute via either music websites or by burning CDs. Some groups attempt their own music videos. Such projects are often sustained efforts of groups of kids over an extended period of time. One clubhouse coordinator comments:

The music studio is the most used resource in the clubhouse among older members, particularly boys. Because the end product, a song or rap, is such a hot commodity among their peers, the teenage boys will make a more concerted effort to learn the technology behind the equipment. This motivation is not so apparent with other software programs or technology tools in other parts of the clubhouse.

Recording a song or producing a CD is a highly prized goal so the members will typically put more effort into learning how to do it.<sup>42</sup>

Why does the ideal of project-based learning apparently work better in the music studio than in other parts of the clubhouse? The comparison of the clubhouse network to samba schools provides some insight.

Papert highlights the fact that learning at samba schools is tightly linked to popular culture. As we have seen, samba has substantial *cultural significance* in Brazil. For clubhouse kids, music – especially rap and hip-hop – is pervasive. Kids at the clubhouses we studied value it highly. When asked about their career goals, many reply that they hope to be professional rappers. They dream of being rappers; they don't dream of being computer programmers. A song created can be easily shared with friends outside of the clubhouse. It creates cultural capital easily understood by friends, parents, and other members of the community.

### Suggestions for the future of clubhouses

Clubhouses today provide substantial benefits to their members. A small number of members truly excel in project-based learning. The coordinator of one clubhouse comments that even those who are the least engaged with computers benefit simply from the fact that they are present at the clubhouse, and not with other neighbourhood kids hanging out at a local basketball court with substantial drug and gang activity. We can still ask, however, how can we improve further on the learning model? How can we help a higher percentage of kids to learn through working on substantial projects? Based on our research on samba, we can make a few tentative suggestions:

- Increase emphasis on music creation ?
- Leverage from music to other types of projects ?
- Create local and network-wide events ?
- Increase diversity of participation ?

First, we suggest that the clubhouse network increase its emphasis on music. Recording original music has a cultural significance that makes it the most successful clubhouse activity, in our field observations. Each clubhouse has only one music studio, and kids often compete for studio time. Adding a second or even third music room to the standard clubhouse design would enable more kids engage in this activity.

Kids making original music are often observed making web pages and videos to go with their music. The Clubhouse Network might adopt conscious strategies for helping kids leverage their interest in music to develop interest and expertise in other areas. While clubhouse members may not know why they would want a personal web page, they know why

their rap group should have its own web page. This leverages cultural significance to help initiate and sustain work on projects.

People attend samba schools to prepare for a big event – *Carnaval*. The grand event publicises the work of the school to the community. It also creates natural rhythms of activity – times to slowly ramp up, times to work intensely, and times to take a break. Members have something to work towards, and a motivation to excel. Without *Carnaval*, there would likely not be samba schools. An event where kids show off their projects (especially original music) might fill this function for clubhouses. We imagine a competitive event where winners at the local level are invited to attend a network-wide event.

Competition plays a complex role in educational environments.<sup>43</sup> While the winner of the science fair may be encouraged to pursue a career, the loser may be discouraged. It will be important to establish a tone for the event such that all participants feel appreciated, even if they do not win. Note that *Carnaval* is competitive – but competitive among groups, not individuals. It will be important to design the event to encourage work in groups to foster collaborative learning.

Finally, our more radical suggestion is to consider substantially increasing the diversity of active participants in projects. Currently, kids do projects and mentors assist them. What if mixed-aged teams<sup>44</sup> worked on projects together? Adult team members could scaffold younger members in their learning, particularly if they received training in how to do so effectively. The clubhouse currently excludes younger children, because they have more difficulty doing independent projects. However, if a project were led by an experienced adult, that adult might be able to support younger children in legitimate peripheral participation, finding them ways to contribute to the group effort within their capabilities.

Groups might also be mixed in terms of socio-economic status (SES) and ethnic background. Middle-class participants bring attitudes towards learning, work habits, and family support that kids from lower-SES might benefit from. In fact, Papert imagined that the first successful technological samba school 'will almost certainly happen in a community of a particular kind, probably one with a high density of middle-income engineers. This will allow the computer samba school to put down "cultural roots".<sup>45</sup> To foster success in creative and technical achievement with computers, it helps to include a population of people for whom computers already have a degree of cultural significance. At the same time, if the subject matter of projects is biased towards popular music, the inner-city kids bring a direct cultural knowledge likely to be valued by the suburbanites. In both cases, simply getting to know one another brings substantial benefits, broadening the worldview of both sides.

