The Trojan horse as a Trojan horse

Impacting the Ecology of the Learning Atmosphere

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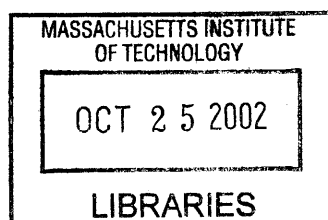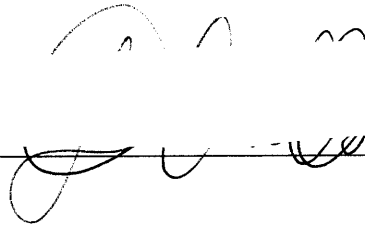
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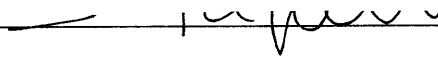Departmental Committee on Graduate Students
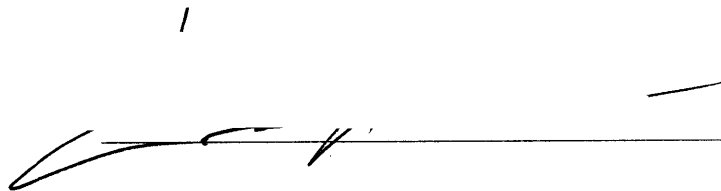
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Abstract

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Submitted to the Program in Media Arts and Sciences, School of Architecture and Planning on August 9th, 2002, in partial fulfillment of the requirements for the degree of Master of Science in Media Arts and Sciences

This thesis proposes a framework to model intervention in education systems using technology: the Learning Atmosphere. The motivation is to show that innovative learning with expressive technologies can happen even in economically disadvantaged regions, such as public education systems in Brazil, where our case studies took place. The contribution of the thesis is to explore ways in which mutual enrichment can be achieved through collective displacements of habits and mindsets taken for granted.
The case studies demonstrate the importance and possibility of a powerful learning experience that builds up from the local culture and expertise, elements often disregarded in schools. Technology plays a central role, enabling diverse and innovative ways of working, expressing and building. In addition, it makes possible epistemological diversity, empowering of students and fulfillment to teachers, reinforcing the community's own livelihood.

The core elements within the Learning Atmosphere are:

- Enhance the concept of generative themes using technology.

- Mix and match expressive media, especially low-cost technologies.

- Invest on relationship building and challenge established power relations.

The legend of the Trojan Horse has the important role of warning us against the easy way into schools, the trivialization of ideas and the superficial experiences that do not change the praxis and mindsets in schools.

Advisor
David Cavallo
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YKCOWREBBAJ

sevot yhtils eht dna ,gillirb sawT`
ebaw eht ni elbmig dna eryg diD
,sevogorob eht erew ysmim llA
.ebargtuo shtar emom eht dnA

She puzzled over this for some time, but at last a bright thought struck her. `Why, it's a Looking-glass book, of course! And if I hold it up to a glass, the words will all go the right way again."

This was the poem that Alice read.

JABBERWOCKY.

`Twas brillig, and the slithy toves
Did gyre and gimble in the wabe;
All mimsy were the borogoves,
And the mome raths outgrabe

"Through the Looking Glass"
Lewis Carroll

Table of Contents

1   Introduction

Só a Antropofagia nos une. Socialmente. Economicamente. Filosoficamente.

Única lei do mundo. Expressão mascarada de todos os individualismos, de todos os coletivismos. De todas as religiões. De todos os tratados de paz.

Tupi, or not tupi that is the question.

1.1. God hides in the details[1]

Digital technologies are elements that, being introduced in learning environments, add a rich layer of complexity. We do not have, however, a mature set of models or languages to understand and design such learning environments.

Nature, on the other hand, offers many models to understand complex phenomena. Some of those models, especially those coming from statistical mechanics and biology, are changing the way we think about problems in other fields of knowledge, such as social sciences, by offering new metaphors, strategies and mental models. One of them seems particularly interesting for its multi-variability, meta-stability and unpredictability: *atmospheres*.

This thesis introduces the concept of the **Learning Atmosphere** as a framework to design and understand learning environments in which computational technology is an inherent component, adding layers of complexity that cannot be properly described or studied using available models. Our approach considers several aspects, such as choice of what to build, which tools to use, affective relationship building, power relations, hidden cultures/agendas, and others, as part of an indivisible whole (the *atmosphere*) that constitutes the real scenario in which the learning experience will take place. Although we will, at times, isolate one of the elements to analyze it in depth, we firmly believe that the inter-relations and interdependencies are key [Papert 1995]. Our method of micro-investigation, based on observations in the field, interviews with students and teachers, and qualitative analysis of the workshops, is an attempt to address details often overlooked towards educational research, but with fundamental consequences in the quality and depth of the work students conduct.

We conceived and utilized this framework in a series of nine field-work activities, mainly conducted in Brazil in 2001 and 2002, within public and non-profit education systems. The goal of the thesis is to introduce and discuss the **Learning At-**

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[1] Gustave Flaubert, *apud* Guinzburg, C. and Blikstein, I.

mosphere framework, using the aforementioned activities as case studies, and to propose alternative models of intervention in public education systems, especially in developing countries such as Brazil. The atmosphere metaphor is also useful as it gives us a model of a phenomenon that can have diverse, complex, and even opposing micro-climates simultaneously, while having a different overall macro-climate.

At the macro level, the **"Trojan horse as a Trojan horse"** metaphor, chosen as the title of this thesis, describes the topology of a dilemma: an element whose advantages give perils as well. As a result, schools are very interested and willing to adopt technologies quickly, as computers supposedly get cheaper and easier to use. Our belief has been that we could utilize this belief to introduce new ideas about learning *together* with the technology – the *Trojan Horse* metaphor. This model, although tempting and reasonable, is not enough to describe what really takes place. Our fieldwork observations demonstrated that, as we would expect, this is not a simple process of cause and effect. Simply introducing new learning methodologies accompanying the new technologies is insufficient in and of itself to bring about broad change. Introducing powerful new technologies and new ideas for learning into a complex system like a classroom, school, or school system necessarily has a number of reverse effects, as well as a number of reverberations throughout the system. In particular, the aforementioned Trojan Horse becomes itself *another Trojan Horse:* the exact same advantages of the new digital technologies that motivate us to introduce them in education (low-cost, low-threshold, high anticipation), also open the possibility of a very superficial contact with them. As a result, people do not develop the necessary fluency and the transformations in school's everyday life, if any, remain at the superficial level, often getting easily re-absorbed and normalized. In other words, the same characteristics that make digital technologies revolutionary tools also allow them to be just a facelift for existing practices.

I will discuss other defense mechanisms as well, mainly at the micro-level (inter-actions at the workshop-level and school-level), but also relating to the macro-

level (school system and central municipal administration), and finally describe the strategies we used to deal with them.

1.2. Walking the talk

The acceptance of the complexity and multi-dimensionality of the **Learning Atmosphere** requires different models for intervention. As Seymour Papert points out, strategies such as presenting a plan with actions specified in minute detail to a Secretary of Education, are incoherent with the changes we would like them to implement:

> We attempt to "educate" School in ways that we would [...] condemn as methodologies for educating children. [Papert 2000]

The discussion about school and its impermeability to change is certainly not new. Many authors ([Singer 1997], [Papert], [Tyack *et al.* 1995], [Morin 1999], [Kuhn 1962]) have discussed how the school system (and other systems as well) transforms innovative ideas and adapts them to its existing mindset. While Tyack and Cuban, as well as Papert, highlight the historical and developmental aspects, Singer pays more attention to issues of discipline and power, using Durkhein and Foucault as her basis.

Although we are all aware of the difficulties in promoting change, a new fact came into view in the last decade. Educational systems presently face a hard problem: there is a sense of urgency in integrating new technologies, and it is a matter of survival, both in the private and the public sector. Considerable part of the public opinion in Latin America has the view that the only way out of underdevelopment is education, especially making use of new technologies or preparing the students to deal with them.

In the Brazilian case, for example, the budget for education has increased significantly over the last few years, especially since the Constitution of 1988. A major part of this increase is for investments in technology. However, due to the prevailing mindset and the normalizing forces, these purchases most often focus on large-scale turnkey solutions or standardized training that for the most part ignore the local context. As resources are scarce, under current budget priorities and

sources, and the capital investment in computers becomes relatively expensive[2], effective investment in technology seems fundamental.

The second part of the problem is that the conflicts between the agendas of the technology providers, schools, state bureaucrats and politicians are extremely hard to accommodate. In developing countries, which are normally importers of computational technology, this problem is even harder, because to some, technology often carries the connotation of a tool for domination and inspires the feeling of dependence. Other elements also play an important role in the normalization process:

- Public views of what good education should be.

- The choice of technologies.

- The idea of curriculum.

- Culture and power structure of education schools.

- Vested interests of existing institutions and corporations engaged in the business of education.

- Systemic inertia

Some of them are discussed in case studies of authors such as Chapman and Sleegers ([Chapman *et al.* 2002], [Sleegers *et al.* 2000]).

Moreover, our technology is not just atoms or bits, but comprises a third dimension: the ideas, concepts and cultural background of its designers. Pierre Lévy, in Cyberculture [Lévy 1999], argues against the simplistic and widely used "impact" metaphor, as if technology was a projectile and the human society a living target. He discusses the use of tools as inherent to human condition:

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[2] As Clotilde Fonseca, from the Omar Dengo Foundation (Costa Rica) points out, how much we spend on education, and military or corporate welfare, is a political choice. It is not a law from God that only 2 or 4 per cent must be spent on education.

The techniques would come from another planet, from the world of machines, cold, without any emotion, foreign to all signification and human value. [...] Not only the techniques are imagined, fabricated and reinterpreted during its use by humans, but also **it is the intensive use of tools that constitutes humanity as it is**. [...] Beyond the techniques act and react ideas, social projects, utopias, economic interests, power strategies, and all kinds of games of humans in a society. As a result, any attribution of a unique meaning for the technique can only be dubious. [Lévy 1999], p. 22-24

When Lévy states that there is no unique meaning for the technique, and that the exact same technology can be used both for domination and building autonomy , school appears to be the perfect example. Papert also warns against the danger of technocentrism:

Combating technocentrism involves more than thinking about technology. It leads a fundamental re-examination of assumptions about the area of application of technology with which one is concerned, if we are interested in eliminating technocentrism from thinking about computers in education, we may find ourselves having to reexamine assumptions about education made long ago before the advent of computers. [Papert 1985]

We might derive from those two authors that the *impact* metaphor, as well as the technocentric mindset, constitute incomplete models to approach the issue of change in education. First, school is not a passive target for technology. Technologies are not extraterrestrial, non-historical artifacts. Research on technologies in education, as a result, cannot ignore the complexity that emerges from the interactions of those two elements in a social context. Not only our solutions, as technology designers, will not fit the local needs, but also we would be wasting the opportunities to interact and benefit from the local culture and expertise, which could be synergetic (as Cavallo's analysis of the engine culture among peasants in Thailand) [Cavallo 2000]. As Papert recommends in his article "Computer Criticism vs. Technocentric Thinking", the best methodology for an educational activist would not be to change one factor while keeping other the same, but instead to change all of them to create an environment as different as possible [Papert 1985].

The framework of the **Learning Atmosphere** pushes in those directions. Thus introducing technology becomes a new kind of Trojan Horse: we intentionally use

familiar tools and technologies, with significant changes to make people pay attention, challenge underlying assumptions, and work in new ways. This then becomes a part of the atmosphere and the role of the facilitator is to create a rich, convivial, friendly atmosphere rather than to bea rule-enforcer or conveyor of information.

1.3. Learning atmosphere

Atmospheres are dynamic systems that have been constantly challenging scientists by their complexity. They are complex, multi-variable, meta-stable systems, which behavior has been confronting the deterministic models of cause-effect. We introduce the concept of a **Learning Atmosphere**: an invisible layer of complex, dynamic relationships that permeates the learning environment. This idea brings in an acceptance of complexity and ecology, in which things can be turbulent, and suggests that a homogeneous atmosphere is not the best for learning.

The three major components of our framework follow.

1.3.1. Generative Spaces

The Freirean *generative themes* have been inspiring educators for decades about how to put the learner closer to his social context. We propose the idea of a **Generative Space**, adding multiple possibilities of projects and ideas as a result of the broadening of the tools and media available. Talking about and proposing possible themes for projects was a fundamental part of the activities' design, as a way of linking together different tools and providing a more evocative, organic meaning to them.

However, we conceived the term **Generative Space** to mark some differences with the classical use of generative themes. In the first place, the "generative" aspect belongs more to the space set up and the kind of atmosphere than to a intrinsic characteristic of the themes. The atmosphere metaphor come in handy here: instead of bringing a bucket with water, the educator has to make sure the atmosphere generates rain.

The presence of digital technologies within the learning environment adds multiple new entry points and types of activities, changing fundamentally the role of the educator and any theme proposed to the students. While generative themes are often used for convergence, **Generative Spaces** allow the interactions of many movements of convergence and divergence, which benefits and contributes to the richness of the atmosphere.

1.3.2. Multiple expressive technologies

One of the important design issues of the experiences described in this work is the simultaneous expressive use of multiple technologies. We choose not to introduce the different technologies separately, in a controlled and planned form, which risks segregating them and building a technology curriculum. Instead, we made the equipment immediately available to the participants, with or without basic training, with no imposed time limits, or specific content. Here we bump into one of the important hidden dimensions: not only was the diversity and availability of the tools important so as to provide multiple entry points for students, but also essential was who had the control over these tools. The result that emerged from this simultaneous use of digital technologies was a profusion of projects and ideas, with a great deal of synergy between them. This also created a more inclusive environment as there were entry paths for different people with different interests and tastes.

1.3.3. Using familiar materials and ways of working

Part of the building of the **Learning Atmosphere** is fighting the high cost of the technology, especially in the most neglected localities. In most places, before starting the activities, the feeling both of students and teachers was that technology was a strange, costly and non-familiar material to work with.

On the other hand, one of Brazil's strongest cultural traces is the so-called *jeitinho brasileiro* ("the Brazilian way"), a practice of creatively solving problems using what is at hand, finding some way, instead of waiting for the ideal or formal solution. This implies repurposing and deconstruction of objects and parts as well as customary utilization of recycled and found materials.

Thus, I was building upon what was deep in the culture, and related to it a positive and powerful manner, albeit at times implicitly. Participants were invited to bring and disassemble broken and found equipment and materials, and integrate them into their projects, as well as combining high-tech and low-tech materials, familiar and unfamiliar. Moreover, I put together cheap, customized kits of locally purchased/found electronic and mechanical construction components, rather than relying solely on expensive, imported devices.

1.3.4. Relationship-building

One of the observations of the field-work activities was the fundamental importance of relationship-building. Special attention was paid to how trust and friendship developed and played an important role in the learning atmosphere. Students were testing me and the environment at all times. The typical tests include the control over the equipment, playing games during the workshop, browsing the internet and choosing embarrassing themes for projects. Again, truth was in the details: rather than simple demands or funny jokes, these tests tacitly set the rules, tone and political climate that will stimulate or inhibit creative projects.

The awareness of and response to these tests is fundamental to creating and maintaining a convivial and creative learning atmosphere.

1.4. A little history

The stream of events that this thesis will discuss begins in July 2001 in Mexico, during the MIT Media Lab's Future of Learning group's Summer Institute. There were over two hundred and fifty educators from thirteen countries. During two weeks, they worked on their projects, attended talks, participated in workshops, discussed ideas about learning, shared experiences and envisioned projects for their countries. The event was part of the Learning Hubs initiative[3], which aimed to instantiate and support innovative learning initiatives in a variety of places. The idea to bring people together for one event was to have them experience a dif-

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[3] This initiative is led by Prof. David Cavallo and Seymour Papert.

ferent learning environment, and to help build a network of education activists from different countries.

One of the projects that gained momentum during the Institute was with the Secretariat of Education of São Paulo, Brazil. During the event, we met with the Secretary, Prof. Fernando Almeida, and his team to plan the first steps of the cooperation.

In August 2001, we had the first workshop in Heliópolis, the biggest *favela* (shanty-town) in the city of São Paulo, Brazil, with a group of twenty students. In November 2001, we gathered twenty-six technology coordinators from all thirteen districts of the city for a two-week workshop. The group split in four and went to schools, to work with four groups of twenty students and local teachers, for another two weeks.

As parallel activities that will also be cited in this work, there were workshops in Campinas (Fundação Bradesco) and Curitiba, in April, June and July 2002

1.5. Other contributors

This work had the contribution of many people, that conducted workshops or helped in other ways:

■ Roseli de Deus Lopes, Alexandra Camargo Alves, Adriana Maricato, Helena Tomoie, Sabo Takahara, Adriana Simizo, Tiago Bernal, Renato Mota Lazaro, Breno Teixeira Santos (University of São Paulo)

■ Alice Cavallo, Arnan Sipitakiat (MIT Media Lab)

■ Nivaldo Tadeu Marcusso, Sandra Bianchini, Simone Claudino (Fundação Bradesco)

■ Paulo Gonçalo, Neide Santana, Lia Paraventi, Tidu, Mônica, Sueli, Ana Maria Moraes de Albuquerque Lima (Municipal Secretariat of Education of São Paulo)

1.6. Structure of the thesis

The political and historical context of the regions or institutions where we conducted field work is the subject of the second chapter. The case studies will be described in Chapter 3, and the discussion about them will take place in Chapter 4. Chapter 5 will present the conclusion of the work.

Extra materials, such as pictures and videos, can be obtained at http://www.media.mit.edu/~paulo, or contacting the author.

2 Context

Só me interessa o que não é meu. Lei do homem. Lei do antropófago.

O que atropelava a verdade era a roupa, o impermeável entre o mundo interior e o mundo exterior. A reação contra o homem vestido.

2.1. Goal

The objective of this chapter is to give the reader some of the context of the fieldwork of the thesis. As much of our atmosphere analysis will rely on the local culture of the school and the community, it is important to have an initial overview of those elements. Also, as one of the goals of the Learning Atmosphere framework is to include hidden, forgotten or implicit elements in the design and analysis of learning environments, getting to know something about the physical and symbolic scenario in which our activities took place is important.

Figure 1
Map of Brazil, with our three sites

2.2. Paulo's São Paulo

The city of São Paulo, for many different and intersecting reasons, constitutes a special setting for projects around innovation in education. During the Seventies and Eighties, alternative, progressive schools flourished in the city, partly in response to the authoritarian educational policy of the military dictatorship that ruled the country. In addition, from 1989 to 1991, the Secretary of Education was Paulo Freire, a symbol of innovative and progressive education.
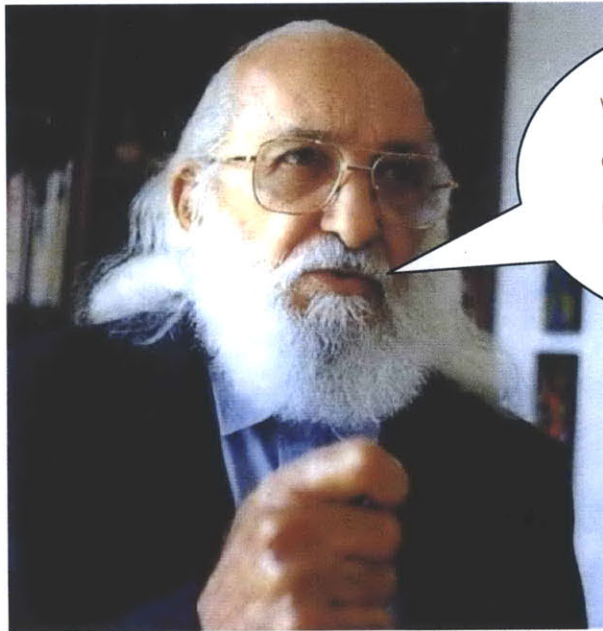
Why not discuss with students their concrete reality? [Freire 1996]

arquivos paulo freire

Another important aspect of the Brazilian culture is what the writer Oswald de Andrade called the "Anthropophagic culture": being able to absorb, understand and transform other cultures and new ideas, yet making it very different from the original. In Andrade words, in his Anthropophagic Manifest:

> Only Anthropophagi unites us. Socially. Economically. Philosophically.
>
> Tupi, or not tupi that is the question.[4]

Another aspect is what Brazilians call the *"Jeitinho Brasileiro"* (the Brazilian way out), which refers to the common habit of solving problems with the tools that

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[4] Tupi one of the languages of the original inhabitants from Brazil, before the European invasion.

are available, instead of waiting for the "official" ones. Also, the *jeitinho* refers to finding ways to break rules in order to make a way through bureaucratic, unreasonable, or unresponsive structures.

At the beginning of the four-year mayoral mandate of Luiza Erundina (1989-1992), who came from the left-wing Partido dos Trabalhadores (Workers' Party) (PT), the city was highly anticipating the implementation Freire's philosophy. The last time he was in a position of such power was during the João Goulart government, when he was the coordinator of the National Literacy Program, abruptly terminated by the military coup and dictatorship that lasted from 1964 to 1985. As a result, the 1988 election of Luiza Erundina was a radical change in the political scenario of the city, and the public was extremely demanding for changes. However, her election was a surprise even for her and her party. She overcame the leading candidates only on the very last day of the election. As Moacir Gadotti remembers in the preface of Paulo Freire's book **"Education in the City"** [Freire 2000], most of the plans advertised during the campaign had a very strong ideological background, but no details of their technical and practical implementation. *That fact is especially relevant because we observed the same phenomenon, more than 14 years later* – a very strong and sophisticated discourse around the Freirean ideas (emancipation, freedom, change in school, citizenship, critical thinking), but few concrete models or plans to put them into practice.

In fact, in the first document written by Freire as Secretary, we can observe the type of ideas he was defending, within the concept of the public popular school:

> "[it] should not only be measured by the amount of content transmitted and received, but equally by the solidarity that was built [...] We should not bring our people to the school to be instructed, threatened, reprehended, punished. [Freire 2000]

When the Partido dos Trabalhadores returned to power in 2001, they felt a moral obligation to recuperate Freire's legacy and ideas. One of Freire's most successful projects as Secretary of Education was precisely around technology: the *Genesis* project, which introduced computers in schools, mainly using the Logo Language.

But the world and the city were a lot different then. New technologies and computers were already in the schools and within the educational world. Indeed, Freire was the first to introduce them to public schools of São Paulo. He was aware of their necessity. Luiza Erundina, the mayor during that period, stated that first she gave food and shirts to the kids, and then worked on improving education, including bringing in new technology. This historical account is important because some of the obstacles that we might have found were already removed by Freire: the discussion about the validity of technology in education, the issue about cultural and technological imperialism, even the concern about the costs.

To understand that, it is important to know that schools in Brazil serves a larger purpose to society and community. In the first place, for many children the meal they have at school is the only substantive one they will have for the day. The school is not only a place to learn but also a safe place to leave the kids while parents work. The decay of the public schooling system in Brazil over the last 30 years generated a lot of dissatisfaction and disbelief in the system. As soon as families are able, they take their kids from the public schools and enroll in the private system. The belief is that only the private schools supposedly can prepare them to be admitted in the good public universities and assure some kind of social mobility.

In addition, the discussion about the "digital divide" became a worldwide concern in the nineties, though often trivial in both discourse and practice. In a context where nobody in the Secretariat knew exactly what to do, the Freirean discourse and legacy became both a smoke screen and an "object to think with". For some, it was a way to transfer to the discourse level all the demands that were posed to the Secretariat on the concrete level. Others, as the Secretary himself, saw in the encounter of the ideas of Freire and Seymour Papert a lifetime opportunity for creating new learning environments [Almeida 2001a]. It was within this turbulent and dubious context that we began our relationship with the Secretariat staff.

2.3. Bradesco Foundation

Bradesco Bank is one of the most traditional institutions in Brazil. The Bradesco Foundation, an initiative envisioned in the fifties by the founder of the bank, Amador Aguiar, grew to be one of the largest social projects in the country. It has more than 25 schools (all with free tuition) and 100,000 students, mostly serving poor regions of the country.

Figure 2
Amador Aguiar signs the first
ntract to buy an IBM computer
for the foundation, in 1961.

One interesting aspect of the Bradesco Foundation management system is that the cost of each student, US$ 250 to 500.00 a year, is a figure similar to what most Brazilian public education systems in the country spend (around US$ 250.00). Yet they provide a much higher quality infrastructure. In São Paulo, where the largest Bradesco school is located, the expenditure per pupil is exactly the same amount as the public system of the city. Of course, the Bradesco system has some extra advantages, as it enjoys contact with the bank, donations of equipment, more flexible hiring policy, etc. In addition, the students of the Bradesco schools can be chosen, expelled and selected, while the public system you must accept everyone and be present at all the regions of the city[5].

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[5] Average Yearly Cost per student (Bradesco network): from US$ 250.00 to US$ 500.00, depending on the segment (elementary or vocational), and US$ 850.00 in the board schools[5]. Excludes technology investment.

Also, as the Foundation is a private institution, its agility for change is theoretically better when compared to the heavy bureaucracies of the public sector.

Although working with the Foundation seemed to be much easier than with a gigantic public education system, the consequences of being a private institution started to surface over time. As we observed during the fieldwork, some other hidden factors were in place:

- discipline was very much enforced

- some students felt that being accepted in the school was a "blessing"

- dating was forbidden

- activities outside the school were reduced or heavily controlled. One of the reasons was the potential damage to the public image of the bank, in case of an accident

Perhaps most importantly, as the majority of students came from families of limited means and since tuition was free, they did worried that if they were expelled that they would not receive the same level of education elsewhere as their families could not afford private school and the public system did not compare.

Another interesting fact was that, in terms of resources and technology, they were in a radically different situation than the public school system of São Paulo. Many companies, interested in supplying technological products for the huge network of Bradesco banks, often donated software and equipment to the Bradesco Foundation schools [Marcusso 2002]. As a result, the schools in which

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Average Yearly Cost per student (public network): (US$ 250.00)

Technology budget for all the schools: US$ 1 million/year, for equipment, software and telecommunications (3% of the annual budget of the foundation).

Technology budget for each school: average of US$ 116,000/year – not including staff, maintenance and donations.

Additional technology budget for each student: US$ 116.00/year Marcusso, N. T. (2002). Cambridge, MA, Personal Communication.

we worked had a very good infrastructure and good technological resources. However, even the Educational Technology coordinators were disappointed with the uses of technology in the schools. They felt that they had sufficient resources of innovative technological tools, but did not achieve the results they had studied from elsewhere.

2.4. Lerner's Curitiba

Curitiba, located in the southern part of Brazil, in the Paraná state, is one of the most famous Brazilian cities, mainly for its environmental projects, innovative urban design and very good quality of life. Since the seventies, a group of young architects, engineers and urban planners, led by Jaime Lerner (currently governor of the state), started to implement revolutionary projects in the city, in the fields of transportation, traffic, sustainable development, parks and public spaces. It is worthwhile to state that this was antithetical to common wisdom of the time, which stated that Brazil was too poor to afford luxuries such as paying attention to these elements – an argument often heard about computers in education. Curitiba came to be recognized around the world as the city with the best quality of life in the country, that respected the environment, and this reputation started to attract a lot of attention and investment.

Figure 3
One of Curitiba's trademarks:
the parks

During the nineties, the state of Paraná started to invest more in technology, especially in software development, as well as in the automobile industry. Several companies, such as Audi-Volkswagen and Renault, built cutting-edge factories in the state.

Curitiba, as a result, unites a tradition in innovation, a critical mass of universities and technology development centers, and a relatively agile public bureaucracy that prides itself on innovative approaches, yet has a manageable size (around 3 millions, unlike the city of São Paulo with 18 million people).

The relationship and the projects in Curitiba, however, did not go as smoothly as we would hope, given their tradition on conceiving and conducting cutting-edge innovation projects. Although eager for innovation, we realized that the Secretary of Education lacked a critical mass of staff with a technical background.

The initial main project of the current secretary of education, Paulo Schmidt, was administrative decentralization. Instead of continuing to concentrate all the finan-

cial decisions (and bureaucracy) in one location, through the centralized apparatus of the secretariat, the secretary delegated the decisions about how to use the money to the committees of directors, teachers, and parents at the schools. At the beginning of each term, they received their share of the budget and could decide how to use it. Schmidt mentioned to us that 90% of the schools' roofs leaked; some schools had no paper and others no textbooks, yet all the schools were planning to build new stationery storage areas ([Schmidt *et al.* 2002], Schmidt *apud* [Cavallo 2002]). The lack of resources at the schools was not due to lack of funds, but rather to bureaucratic mismanagement. Material purchase was centralized, and they took so long to get to the school that building more storage area was the only solution for them, which would store paper for months or even years. The papers were reports that no one wanted, read, or used. Yet the secretariat continued to produce them (and to spend a considerable amount to produce them!). Yet, the feedback about the waste was never received or acted upon, until Schmidt took office.