Increasing the diversity of participation necessarily means serving a smaller number of less-advantaged kids. However, those kids are likely to be better served. This is a complex trade-off. Middle-class kids could potentially pay for participation, with those from lower-income

backgrounds receiving scholarships. This might help sustain clubhouses financially, and still allow lower-SES adults and kids to participate.

**Conclusion** When Papert first visited Brazil in the late 1970s, he was inspired by the learning he observed in samba schools. Samba schools are rich cultural and learning environments rather unlike anything observed in Western society. Since then, the idea of a 'technological samba school', has inspired many educational technology designers. The Intel Computer Clubhouse Network is just one example – the second author's MOOSE Crossing project is another,<sup>46</sup> and there are many other projects built on this model in whole or part. In this paper, we have reviewed the literature on real samba schools to try to provide more detailed insight into the design of their technological offspring, and more broadly into the intersection of learning, technology, and culture.

The samba schools of Brazil are cultural institutions in which a great amount of learning takes place. Why are some learning environments more successful than others? What factors are conducive to the growth of a learning culture? Can those factors be replicated? From our analysis of samba schools, one key factor that emerges is *cultural significance*. Barab and Duffy comment that:

It is not just the community members who are a part of something larger. The community itself functions within a broader societal role that gives it, and the practices of the community members, meaning and purpose. If the community isolates itself from the societal systems of which it is a part, then both the individuals and the community become weaker.<sup>47</sup>

The cultural meanings of samba help support samba schools as cultural institutions and places of learning. In Western culture, organised sports play a similar role. For example, the World Series helps to sustain interest in Little League baseball. The converse is also true – Little League helps create a new generation of professional baseball players. This leads to an intriguing question: can designers of learning environments consciously leverage cultural significance to create more successful learning environments? Can areas of potential cultural significance be deliberately nurtured? The samba schools of Brazil provide some insight into how this might be possible.

Western organised sports typically have one noteworthy difference from samba schools: age segregation. The basic design of our sports makes this desirable. A seven-year-old on a playing field with 15-year-olds is likely to get trampled. Yet learning from people of different ages is a central feature of communities of practice. Learning in samba schools is not only cross-generational, but also family oriented. Our analysis suggests that cross-generational learning environments have advantages worth leveraging more effectively. A different kind of learning takes place when two people of different ages work together towards a shared goal, in contrast to elders participating solely for the purpose of aiding kids.

In a similar vein, in charitable endeavours like the Intel Computer Clubhouse Network, middle- and upper-class individuals (clubhouse coordinators, network sponsors, etc) participate solely to aid the

economically less advantaged. We imagine a richer learning environment could be created if individuals from diverse socio-economic backgrounds all participated in shared activity as first-class participants. This does indeed take place in samba schools. Class differences in samba schools are sometimes a source of tension,<sup>48</sup> but hopefully most of the time it is a creative tension that promotes mutual understanding. Regardless, one could argue that any context for meaningful interaction, whether tense or harmonious, is preferable to mutual ignorance.

Flexibility to outsiders is a desirable characteristic for any cultural/learning institution that wishes to grow in numbers and diversity. Samba schools have economic characteristics that make this scalability relatively easy. For technological learning environments, the cost of computing technology raises barriers. Norris and Soloway note that the emergence of low-cost handheld devices creates possibilities for a 'total access computing infrastructure' that could help solve this problem.<sup>49</sup>

Finally, it's impossible to understand samba schools without understanding *Carnaval*. Sports leagues excel at using regular cultural events to create excitement and rhythms of life within a community. In the world of formal education, science fairs and spelling bees attempt to fill similar functions. It's doubtful that events consciously designed to promote learning could ever be as festive and joyous as *Carnaval*, but there is still a great deal we can learn from that even – particularly, what creates a successful public cultural event and how such an event can be the *raison d'être* for a community.

More than 30 years later, Papert's vision of a 'computational samba school' continues to inspire. In this paper, we argue that the details of life in real samba schools are a rich source of insight into the design of learning communities and the synergies possible between culture, technology, and learning.

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- Notes**
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