The background of the Secretary, Paulo Schmidt, is unusual for a Secretary of Education – but is also an explanation of the conception, implementation and success of some of his initiatives. He is a Mechanical Engineer who spent most of his professional life working with quality assurance and Japanese management techniques. Moreover, he has a philosophical commitment to empowerment and decentralization. He did it for the schools and he also does it for his staff. That was one of the reasons we had trouble starting – when you delegate, things do not happen at the same pace you desire – but once they begin, they are more sustainable.

The decentralization scheme was also used for educational technology. Some companies were selected by the secretary through an expo fair, where they offered their products and schools could visit, view, interrogate and choose. In addition to the empowerment through local choice, another clear advantage was that all the process of buying and implementing technology was much faster. An important downside, however, was that the marketing strategies used by the companies were taking advantage of the lack of technical and pedagogical back-

ground of the schools administrators [Schmidt *et al.* 2002]. The vast majority software was presented in packages, and Computer-aided Instruction (CAI) was the predominant kind. Different schools had different versions of Logo, for instance, just because they prefered different companies as their technology providers, and not for the quality of the product. For commercial reasons, different companies would not carry the same version of Logo, for instance. Also, the training was product-based and delivered on an industrial basis to the schools, concentrating on simple technical aspects (e.g. names of commands, where to click, etc.) and ignoring the learning aspects.

The overall result was that the companies, and not the schools or the secretary of education, was in fact defining the educational technology policy, taking advantage of their aggressive marketing and technical experience. Obviously, there was a very positive upside as well: the schools had access to computers in a much faster way.

The three contexts have in common the willingness to introduce new technologies in their systems, which are very different. São Paulo has a centralized management model, while Curitiba has a decentralized one. Bradesco Foundation is private and agile, while Secretariats of Education are public, heavy and slow bureaucratic structures. Ideologically, they are also quite different. To work within those very diverse scenarios demonstrated that although the overall operation of school is the same across those systems, their differences only surface when we make a more fine-grained analysis of the **Learning Atmosphere.**

3   Case studies

Nunca tivemos gramáticas, nem coleções de velhos vegetais. E nunca soubemos o que era urbano, suburbano, fronteiriço e continental.

Contra todos os importadores de consciência enlatada. A existência palpável da vida. E a mentalidade pré-lógica para o sr. Lévy-Bruhl estudar.

3.1. São Paulo: participative project design

3.1.1. One million students

Our contact with the Municipal Secretariat of Education of São Paulo began in January 2001. A new administration was beginning in the city, we approached them and proposed a collaboration. The previous mayor departed with one of the worst opinion polls ever. Seventy-eight percent of the population considered his administration bad or very bad, with a 1.8 out of 10 average grade [2000]. There was a lot of anticipation about the new mayor, Marta Suplicy, a woman from the left-wing Partido dos Trabalhadores (PT, meaning Workers' Party). She made education one of her priorities through the campaign.

She had a hard time finding a Secretary of Education. It is a risky business for any politician to assume the responsibility for recuperating a educational system of one million students and nine hundred schools immersed in crisis, especially considering the high expectations, the huge and heavy bureaucratic structure, and the strict supervision from the governing party.

Finally, Suplicy named as her Secretary of Education Prof. Fernando José de Almeida, a renowned progressive educator and former deputy provost of the Catholic University of São Paulo. He is also a specialist in technologies for education.

We believed that this was an appealing combination of events, and that it would be interesting to try working together. Also, Almeida knew Edith Ackerman from our research group at MIT very well, and has had a fruitful collaboration with her. He is also known in the Piagetian *milieu*.

On the first meeting, Almeida expressed his concern with pilot studies that never go beyond the pilot stage, and how the recently elected municipal administration was gearing projects for inclusion:

Quality for a few is privilege.
[Almeida 2001a]

Almeida challenged us to come up with an idea that could be implemented in all nine hundred schools of his network. We brainstormed for two months within our group around these issues. On one hand, we wanted to present something that would be innovative and go deep on the learning side. We also wished to avoid having the project extend too far at the expense of being too superficial. On the other hand, we aimed for a formulation that would not be intrinsically excluding, either by being too expensive, too dependent on our presence, or not customized enough to fit the diversity of the schools of São Paulo. This was a difficult design tension, and also a research question: is it possible to come to a formulation flexible enough to be extended over a number of schools while still maintaining its depth?

Figure 4
Fernando Almeida, Edith
kerman and David Cavallo, in
front of the São Paulo map

After all those considerations were carefully discussed, we presented two ideas: Prof. David Cavallo had the idea of having the kids think about the city that they want 10 years in the future, proposing and building solutions using different expressive technologies. I proposed to use "Energy" as a possible theme for one of the projects, as there was a huge electric energy crisis in Brazil at that time.

3.1.2. The taming of the consultants

Flexibility was one of our main concerns. One conscious decision was not to hand in a four year plan, with closed ideas and schedules. We initially offered some ideas, and hoped people to contribute so that they would have ownership over the project. This eventually happened, even after some initial difficulties, but not without a hard effort to make it clear that we were not delivering an inflexible, ready, packaged project. Also, it meant that we had to change our initial plans of how to conduct things, how to invite people for workshops, how to formulate them. One indication that our approach was (at least partly) successful was that, even after Fernando Almeida left the Secretariat, there was still interest and motivation there, and the team managed to finally come up with a formulation that could be sustainable, and less dependent on our presence in São Paulo.

Further meetings we had, in March and May 2001, presented many ideas that were discussed and appreciated. Fernando Almeida suggested a name for the project: **"The City That We Want"**[6]. To differentiate ourselves from other similar projects (but having a very different methodology), I suggested adding a phrase to the name of the project: "The city that we want - and will build now"[7]. We often see essay or projects contests with themes such as "how will my country/city/family be in the future". We wanted to stress that we hoped for more than a simple exercise of imagination. Rather, we envisioned students creating projects for the real city, for the present time that would have real impact on everyday life. One extremely powerful aspect of the idea was to put together *technology* and the *Freirean principle* of working with themes/ideas that are meaningful to the students and their community.

Although the idea seemed good, we knew we were in the beginning of a long path. First, we had to deal with the bureaucracy[8] of the Secretary of Education. The initial problem came in the first six months of 2001, when the person designated by Fernando Almeida to be our contact there (a consultant, not staff), turned out to be extremely hard to reach. Recognizing that the scheme was failing, Almeida changed the approach and the people. Then we were pointed to the DOT (Technical Orientation Department) team, who are also responsible for the "Educational Informatics" section. An organizational chart of the Secretary is pictured below.

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[6] "A cidade que a gente quer", in Portuguese

[7] "A cidade que a gente quer – e vamos fazer agora"

[8] I am using the word "bureaucracy" in its literal sense, without the derogatory sense normally associated with it.

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                              │    of Education     │
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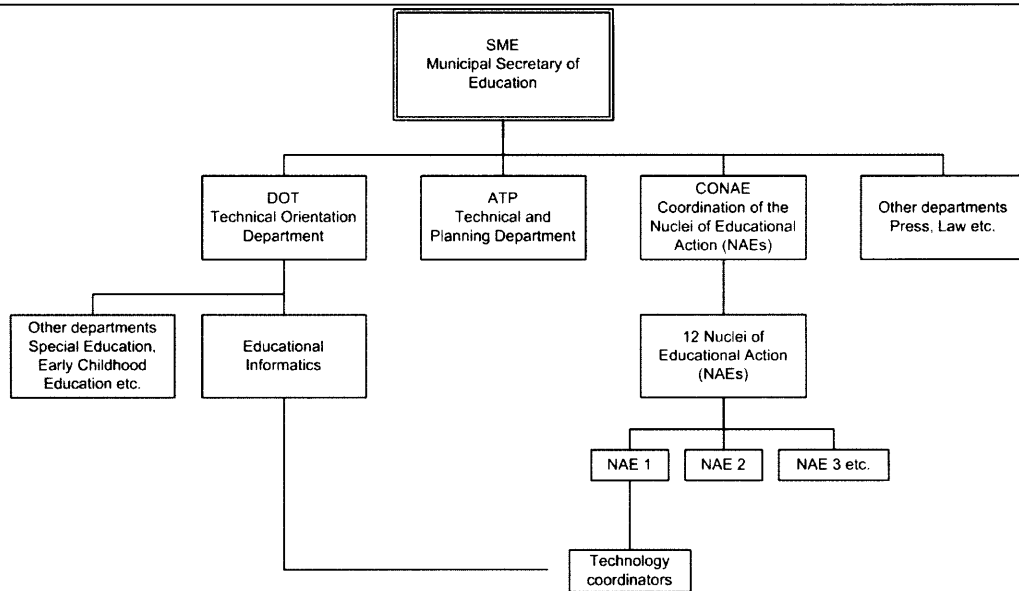
This first problem reveals one important issue about public education systems in Latin America. Because of the hiring restrictions it is very hard to hire some kinds of professionals as consultants or staff. One of the few ways is to hire them through a public competition, which takes months, or to appoint them to a specific post in the administration, with a full-time obligation (inconvenient for consultants, university professors etc.) and very low pay compared to the market value.

As a result, Fernando had to invite people to work with him as consultants, but with no pay. That status, however, is far from ideal. On one hand, they lack real power to implement ideas, as they are outsiders. On the other hand, they have different agendas and interests.

Our situation was not different. We were outsiders, with no legal connection to the Secretariat. The fact that Almeida's collaborators had this kind of profile posed new problems for us. We heard a number of times, in personal conversations, that there would be no reason for working with MIT when many Brazilian universities could do the same work. As the collaborators were mostly professors from

universities (that claimed to have experience in Logo, Lego, Constructionism etc.), we were in fact competitors to them.

We ended up getting into disagreements (more silent and subtle, though) with some of the consultants. They claimed that our project should be in harmony and inside the "bigger project" of the Secretariat, and that it could not be isolated or separated from that. However, it was never actually clear what was actually meant by this "bigger" thing. There was a name but no bigger initiative. Our impression was that it was more a declaration of intent, a philosophical text on their beliefs in education than a real plan for action. It was never defined, concrete, or put into practice so far as we know. For the first time, also, we heard a phrase that would become almost an anti-slogan for the project:

> Project-based learning? Constructivism? Constructionism? Learner-centered education? We are already doing that.

We realized that it was very important to state our concrete contribution to the Secretariat, to show (and not only say) what we were proposing, what was unique, and how that could fit in to their reality.

3.1.3. Our concrete contribution: The Summer Institute

Fortunately, Almeida was both a very experienced educator and a good manager. When we invited him and his team for the Summer Institute, a two-week workshop for educational activists, he understood that it was his chance to disconnect the project from his person and engage the Secretariat in it, as an institution. He invited key people of the Secretariat – if they agreed with the project, things had more chances to move forward.

At the Summer Institute, they had a concrete experience with new ways of learning through the technology. They finally understood what we were bringing to the table. As one of the endeavors of this thesis is to talk about models of intervention in public education systems, it is important to point out the role of the Institute in the further development of the project. Serious education planners were doing hands-on activities, and seeing what we were proposing in practice. Also, technology coordinators were having a different experience with technol-

ogy. The Secretary himself came to the Institute for three days. On his last day, we had a meeting where he enthusiastically invited us to work with São Paulo.

The first step was concluded. It was no longer our proposal, but their invitation.

3.1.4. Energy and the "City that we want" project

We started then planning the next steps in the project.

I realized in some of my visits to Brazil in 2001 that the electric energy crisis was revealing some of Brazil's expertise: reutilizing objects in creative ways, improvising solutions, living with few resources, creating solutions for everyday problems, building strong social interaction, hacking[9]; as well as creating an important awareness towards the meaning of a finite source of energy.

Due to rain shortage and lack of investment, the Brazilian government announced in mid-2001 that the situation was critical and blackouts were bound to happen. One of the measures announced was to apply heavy fines to households that do not save twenty percent of their energy bill [Zimmermann 2002].

This event led to a big change in mindset, both in self-interest and in citizenship. My perception was that energy, normally considered to be an endless resource connected to personal comfort and success, became increasingly associated to waste and lack of solidarity – and was finite. Because of the 20% consumption reduction law, everyone had to learn. People started to understand electricity as a system. They realized, for instance, that a TV in stand-by mode could consume as much energy as hot shower – they added a **time** variable to their mental model of energy consumption, which previously was only based on the instantaneous or apparent power consumption of the device (water heaters, bulbs etc.). People also became more critical of marketing strategies, propaganda, companies, consumption, and waste [Nunes 2001].

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[9] Hacking here means finding creative solution for problems even when you do not have the right tools or parts. In Portuguese, people call it the "jeitinho brasileiro", or "the Brazilian way out"

The concrete result was an impressive twenty percent reduction of consumption all over the country. Even after the law was abolished, a five to ten percent reduction remained [Zimmermann 2002]. One could argue that these were just actions in self-interest and that there is nothing special in turning off lights when leaving your bedroom. However, things were not so simple. To cut an energy bill by twenty percent is a very hard task, which cannot be achieved with superficial changes. It is possible only with a dramatic redesign of day-to-day life, in a systemic way. That created an awareness in people not only for energy, but also for the finite supply of other natural resources, such as water, which was closely connected to energy generation.[10]

The rationale of choosing the "Energy" theme for the children in São Paulo was to profit from all of the expertise I expected to find in the schools and communities, together with a very particular event (the energy crisis).

For us, the energy project became a good, concrete, practical first step towards demonstrating our ideas, methodology, and tools, as well as to show the type of results. Our hope was that such a concrete step would differentiate what we were proposing from the proposals of others that shared some of the same discourse but lacked the same practice.

3.2. Heliópolis: proof of concept

3.2.1. Rationale

Heliópolis was the second step of the project. After the planners were convinced that there was an interesting collaboration in sight, it was time to show what was possible with the tools, ideas and methodologies that we had. As a proof of con-

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[10] The greatest irony and cruelty of the process came later. As the energy distribution in Brazil was privatized, the companies started to have lower profits after the crisis, as people were saving energy. Then, in a surreal move, some of the companies started a marketing campaign to convince people to increase their consumption. One of the strategies was to send free microwave popcorn bags to customers, to stimulate the use of the now demodé device.

Fortunately, after a couple of months, the campaign was called off. However, to make up for the loss, the government authorized two increases and a special tax in the energy bill to make up for the reduction in profits.

cept, the Heliópolis workshop was an after-school thirteen-day program, with twenty kids with ages from eleven to fourteen.

3.2.2. Preparation

I imagined that it would be interesting to have kids model and interfere in the change, designing devices and ways to save energy. However, we also wanted to engage them in a discussion about the causes of the energy crisis, the society of consumption, industrial policy, etc.

In August we decided together with Almeida's team to run two workshops: one for the team of "Educational Informatics" from the Secretariat (see Figure 5) and one with students from a school that we would choose. Both workshops would be around the "Energy" theme – or, as Edith Ackerman suggested:

> To solve the problem of energy, which was caused by the new technologies, with the new technologies. [Ackermann 2001a]

The Education Informatics team and I visited three different schools, showing the technology, talking about the ideas of the project. Everyone was extremely excited. They said that kids were waiting for something different, something exciting.

Finally, we settled on the Campos Salles[11] School, located in the shantytown of Heliópolis, one of the poorest regions in São Paulo. There were many reasons for the decision: it was a school with significant experience in carrying out projects with the community, the political orientation of the community leaders was similar to the one of the Partido dos Trabalhadores (Workers' Party)[12], and it was located inside a shantytown, which would allow a very close contact with the community.

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[11] Manoel Ferraz de Campos Salles is the name of a former president of Brasil, from 1898 to 1902.

[12] That's a personal observation, as this was not explicitly declared.

Figure 6
he patio of the Campos Salles
School

Figure 7
The sports court

We have been opening the school to the community for some years now. (Idalina, principal of the Campos Salles School)

The school, therefore, seemed a very interesting and challenging place. The first talk we had with the Campos Salles principal, still during the selection process, revealed that they had some other projects going on, most of them in the direction of opening the school to the community. After they mentioned the good relationship they had with the UNAS (the Heliópolis Resident's Association) and its president, João Miranda, a much respected community leader, I asked if he could come for a talk before the workshop, to see how we could collaborate.

3.2.3. Low-cost materials

It was impossible to ignore that the use of expensive materials would be an immediate obstacle for the kids. I tried to get, as much as I could, cheap, local and found materials. This decision was important to avoid the usual (and reasonable) argument that technology is just too expensive – especially for people living in a shantytown or in a city as diverse as São Paulo is. I bought various materials in the Santa Efigênia Street in São Paulo, the "electronics street" of the city, including some broken or old tape recorders, microphones, telephones, computer boards, and other various electronics equipment. I assembled one toolbox and one electronics box for about US$ 20.00.

Figure 8
The electronics toolbox after a
week of use

I also acquired a number of arts materials and borrowed Lego Robolab kits[13]. We had one Digital (DV) video camera and two digital still cameras. The school had a computer lab, equipped with 20 IBM-compatible 486 machines. Although they were quite old, they were enough for the programming and for simple image editing.

Roseli de Deus Lopes, a professor of the Engineering School of the University of São Paulo, who had also been to the Summer Institute in Mexico, was crucial in the preparation phase. She got four of her undergraduate students to go and help during the workshop on alternate days. A graduate student from the Communications and Arts School got to know about the workshop and asked to go and help working on videos with the students.

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[13] The Lego Robolab kits originated from a research at the MIT Media Lab. Apart from the regular Lego gears and pieces, the kits included one microcontroller device that can be programmed and connected to motors, lights, actuator and different sensors.

Everything was ready to go, and it seemed that things should go well: we had materials, the energy theme, students to help, support from the school, and from the Secretariat of Education.

3.2.4. Openness to real reality

On August 20th, one day before the workshop, we briefly met João Miranda, the community leader, to explain the goals of the "energy" workshop.

Everything turned upside-down.

Before the talk, I was sure that, by identifying a theme that was important locally (the energy crisis), I was proposing something close to their reality and to their interest, as we discussed in the previous section.

However, as João Miranda told me, and the students would confirm later, the energy crisis had a whole different meaning for them. It was radically different from preventing the use of microwave ovens or a second elevator in an apartment building.

My middle-class take of the energy crisis was, indeed, completely different from theirs. I had a set of possible projects in mind, such as building galvanometers, timer devices, waters heaters, energy generators, robots to switch lights etc. I wanted to work with them on modeling and understanding the energy consumption of a household, and trying to identify the critical devices, looking for implications and alternatives. In addition, by having a model, we could extrapolate them for the city, the whole country and the planet. How much energy goes to TVs in stand-by mode in Brazil? Most of those things, it turned out, were meaningless for them.

The real issue was a lot different, and constitutes a canonical example of the importance of having multiple media, openness for diversity, a flexible set of expectations, and being truly open and adaptive to the concepts and interests of the learners and their communities. Many project-based learning attempts pre-ordain the project based upon the educators' interests and culture and then impose.

João Miranda estimates that more than half of the households in Heliópolis have illegal energy connections. This was a first indication of one important aspect of the Brazilian culture: the *jeitinho*, a way through which you can solve problems in unusual ways. On June 17th 1996, a tragic fire killed four people, including one newborn baby. Sixty people were hurt and twenty houses burned [1996], [Gentille 1996]. The apparent cause was an illegal energy connection.

Figure 9
A view of Heliópolis

Six years later, the situation was not that different. More than half houses did not have an energy meter, and the rest pay the minimum fee. However, with the energy crisis, the recently privatized utility company became more rigorous in reading the meters and charging customers. Most of them could not afford the energy bill anymore, and were disconnected. On the following day they managed to create an illegal connection for themselves – using the Brazilian *jeitinho*.

Figure 10
Illegal energy connection in
Heliópolis

The problem was that the transformers were designed to only handle the "legal" number of energy connections. As a result, with more than the double of the load, they would eventually overheat and burn – causing either fires or a blackout that could last for days, as there was no interest from the utility company to come and fix it [Miranda 2001].

After that discussion, my existing expectations were fortunately destroyed. If they did not have meters in their houses, why would it be meaningful to comply with the twenty percent cut rule established by the government? If they did not have microwave ovens or a handful of TV sets at home, what could they save? Saving energy was important, of course, because they also had a sense of citizenship. Nevertheless, while middle class families were disconnecting their second refrigerators, people in Heliópolis were fighting for their safety and survival, afraid of the blackouts and possible fires. Energy was a completely different issue there, and that definitely changed the direction of the projects that people would do.

I realized that the only person that could open the workshop was João Miranda himself – he knew their reality, their lives, and the kids knew that.

Energy is a matter of safety and survival here. (João Miranda)

After João Miranda's talk, I screened a five-minute scene from Stanley Kubrick's **2001, A Space Odyssey**. I chose the scene where the ape discovers the bone as a weapon and a tool. We initiated a discussion about the importance of knowing how to use the tools. The students had some interesting responses:

> **Mauricio (7th grade):** He discovered the tool. A tool exists to make your life better. The person that have the tools can be more successful than the one that does not.

> **Marcos (8th grade):** Inequality... It should have been used for the good, not to hit other people. Who can use one tool has an advantage. [ParticipantsHP 2001]

However, the idea is not to say that **2001** is a good movie for opening workshops. The point is that I was trying to use all the resources I had to rapidly prototype and test-drive activities, and trying to get closer to the participants using different techniques. That was also a first step to create a different **Learning Atmosphere**, starting with an unexpected element - non-didactic, enjoyable, and not necessarily related to the main theme. That was key to creating initial displacement, and opening up to a different learning atmosphere. Showing the movie ended up being successful, so on the next day I brought a scene from Hitchcock's movie "The man that knew too much", where diversity and cultural

differences are portrayed. The brainstorming was rich and, for that group, movies were a good entry point for discussing and getting familiar. However, after a few days, people were so involved in their projects that movies were disruptive. Even still, because I considered that some disruption would be positive, I screened other movies: pieces of scientific documentaries, movies directed by students in other schools etc. I realized that even showing movies cannot become a habit, as some students were sometimes not acting very spontaneously – I had the impression that they got my 'trick' about showing movies, and were often trying to please me with comments that they knew I would like.

Figure 11
eening *2001* and showing the
equipment on the first day

3.2.5. Openness to real diversity

As children were engaging in some initial activities with Lego or playing Solitaire, some girls were alone, wandering around the classroom. I started to feel tense, and was not sure about the best way to help them engage in some activity. Having realized that some of them, such as Roseli, were not interested in Energy or

Lego, I asked my advisor for advice, on a phone conversation. His answer, although apparently simple, lead to a turning point in the workshop, and made me aware of the fundamental issue about the management of diversity:

> Get to know them as people. The ideas for the projects will depart from that. [Cavallo 2001]

Getting to know people *as people* requires time investment. That means, in the first place, spending time talking to the students and taking them seriously. Not to my surprise, they realize quickly when I was just being diplomatic or rhetorical. One of the most personally rewarding moments was the lunches we had at the McFavela (McShantytown), an old snack place nearby the school. I took all the students there for lunch a couple of times. We talked about their lives, their parents, their dreams, their plans for the future, and more. They asked me about my life in the United States, my girlfriend, and my advisor. We made fun of each other, I asked them about their dreams in life. I got to know that Roseli wanted to be a famous singer, Luis wanted to be rich, Claudio wanted to be an honorable man, Suellen wanted to be a model. They got to know my dreams, my frustrations, and we slowly started to build affective bonds that would grow much stronger than I ever imagined.

Edith Ackerman describes the role of a teacher in alternative learning environments as a connector [Ackermann 2001a], someone that should know the students talents and skills and make the most of them towards a collective learning experience and putting together a whole that would be far more valuable than the parts.

That is not only true for the formal activities of the classroom, but also for the constitution of the Learning Atmosphere. Roseli wanted to be a singer and was very religious. I suggested her to sing for the class with her band and to bring CDs for the class to listen. Even though she was still shy, I noticed that she appreciated the idea. A couple of days later, during a bus trip, she started to sing for the group, and finished the workshop as one of the most popular and engaged students – as well as building the "Praying tower", a complex Lego mechanism of a foldable tower.

Daiane was also in the same situation, and I suggested her to tape and interview their friends working. She not only did a great job as an interviewer and camerawoman, but also became a very requested person in the group, to teach other how to use the camera. The familiarity that she got with the camera was a starting point for other projects such as the photo novel and the documentaries.

3.2.6. Openness to real mess

When still and video cameras are seen for the first time, children get fairly excited. They take pictures of friends, teachers and themselves. They are thrilled to see the pictures available right away with a digital camera, and that changes the whole dynamic of using photography in learning environments. However, that moment of excitement was criticized by some teachers (especially in the Fundação Bradesco workshops) – to their mind, they were just fooling around with the expensive equipment without any specific goal. However, learning digital technologies happens in fundamentally different ways than the conventional curricular content[14]. People often learn much more by fooling around with computers and cameras than by reading manuals. Many of the students declared that they had learned complex software, as Macromedia Flash or Adobe Photoshop, or electronics, just by playing around with them [ParticipantsBD1 2002], [ParticipantsBD2 2002]. As soon as they get familiar with the tool, they start to think of deeper ideas for projects.

That was the case in Heliópolis. As Daiane got more and more comfortable with her reporter/camerawoman position, she began doing more interesting interviews. By the last days, they looked like almost professional journalists. Also, having students self-documenting their work opens more space for them to talk and criticize openly.

> **Daiane:** What do you think about the course?

> **Girl:** It's cool, but I did not understand what the course is trying to 'pass' to us [this girl quit the workshop after the second day, for personal reasons]

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[14] It is true that this also happens with other constructive technologies, such as car mechanics. But digital technologies take this to a much further point.

Daiane: What do you think about the teachers?

Suellen: I think they are nice, they respect our ideas, we respect theirs. [...] If the teacher cares about you, you get interested. [ParticipantsHP 2001]

Suellen's statement shows that, right in the first two days, the issue of trust and respect was surfacing. She did not only declare that the teachers were respecting her ideas – she almost implied that this was a precondition for her to respect the teachers' ideas. Suellen was not only revealing that she was waiting for respect from me, but also that she realized the workshop was based on a set of different ideas. She understood that, in a way, we both were in the same position: I had my project (the workshop) and they were part of it, but they also wanted respect for their projects/ideas.

3.2.7. Building real trust

All the material (Legos, arts materials, electronics materials, my own notebook) were scattered all over the floor of the room. I showed them some basic Lego mechanisms and how the Yellow Brick[15] worked. I started to go around the room, helping the small groups that were being formed. About fifteen minutes later, when I looked back at my notebook computer, which was on the floor, two students were already doing some simple programs and downloading to the Yellow Brick. They have never touched a computer like that, and hardly knew what programming a computer was like.

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[15] The yellow brick is the miniature programmable computer that comes with the Lego Mindstorms kit. It is possible to attach sensors, motors, relays and lights to it.

Figure 12
Kids programming the Lego
Yellow Brick, on the first days.
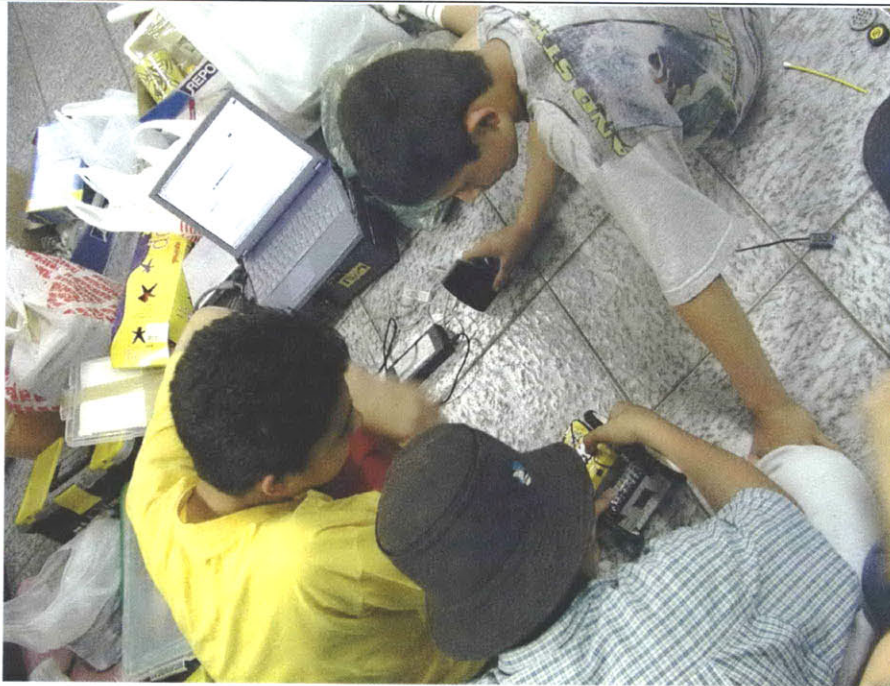
However, the fact that a supposedly expensive computer was lying on the floor, available to be used, was extremely meaningful for them. That was clear in the final interviews with the participants, when at least half of them pointed out the "freedom to use the equipment" as one of the things they liked most. Putting my notebook computer on the floor and allowing them to use it was one fundamental *displacement* that constituted one of the most important findings of the workshop: the meaning of allowing free access to the equipment – and the consequences of denying it.

But that was not their usual way of working. In the Campos Salles school, the computer lab teacher/coordinator (POIE[16] is the acronym in Portuguese) always deleted the MS Windows™ games from the computers, but the students managed to reinstall them every time. Some kids, such as Marcos, who was older than the others and one of the few that worked in an office, did not get very interested in the materials we had at first. He observed a lot, did some Lego, but

---

[16] **Professor Orientador de Infomática Educativa**

would most of the time play Solitaire. Whenever I approached, he would try to hide the game or close the window. I said to him that it was OK to play, and that he did not need to stop playing. That event happened a couple of times with other kids, and ended up to be an interesting issue. Computer games have a reputation of being a useless distraction. Teachers delete them from the computers. However, the real problem was not about the use of time, but both about the politics and the respect to the individual timing.

Obviously they knew that I would see them playing – and maybe were testing to see how far I would go with my discourse [Cavallo 2001]. On the other hand, some of them needed time to think (or not), to observe others without the embarrassment of being alone, or simply some rest. As a result, playing the game had many additional dimensions. However, after hours or days of playing Solitaire, students such as Marcos started to engage in projects, either building with Lego, helping others out, etc. Without the prohibition, playing Solitaire gradually became an activity less enjoyable than building and thinking about projects. In fact, it became part of their daily activities. Some would play Solitaire a little and then work. Some would use Solitaire as a reflection moment, some as fun, some as a self-reward. Most of them did not have computers at home, nor money to go to an arcade. That was one the few moments they had to play with the computer and, although that could have meant a little less time to work on projects, my perception was that the frustration of being (again) forbidden to play would be far more harmful to the Learning Atmosphere.

I realized that there was no objective reason to be against some gaming within the workshop. As we were designing a new experience for all, assumptions had to be revised. Instead of setting up rules from the beginning, I perceived that they realized I was demonstrating trust and respect by counting on their common sense and responsibility.

Figure 13
Solitaire at the Heliópolis
workshop

Figure 14
The concentrated student is
actually...playing pinball!!
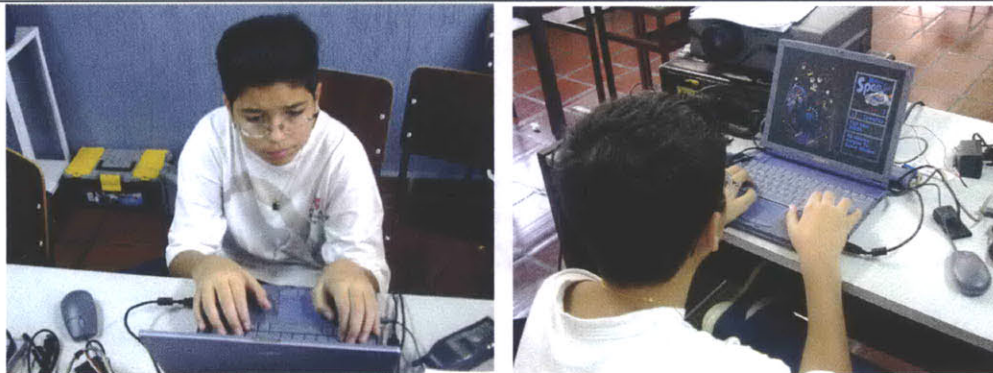
3.2.8. Multiple media

Monalisa and Gleidiane were not so excited about Lego, but they liked arts a lot, as well as taking pictures of one another in "fashion-model" poses. Monalisa painted a picture in the first day. Then she and Gleidiane began exploring the other arts materials, making small figures and miniature furniture. They decided to build a house to put their furniture inside, doing a little claymation.

Figure 15
The furniture of Monalisa and
Gleidiane
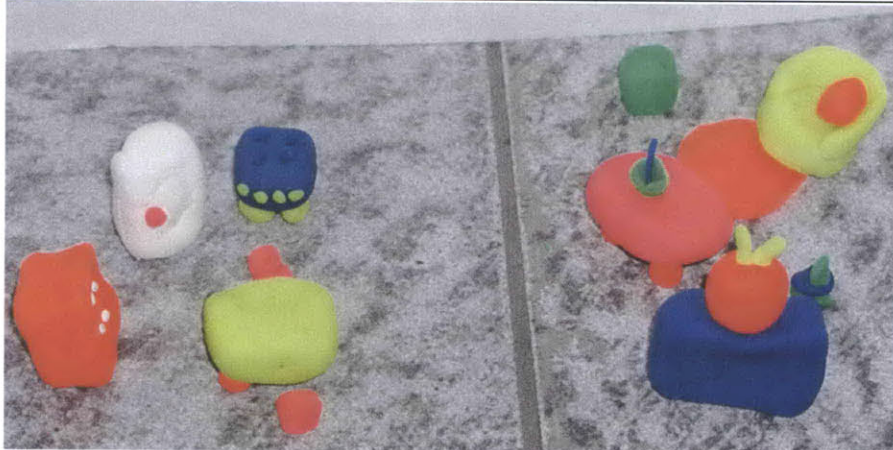
Figure 16
The furniture inside the house

They were extremely happy with it, but I had a concern: their house had nothing technological. There were no robotics, no programming, no digital stuff. We care about those technologies because they open up many possibilities that conventional material do not allow. I was tempted to give some ideas about how to integrate robotics into the house, but it was clear to me that it would be an imposition from my part. But something else happened: while I was helping Monalisa and Gleidiane, two other girls, Edilene and Mauriza (8ᵗʰ grade, 14-years old), came

to ask for help to learn robotics programming. When the session was over, Edilene and Mauriza were in search of an idea. I suggested them to team up with Monalisa and Gleidiane and see what they could do together, as they had then both the robotics and the arts experience and interest.

Finally, Mauriza and Edilene had the idea of adding up some stuff to the house. Their first idea was an automatic front door. The original creators of the house continued together with them for a couple of hours, but then decided to leave and do more painting.

Everybody was happy: one group had found a project in which adding technology *was meaningful for them*, and the other, satisfied with the house, wanted to move to more complex painting challenges. Gleidiane, the youngest of all the girls, who had the original idea, was interviewed shortly after and proudly declared:

> I had the idea of the house, now Mauriza and Gleidiane are working on it, but I want to move on to do more paintings. [ParticipantsHP 2001]

Figure 17
Monalisa's and Gleidiane's
irtwork in the computer room.

I was also glad; realizing that making sure technology shows up in every project was the wrong thing to do. What happened in the house project illustrates that having a multiplicity of expressive tools and a convivial space opens up new possibilities for real collaborative work. The fruitful collaboration between the "architect-girls" and the "engineers-girls" was one example of the synergy that can take place in such environments. Neither group gave away their ownership of the idea and the project, but kindly agreed to share the credit for a collective work, to which each one contributed their own interests. That is, in fact, how adults work on projects, but very uncommon in school. Normally, the opposite happens: schools claim that some of its worst characteristics are needed to prepare students to work in the "real world" [ParticipantsBD2 2002], yet the most important part of how people work it is often ignored. I heard teachers in the Bradesco Foundation school, for instance justifying some unpopular impositions as a way to "train them for the workplace".

Mauriza and Edilene went on with the automatic door. The mechanism was not simple, and they spent the rest of the day figuring out ways to make the door open and close with just one motor and a string.

Figure 18
door of Mauriza and Edilene

When it was ready, we met and talked. They asked what else they could connect to the Yellow Brick, and I suggested a light bulb. So they said:

> If we can make the door open and close, we can do the same with the lights. We can build a house that turns its lights off when people leave it, or turn on when they get in. [ParticipantsHP 2001]

As we did not have Lego light bulbs, we disassembled a broken flashlight and got the bulb and the socket. At that point, some other people were quite experienced in soldering and helped Edilene to solder the Lego connectors to the bulb. We went on discussing possible ideas and they wanted to integrate sensors. Their idea was to build a temperature controlled fan that would turn on and off automatically depending on the temperature of the room.

They got the sensor idea and the conditional programming part quite quickly. The hardest part was to make the actual fan. I told them to look around and see if they saw a real fan. They have found a fan right in the ceiling of the computer lab, and tried to copy its shape in cardboard, but it was not working well. They also said that there were no motors around to test it – all were being used in other projects.

We had two broken tape recorders around, and I suggested them to disassemble them and look for motors. They were so proud to get a motor for less than 50 cents instead of the US$ 20.00 Lego motor that it became their favorite story. They attached the cardboard 'cross' to the motor and turned it on. No wind came out from it. Their fan and the ceiling fan seemed the same for them, so I asked:

> **Paulo:** Why does a fan generate wind?
>
> **Girls:** It turns.
>
> **Paulo:** So everything that turns generates wind?
>
> **Girls:** I don't know... I guess...

After a lot of reflection, comparison and observation, they finally realized that the difference was the shape of the blades. So they just bended a little the blades and – voilà – there was wind.

Figure 19
e motor came from a broken
tape recorder
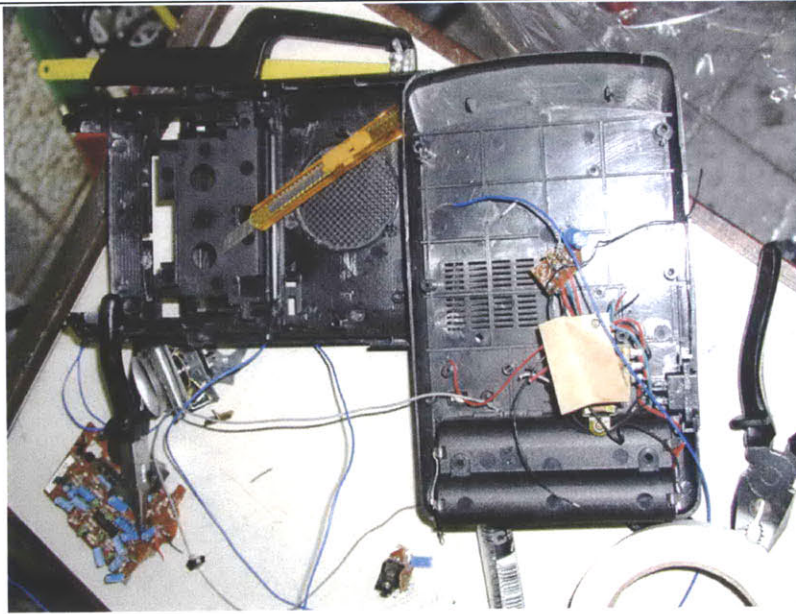
Figure 20
The cardboard fan
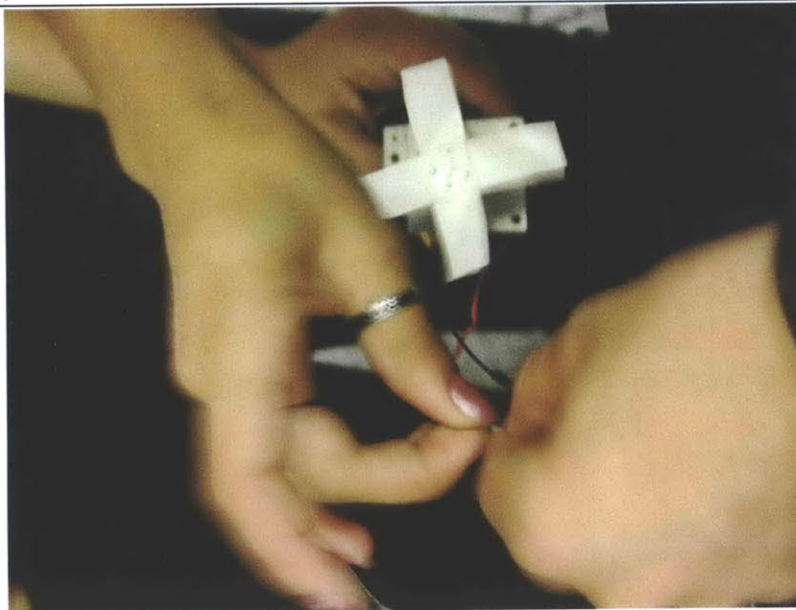
Figure 21
he US$ 20.00 Lego motor and
the free tape recorder motor
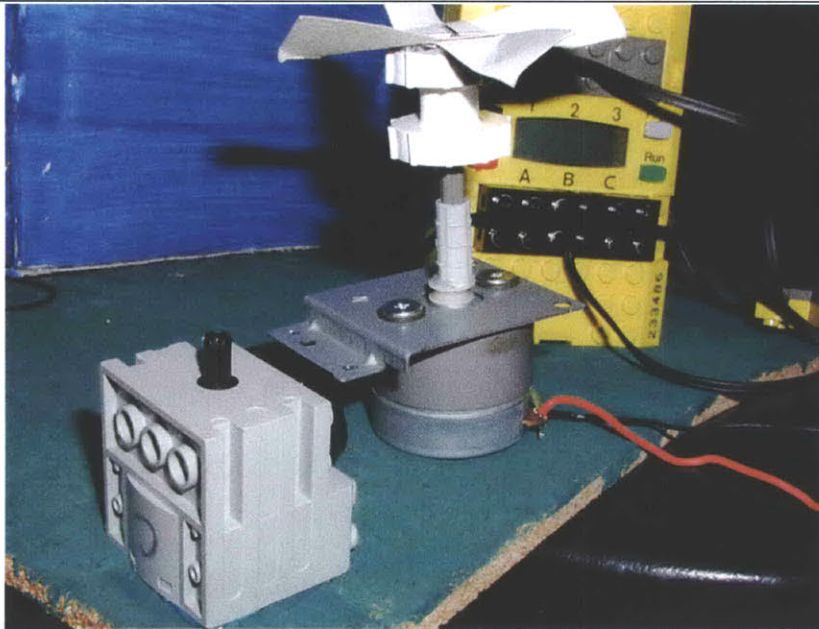
Engaging in robotics through a completely unpredictable path, Mauriza and Gleidiane learned about electronics, sensors, fans, architecture engineering, soldering, and voltage. They reflected about ways to save energy. This shows that, although for most families in Heliópolis energy saving was not the main issue, it was still meaningful for them in some ways.

I knew something (how to build a fan) but did not want to tell them right away. I wanted to lead them to discover by themselves, which they did. For me, the process of leading this discovery was fascinating, but for them it was just another part of the many things they learned for their project. As I could perceive from their final interviews, they were not especially fascinated with aerodynamics or electricity for its own sake, but with their projects and all that they achieved and discovered. This demonstrates another important aspect of the learning atmosphere: that the process of construction and learning, and the reflection on this process and the learners' own realization of their growth, is far more important than the end product.

One of the most important parts of the project was that they were not only building a house to save energy, but also their method of building the house was eco-

logical. That meta-sense was one of the most appealing characteristics of the projects for the others and for the people that came to see the results of the workshop. Instead of using the expensive Lego motors, they disassembled something that was regarded just as trash (the broken tape recorder) and took a motor from it. The US$ 20.00 LEGO motor ended up being free *and* environmentally-friendly.

That was particularly empowering for them. One of the big issues since the beginning was the *price of things, which they would ask many times over the days.* They suspected that a video camera would cost more than the yearly salary of their father or mother. Their parents were bus drivers, cleaning professionals, housewives, manual workers in industries, etc. Their monthly household income was under US$ 300.00[17] - sometimes much less than that. I told them that a Lego kit was US$ 200.00, which is more than what many households make each month. Being smart, they realized that such a cost equation would not work in their school. As a result, the reason to make low-cost materials is not only that it will make the materials affordable, but also that the participants of the workshop would believe in the sustainability of the project – and engage in it in a different way. Using the motor from a broken tape recorder, the girls were at the same time learning to work around problems (the *jeitinho,* so familiar to them, what to do when you do not have the right part) and giving a new meaning for an object seen before as trash. Some of the students (as well as teachers from the school) were happy with the activity, but knew that all those materials were excessively expensive for their school. Accordingly to Natalina, the principal, the whole school had around R$ 8,000.00 (US$ 3,000.00) *a year* to buy *all* materials (arts, paper, toilet paper etc.) for almost 1,500 students [Natalina 2001]. Although the workshop was designed to be a proof of concept, hiding or ignoring issues like cost is frustrating to the students because they know that they are not going through something sustainable.

---

[17] Accordingly to IBGE, only 4% of Brazilian families get more than R$ 4,000 a month (US$ 1,400.00 as of July 2002)

This issue also appeared in other projects, in which I realized that the participants were terribly engaged in this meta-construction, trying to find the parts they needed from broken devices or found materials. By the end of the workshop, most of them were using those materials instead of Lego pieces to build their projects – they appeared to feel more proud to assemble things with parts they found by themselves.

3.2.9. The water sensor

A similar story happened with Geraldo. He built many cars with cheap LEDs[18] and light bulbs. He and other boys would disassemble his cars, build another one and add a couple of features everyday.

He asked me to explain to him how to use the sensors. He wanted a water sensor. So I asked him to get me a glass of water. I connected a pair of wires to the Lego Yellow Brick and put it in the "View" mode, which allows you to monitor the sensor value of the brick itself. When I touched one wire to the other (closing the contact), the sensor value went to zero. When they were apart, the value was 1023. So I put the two wires in water, and the value dropped to 600. I asked Geraldo why that was happening.

> Geraldo: I don't have the slightest idea.
>
> Paulo: Why is it dangerous to step on a wet floor when there are electrical wires around?
>
> Geraldo: You can get a shock.
>
> Paulo: And why is that?
>
> Geraldo: Because water transmits energy.
>
> Paulo: So, again, why does the value change when I put the wires in the water?
>
> Geraldo: That's obvious. Because water transmits energy.

---

[18] Light Emitting Diodes, small colored lights.

Then I asked Geraldo to get some salt from the kitchen. We mixed the salt to the water and repeated the experiment. Now the value was 300, closer to the zero value of the closed contact.

Geraldo explained that the salt was making it easier for the water to conduct energy. On the next day, when we were starting to work, one of the students realized that the keyboard of one computer was acting in a very weird way. As it was the same computer Geraldo used the previous day, he went to have a look at it. He looked closely at the keyboard, tested it and concluded that someone dropped the salty water on it – his diagnosis was that the water inside the keyboard was damaging the circuits, 'transmitting' the energy to where it was not supposed to[19].

Again, the unpredictability of Geraldo's trajectory shows how learning happens in a different way. He knew beforehand that water conducts energy, but couldn't make the connection with the behavior of the simple sensor we built. The knowledge he had of energy and electricity was in a different realm. As soon as the connections started to be made, he was able to extend them to something completely new: the diagnosis of the keyboard's malfunction.

With the knowledge about how a water sensor works, Geraldo built a car that would avoid water, by turning around when it was detected. He used bulbs from broken flashlights and some 5 cents LEDs for the lights of the car. The water sensor (just a pair of wires, in fact) was placed underneath the car, bent in a way that ensured it would always touch the floor. After his car was completed, he baptized it as the **Cat Car**, and claimed that it could warn and help the driver in cases of flooding, detect the level of the water underneath the vehicle.

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[19] Using the funding I had for the workshop, I replaced the keyboard to the school.

Figure 22
ldo and his *Cat Car*, showing
he press and the Secretary of
Education
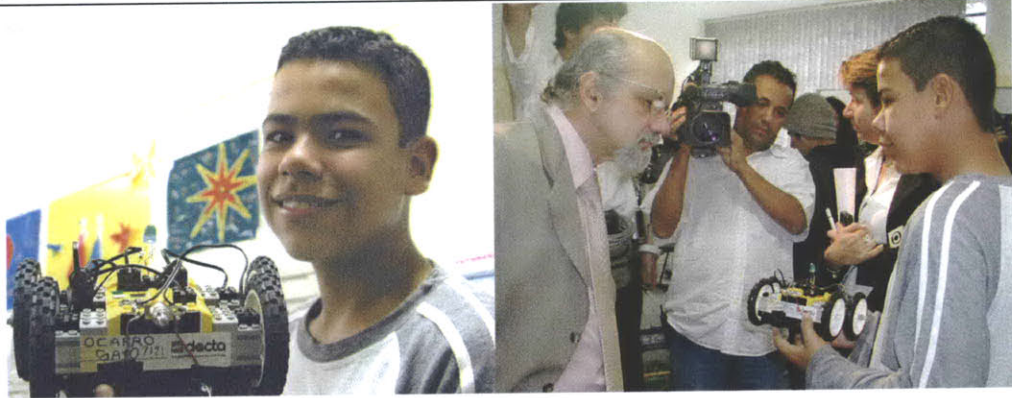
Figure 23
e water sensor: just two wires
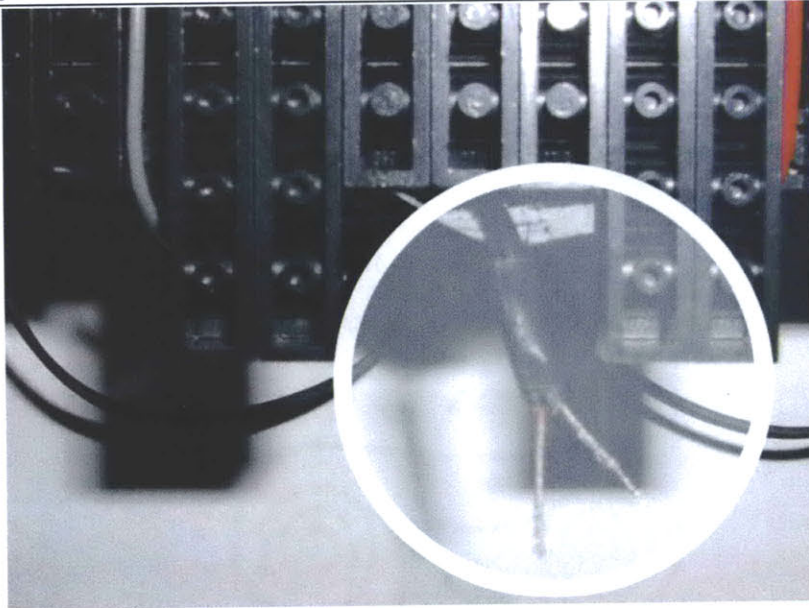
3.2.10.   The River documentary and the community radio station

On the third day of the workshop, I proposed to go out to the community with the cameras. Just two blocks away from the school, we found one of the poorest regions in the shantytown: the Bridge.

Figure 24

miserable bridge region. The
sewage from the houses goes
directly to the small river
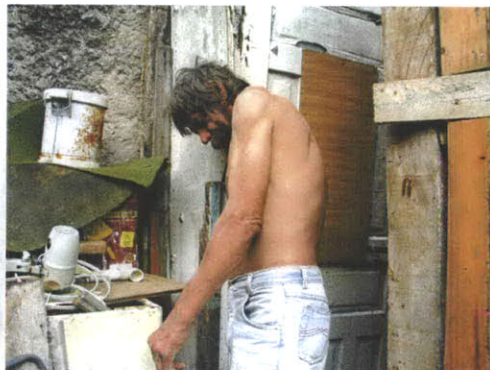
Figure 25
he trash and rats are a serious
threat for the children

It is above an extremely polluted river, and around 100 people live there in wooden houses, in precarious conditions. Energy connections are also terribly unsafe. The students interviewed five people there, asking them about their conditions and possible solutions, and filmed other children that lived there. The

houses were throwing their sewage directly into the river, which had lots of rats that would to bite children, transmitting all kinds of diseases.

Then we went to the community radio station, were they did another documentary. The radio station is one of the community's prides, with 25kW of power and more than 50,000 listeners.

On the way back, they showed their footage to the rest of the class. Part of the group stayed in the school working on robotics projects. Maurício, one of the boys, while watching the video took by the other group, saw the big pipes that carried the sewage from the houses. He proposed the idea of incorporating to the end of those pipes a small energy generator, which could be used to light the place up or just to store energy. He then built this small energy generator with a piece of PVC plastic, cork and small pieces of wood. He attached it to a Lego brick and saw that the energy could be easily stored in a capacitor, with the help of Claudino, who had spent the previous day working on experiment with the Yellow Brick, a solar panel and a Lego capacitor.

Another example of this synergy was that some kids got interested in knowing how radio waves work – as they have just seen the scenes of the documentary about *their* radio. The coordinator of the radio station declared that their transmitter had 25kW of power, while a big commercial radio could reach 1MW, and they were curious about the meaning of that. With the help of one plate with water and a stick, I explained propagation and attenuation of waves, the meaning of

the power of the transmitter of a radio station, the relationship between radio waves and light etc.

Some kids did not go to do the documentaries, but by watching the videos they had inspiration for other kinds of projects, and were helped by other kids that did yet more investigative projects. Had everyone been to the shooting of the documentary, as a regular school field trip, that synergy would never take place.

> "If I that know everyone has the same information and is doing the same thing, I would hide my project fearing that my colleague will copy my idea. However, if I know that everyone is doing different things, I would not bother if one idea of mine is in someone else's project, because they are so different." [ParticipantsWI 2002]

3.2.11.   Visits to USP, Estadão and the "Jornal da Escola"

Most of the time, students take school tours to **see** things outside. My idea was to go beyond that: since the kids have built robots, let us take them to a robotics lab at the University of São Paulo (USP). If they did video, we would take them to the university's TV station. Therefore, the lab or the TV would not be like a museum or an exhibition show, but a place to discuss and get inspiration.

We split in groups and visited various laboratories at the University: energy, solar energy, virtual reality, robotics, and TV station. One interesting and unexpected connection came from Claudino, who was one of the most interested in measuring and modeling energy consumption. While we were having lunch at the students' restaurant, he noticed that there were small signs next to the food with the caloric value. We had then an interesting discussion about energy in a broader sense, including how the human body generates energy, how food is transformed in energy, how much beans would be necessary to turn a light bulb on etc.

Figure 27
nergy everywhere: calories at
unchtime and Watts at home
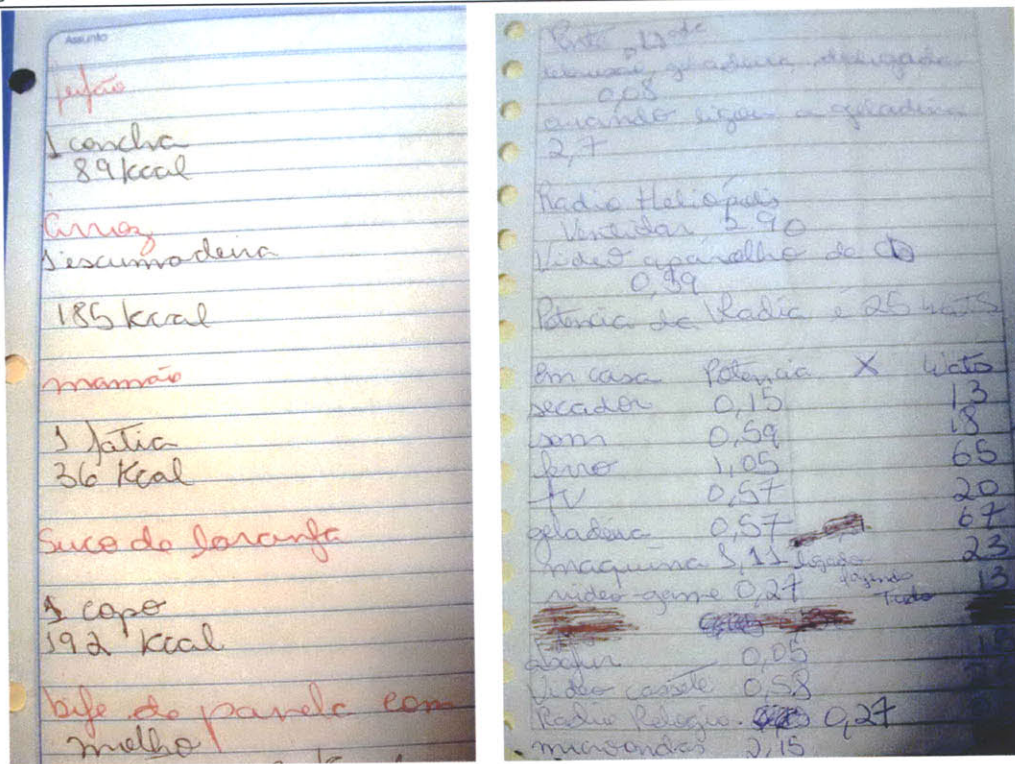
Figure 28
he Solar and Robotics labs and
the Digital Cave at USP

The second trip we did was to the Estado de São Paulo newspaper archive. Two people from Estado's staff were waiting for us. They proudly told me that all computers were ready and locked to do research only about two keywords: "Heliópolis" and "energy". As we spread all over the computers to do research about their community, the two Estado employees warned that internet access was not allowed. Even still, two students tried to access it – I was hiding them from the supervisor, but we were eventually caught.

Figure 29
The research at the Estado de
São Paulo archives

They started to read many articles about Heliópolis, but soon many of them wanted to do other researches, changing the keywords. The two employees replied that it was not possible, as all the machines were already set up for the research about energy. In fact, they were so used to receiving schools there that it seemed a perfectly reasonable way to do things. Normally students have little

time, the teacher has already set the theme, and they print some articles and go home.

But the students wanted more. They wanted to see if there was news about their theater group, or about the movie that had been was shot there. After a lot of negotiation, the employees finally agreed to let them use other keywords (which was an extremely simple operation), and we spent more than one hour there.

The result of the work was quite astonishing. Most of the news they found in the archive about their community was about drug dealers, violence, fires, accidents, and poverty. They just found one piece of news about the theater group they had there, and were very disappointed about the image that they might have to others.[20] "What about our theater group? What about the good things that happen there? What about our community projects?"

In a letter that Edilene sent me two weeks after the workshop, she expressed the same feeling:

> As you can see, this was the "big" report that our local newspaper published.
> Again, just a small thing. [...] Things like that make me so sad, I would bet
> that if it was been something about violence, they would have given a whole
> page to it. [ParticipantsHP 2001]

Everyone left Estado upset. I felt that they were quite saddened by their experience of the day and the realization of the public presentation of their community, their lives, and their value. They were feeling that, not only people considered them as *favelados* (pejorative slant for inhabitants of shantytown), but also their place was the most dangerous of the city – and nothing more. It looked like the visit to Estado took them back to reality and their supposedly "right" position: poor kids from the *favela*. However, there was one fundamental difference. By the way the visit was programmed, we could realize why schools visit Estado and what they seek in such environments: to know about a profession, to see big

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[20] One of the girls mentioned in her final interview that she felt very sad when one of the printing press employees said something negative when he found out that they were coming from Heliópolis.

printing machines and maybe do research about a predefined theme. Everyone knows that their research has already been done by someone else. They are there to pretend they are finding things by themselves – and they quickly understand the trick. Our visit to Estado was different. To begin with, we took Lego boxes and tools to work on projects, while other people were doing research in the archives. Other students took cameras to document the trip. We were there to augment the complexity of the projects, and integrate new and unexpected ideas and information to what they were doing. Finally, we were *already* involved in an empowering **Learning Atmosphere** – where they had much more control and freedom than usual. They were already creating projects of their own choice. I felt that they had already understood that we were in a fundamentally different experience.

Their response was one of the most powerful and moving moments of the workshop: as the big press was *not* talking in a *fair* way about Heliópolis, *they would make their own Jornal da Escola* (The School Newspaper), to talk about all the cultural events, community projects, and other things that happen there.

A group of about seven **girls** got together for the project. Girls, during the workshop, were usually in a leading position. That goes against the common idea that technology-rich environments are more suitable (or attract more interest) for males. By offering different expressive tools, we were providing many alternative points: video, journalism, robotics, programming, acting, and painting. This is not only about gender issues, but also about individual styles, histories of life, and preferences.

So they asked me how to do a newspaper. We went to a newsstand and bought one. They went through it and designed a plan for their publication: the sections, the possible articles, interviews, formatting etc. They even did the product analysis, discussing if they should charge for the newspaper or make it free, as well as get external funding. On the next day, they interviewed David Cavallo, my advisor, who was visiting the workshop. They had prepared all the questions on the day before, and had the entire interview prepared. They asked questions that demonstrated knowledge of international politics (e.g. if David Cavallo was related to

Domingo Cavallo, the former Argentinean Minister of Economy), and kept asking David Cavallo how was the interview – he replied that it was very good and much better than many conducted with him by professional journalists.

It bears mentioning that I have worked for many years with journalism (at my school, college and professionally), as well as television. That was also an influence for the kids, because their idea resonated with me and I had previous experience to help them with those projects.

One of the important parts of the newspaper would be a special supplement about secure energy connections. They realized that it was impossible to get rid of the illegal connections, but wanted to help people make them safer.

They took pictures of unsafe connections, crowed poles, and transformers, to illustrate the supplement.

Figure 30
Unsafe energy connection

Figure 31
Unsafe energy pole

Figure 32
Crowded poles

During the long bus trips, the group developed stronger affective bonds. Roseli was singing all the time using the bus microphone, everyone was taking pictures, talking, filming, and making jokes with the truck drivers. After the first trip, in which I had the opportunity to be closer to the kids in a different and more relaxed position, we really emerged as a group. During all the visits, people could do what they were interested in, separating in groups and continue to pursue their projects.

3.2.12.　　　The moviemaking projects

One of the collaborators of the workshop was trained as a journalist, and finishing her masters' degree in the Communications and Arts School of the University of São Paulo. She volunteered to come to the workshop help in the video part, two or three times a week. That was a big help for pushing the video projects deeper, as there was someone exclusively responsible for them. In other words, more assistance extends possibilities and the range of work, especially in unfamiliar areas with unfamiliar tools [Cavallo 2002].

As the students were learning how to use the digital camera, on the second day of the workshop, the group had the idea of telling a story with the camera. They did a small, four-picture story at first. Then we talked and I proposed them to do something longer. A group of girls did a photo-novel ("The spanked boyfriend"). It told the story of a guy who had two girlfriends, but ends up discovered and spanked by both of them. Two days later, we decided to retell the story using video. This time, they had to have a script, act, and plan the scenes. The spanked boyfriend storyline was not related to the energy theme, but I did not interfere. The process of creation and production of it helped to create the first friendship bonds in the group, once most of them were coming from different classes. This group activity helped more towards building a convivial atmosphere than the work with Lego inside the room, much more individualistic. On the next day, as we have already mentioned, the photo-novel group – with some new members – did three documentaries about their community and finally, on the last day, a full movie, with costumes, rehearsal, more acting, script etc.

Although having more people to help is good, there is an additional issue derived from inviting different specialists to run workshops - they do not necessarily share our view of how the workshop should be conducted.

We had various examples of collaborators. The journalist was one of them – and although the result of the projects she conducted was good, the students were divided. While some connected to her, others complained that her way of conducting the workshops was too directed.

During the shooting of the "Royal Family" movie, we observed that she set up some important technical rules. However, we saw that she was, in fact, directing the movie. That does not mean that the kids were only obeying orders, but we observed that the her idea of intervention was more biased to transmitting some knowledge and the quality of the final product, as her final statement to the students, on the closing day of the workshop, clearly demonstrated:

> *You wanted me to talk, now you have to listen...* [I had] the intention of getting the best out of you... [...] *I don't think you could do without me what you did...* [...] *I started to realize that what I brought was... reaching where I want to reach.* I was so happy with the results... I could hardly sleep. [...] It's nice to do a video workshop, *but it's better to do with people that think like you do...* It was my first time... *Some of you gave me a hard time...* others were OK ... You, Luis, you gave me a hard time. But you understood that if everyone is talking at the same time, we cannot do a video... and it's not only in video... it's in everything in life, *we have to pay attention, choose what we want and not disperse energy with other things...* [ParticipantsHP 2001]

Phrases like *"I don't think you could do without me what you did..."* and *"I started to realize that what I brought was reaching where I want to reach"* – are not absurd. It might be reasonable to say, "you could not do without me". Otherwise, we could just leave kids on their own. To me, it was uncomfortable (but understandable) that her choice was to say those words to the students as a last statement. The evaluation about the importance or the role of the facilitator was implicit all the time, and I did not find it appropriate to ask the students for a more formal recognition – or to do that myself. We knew we were friends, and it was not me on one side and them on the other side, but all of us together as a group. I considered that it would damage our relationship to say, on the last day, that they could not do anything without me. My option was to say that the best part of the workshop was actually coming from them. She preferred another way, and I felt that the class was perturbed about it – it seemed to be out of sync with the atmosphere.

Other collaborators, however, had a different attitude. Ana Maria, a psychologist working as a volunteer for the Municipal Secretariat of Education, came everyday to help. She was a fundamental help at all times, and let herself dive into the

workshop. By the last day, she was so excited that she proposed to go back to Heliópolis and do a follow-up activity. The same happened to Paulo Gonçalo[21] and others from the Secretariat of Education, who came for some days, and the engineering students from the University of São Paulo. Although some had a hard time adapting their technical language to something more understandable, they soon integrated themselves into the spirit of the work.

One of those students, Breno, who was considered handsome by the girls, became an actor for their movie. Girls were fighting to be his romantic pair. All the excitement about Breno helped to bring people together and create an even stronger affective bond among them. He came as an engineering student, but ended up more useful as an actor. Small details like these, normally overlooked in learning environments, are extremely important and demonstrated to have impact on the choice and quality of projects.

3.2.13. The exam

Almost at the end of the workshop, we had a small incident that turned out to be a nice opportunity for reflection. The key to the computer lab broke inside the lock. No one could open the door. We moved to a regular classroom, with no computers. So I proposed them to read a text by the Brazilian philosopher Rubem Alves[22]. It was a series of six essays about the "Bridge School", a radically alternative school in Portugal. They read the texts in small groups and we then discussed it. While some found similarities among what we did and the Bridge School, some pointed out that not all students are prepared for "freedom" – some would abuse it and not do anything. "Here we don't have much discipline" – they said.

So I proposed another activity: I told them that we would have an exam – but instead of answering my question I would like to know what questions they feel they were capable of answering after the workshop. They had more than 40 sentences filling up the whole blackboard. To my surprise, although the energy

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[21] One of the coordinators of Educational Informatics of the Secretariat.

[22] Thanks to Simone Custódio, who sent me the text.

theme was not very engaging for them in the beginning, many of the questions they suggested were about it. Some of them were precisely the kinds of questions one would find in a schoolbook, except that they learned them in action, talking to journalists, building things. Some of the questions are listed below:

- Why there will be an energy shortage?

- How to make a Lego wheel turn?

- What does a webmaster do?

- Why is it not raining in the country? (drought that causes the energy shortage)

- Why does the light of the LEGO capacitor goes on?

- How to turn the Yellow Brick on?

- Why is the word "why" is called why?

- What did we eat yesterday?

- What is a computer?

- How can we do a newspaper report?

- What do the calories mean?

- How to make a movie?

- How to use the camera?

- What is the power of the radio?

3.2.14.   Their final impressions

On the last day everyone was sad. We knew it was going to end. A strong affective bond had come to exist between us. Around noon, they gave me a collective letter, then we concluded the projects, the press came, and finally we started the farewell session. For me, the saddest part was to be aware of the hard path that remained in their lives: no opportunities, no respect from society – but still a lot of potential. In my opinion, one of the reasons for the strong affection among us

was that we evolved and learned together. Their closing remarks, reproduced below, show that almost all of them were "lost" at the beginning of the workshop. All of them, without exception, found some activity of their interest and did great projects.

Gleidiane: *In the beginning, I didn't know what to do.* I saw a lot of things here, I didn't know where to start. Now, at the end, I have a lot of ideas, but I can't make anything anymore, because it's the end... In the beginning I was lost... God, so many things, what am I going to do? But then, there was the idea of making the house, we put one little thing from here, one little thing from there... even this week we had things to do... and now it's the end, we are a little sad... but I know there will be another one... *I hope Paulo liked us all, because I think everyone here liked him...* we will all miss it a lot.

Mauriza: *At first I thought I was not going to get familiar* with all these instruments... It's so much stuff.... But then I began to like it, to like the people here, *to like Paulo also...* I'm sad because it's going to finish... The voice trembles... And I learned, I didn't really "learn", to use all of those things, the photo camera, all this things... to be in front of a camera... I liked it a lot. What I did the most was to work in the video workshop, always behind the cameras... what I like the most is to be behind the cameras... In the beginning I though this was very odd, *I didn't know what this course was about, I didn't know what I was supposed to do in the course,* and then I began to let myself in it more and more... loosing up... and seeing what was nice... we asked David to allow you to stay more, but he did not let you... I don't forgive him for that.

Geraldo: For me it was *a great experience, to get to know you,* everyone that came here... I have never worked with Lego, transferred a program from the computer to a car, now it's finishing... I hope it continues... Other schools should have it as well... and regarding you, *Paulo, you are a great person, understanding, and I think everyone here liked you, I hope you have liked us, I learned how to deal with us...* I hope that Jesus is with you wherever you are.

Monalisa: *In the beginning, I didn't know how to start.* I have never worked with Lego, but then, me, Marcos and Suellen, we started to make things, learn, to learn new things.... *I have never painted before...* and I painted those pictures... I liked it a lot.

Daiane: *In the beginning of the course... I spoke a lot... I didn't know what to do...* this course... made me go to places where I would not be otherwise, like Estadão... And I liked a lot because... I didn't do anything of much importance... But what I did I liked so much... If I could go back in time I would have done more, talk less and do more...

Suellen: *In the beginning, I talked a lot... I was lost...* I ended up not doing almost anything... It was nice... get to know other places, like USP, Estadão... go to the Mc Favela, eat a lot...

Marcos: *In the beginning, I did not do anything...* and now... also I don't do anything... (laughs). *In the beginning I did not know what do do...* I stayed in the computer all the time... playing cards... but now I play around with the Leks (everyone laughs at his confusion with Legos)... I liked it... I liked to go to all those new places... I don't know... (Laughs) I liked to go on the field trips.

Rosell: I started to get along with everyone... *I conquered Paulo's friend-ship...* I did only some things.. not as interesting as what I did today... I wrote a message to Paulo... We laughed a lot... we learned to take care of each other... the best thing was to have the friendship of you all...

Barbara: I learned a lot of things... to operate the camera, those small computers as Paulo's notebook, those things about electricity... *We went to many places that we could never go...* USP, Estadão...

3.2.15. The return, two months later

When I returned to Heliópolis, and met the group again, the most impressive fact was how much we were still friends and how quickly they re-adapted to the usual scheme of school – after all, there was no choice for them. It seemed that the affective bond was there, but the impact of the experience on their lives was vanishing.

That is not surprising. Two months later, one would not expect kids to go further in the work without any equipment, time or support. That demonstrated clearly that, although everyone had a good experience, workshops with no continuity are not a model for sustainable change. However, they had a different experience and they knew what was possible. It bears mentioning that, together with the Heliópolis workshop, which happened in the afternoons, I was conducting another one for the Secretariat's staff in the morning – that helped create the familiarity and fluency so that they could participate actively in the afternoon workshop, as facilitators.

*Heliópolis was the second step in our intervention model, after the Summer Insti-tute: **a successful proof of concept**. Teachers, the principal, staff from the Secre-tariat of Education and the Secretary himself saw that, even in a poor community, with little equipment, found materials, it was perfectly possible to offer a different experience to the kids, and they would learn about all fields of knowledge. That event gave us (the MIT group and the staff of the Secretariat) credibility to move the project forward. Although in the beginning of the conversations with the Sec-retary we had a skeptical welcome from some people in his staff, people were starting to see that our contribution was different and concrete.*

3.3. Artur Alvim: working within real school

3.3.1. Rationale

The five workshops of this third phase had a different goal. It was not anymore a proof of concept, but a way to get teachers familiar both with the tools and the methodologies we use when working in school. We had two phases: a two-week workshop for 24 technology coordinators from the 13 districts of the city, and four seven-day workshops in four different schools, with our group working with the coordinators, local teachers and kids.

3.3.2. The three great barriers – a beginning

The main goal then was to create enough fluency in the technology and method-ologies to give people the feeling that they could run workshops with their own resources (human and material). Of course, that goal would not be accomplished in four weeks, but that would be an important beginning. The "great three barri-ers" were the most important discoveries of this round of workshops, and how they were (at least partially) overcome: the **cost of equipment**, the **control over the students with technology**, and the **lack of self-confidence to use the technology.**

Those 'great barriers' appeared naturally during the work – and overcoming them is an example of the application of the concept of **Learning Atmosphere.**

We conducted the first workshop, for the technology coordinators, in the Digital Cave, a new facility in the Engineering School of the University of São Paulo, put together by Prof. Dr. Marcelo Zuffo and Prof. Dr. Roseli de Deus Lopes.

The Cave is the only five-wall unit in Latin America, and had a training room with computers. Doing the workshop there was an interesting displacement for the participants [Ackermann 2001a]: accustomed to schools or computers rooms, they came to a prestigious public university, together with engineering students, in a high-tech room, to learn technology. Two facts should be highlighted. First, this advanced lab is in Brazil - this eliminates the idea that it is not possible to do things with such advanced technologies. The lab was world-class, even compared to prestigious universities abroad, and thus another proof of concept.

The second fact is that, by coincidence, on the room next door to the Cave, there were final presentations of a design contest for the freshmen engineering students, in which they had to build cars that would go over an obstacle for the minimum price.

What they were doing was a design challenge similar to what we had showed them, discussed with them, and were about to do with them. This eliminated another important, albeit primarily rhetorical, barrier. Many complain that the projects we do are not theoretical. They may be fun, but where is the real learning, where is the formal aspect, where is the curriculum? However, here they saw the engineering students at the successful, prestigious university doing the same things we proposed for the students at the maligned public schools. If it provided a good education here, then it would be the same at the public schools. The coordinator of the project, a civil engineering professor, told our group that after many decades of conventional teaching, even the most traditional professors were admitting new ways of learning for the engineering students.

Figure 33
gineering students during the
car design challenge

Some of them were not familiar at all with programming or robotics, but the projects had an impressive complexity. We proposed them to work on the "city" theme, thinking and designing solutions for the city.

One group did a trash truck that pre-selected of trash for recycling, using a sophisticated scheme of light sensors and conveyor belts. The same group did a video about recycling, interviewing people in the University and in their neighborhood. Another group did projects on smart street lighting, traffic lights with sounds for blind people, fluvial transportation systems, performance and cultural centers for the inner city, etc. Their use of multiple media, real-world research and alternative materials was impressing. Also, the "city" theme seemed to resonate with the group, and to be a good starting point for thinking about projects. After two weeks of hard work[23], everyone was much more familiar with the technology, but not sure about how to apply them in the schools with kids.

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[23] The team of those first weeks was: David Cavallo, Edith Ackermann, Roseli de Deus Lopes, Alexandra Camargo, Paulo Blikstein.

Figure 34
The intelligent street lights
would turn on when a car
approached, using a creative
sensor
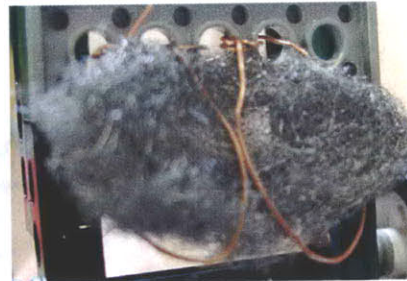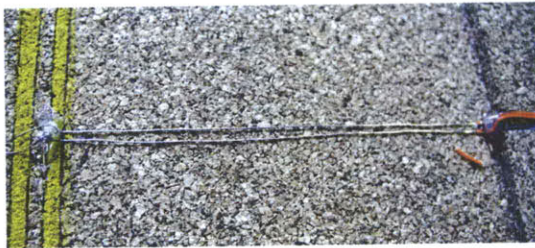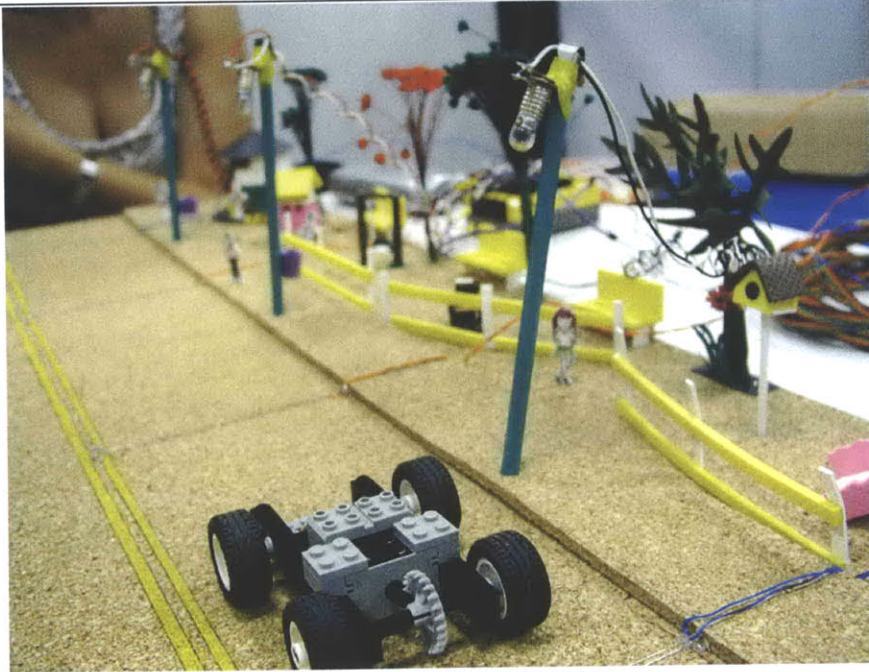
Figure 35
The trash truck with sensor-
based separation of metals,
plastic and glass
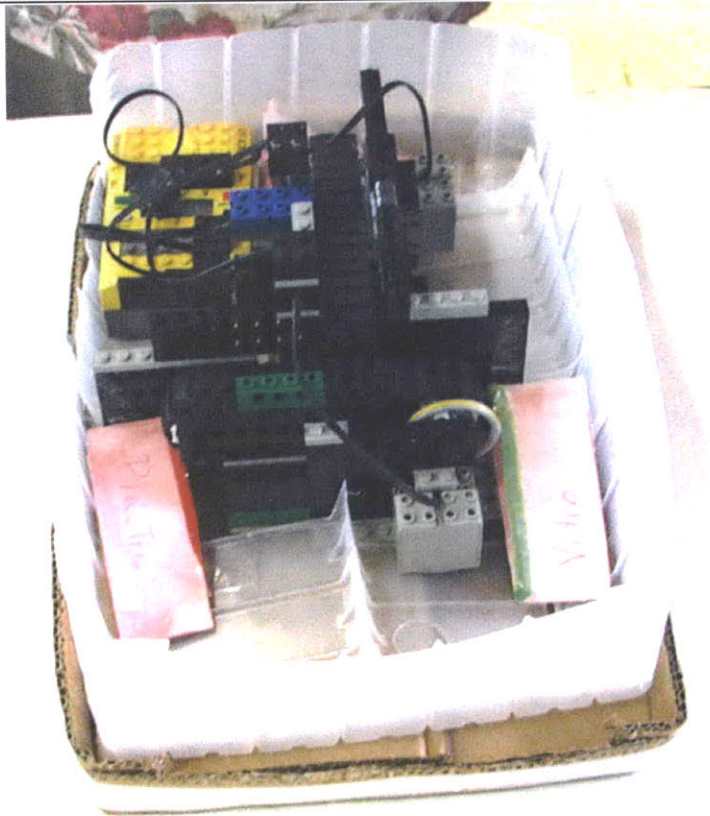
The group split into four for the second phase: workshops in the schools. This time, those participants were supposed to lead the workshops, but we would be there to help. I participated in two of the four workshops, one in the morning and the other in the afternoon. Roseli de Deus Lopes, Alexandra Camargo and Alice Cavallo were leading the other two workshops.

The setup of this workshop is another example of a **generative space.** The Digital Cave offered an unusual setting, the presence of technology around the group was inspiring, the theme resonated with their interests, they had plenty of electronic and physical resources of information and many research labs from the Engineering school. One group, for instance, was doing a fluvial transportation system and tested their boats in the wave pool of the Naval Engineering Department.Finally, and importantly, the group had complete freedom to choose their projects and tools (and even to diverge from the theme).

Figure 36
achers testing her boat in the
Naval Engineering Laboratory

3.3.3. First great barrier: It's nice, but too expensive

Right in the first days, we got comments from the teachers about the price of equipment. Having had a successful experience from Heliópolis, I prepared one kit of equipments for each school, with tools, components, and cheap arts materials.

On the second day, I opened all the kits and told them the price of all the things that were inside. Teachers and students were surprised to know that a LED was US$ 0.10, and a motor US$ 0.50.

The kids brought many broken toys, CD-ROMs, game controllers, tape recorders, we disassembled them and reused the parts. The teachers were very afraid of touching the soldering iron and the other tools, but after a couple of days they were sitting on the floor working together with the kids.

Figure 37
eachers and students working
on the floor

Some kids found it extremely engaging to disassemble things and assemble something else. One kid in the Tatuapé workshop, realizing that the glue took too long to dry, got a broken car remote controller, a broken CD-ROM drive and turned them into a fan to dry the glue.

Figure 38
om a broken CD-ROM to a fan
(to help dry the hot-glue)
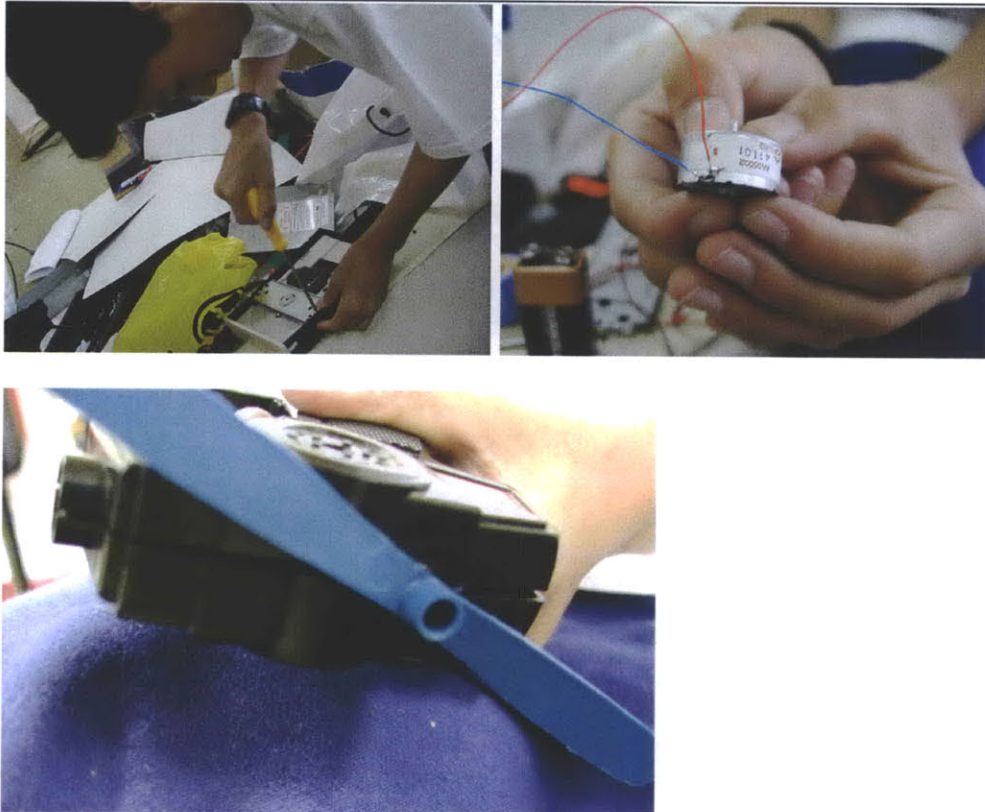
Other kids use the broken game controller to make an automated house, using the US$ 20.00 Gogo Board. This device, created by Arnan Sipitakiat, a PhD. Student at the MIT Media Lab, is a low-cost microcontroller-based device that can control motors and receive information from sensors. It works connected to a computer, and extends its programming to the physical world. The board is designed to be cheap and easy to manufacture without sophisticated equipment.

Figure 39
dents explore the Gogo Board
and found materials

The result was that the teachers there started to change their minds about the cost of that kind of technology – not because I was telling them, but because they were actually seeing it happen: broken stuff turn into sophisticated robotics, the US$ 20.00 Gogo board.

In most of the projects, found materials were actually more popular than Lego or other pre-packaged products. Milk boxes turned into a robot body, motors from tape recorders were elevating a two-floor garage, cork plates and ice-creams sticks were used to build a bus with a novel fare model.

Figure 40
ıg found, broken and familiar
material to build robotics
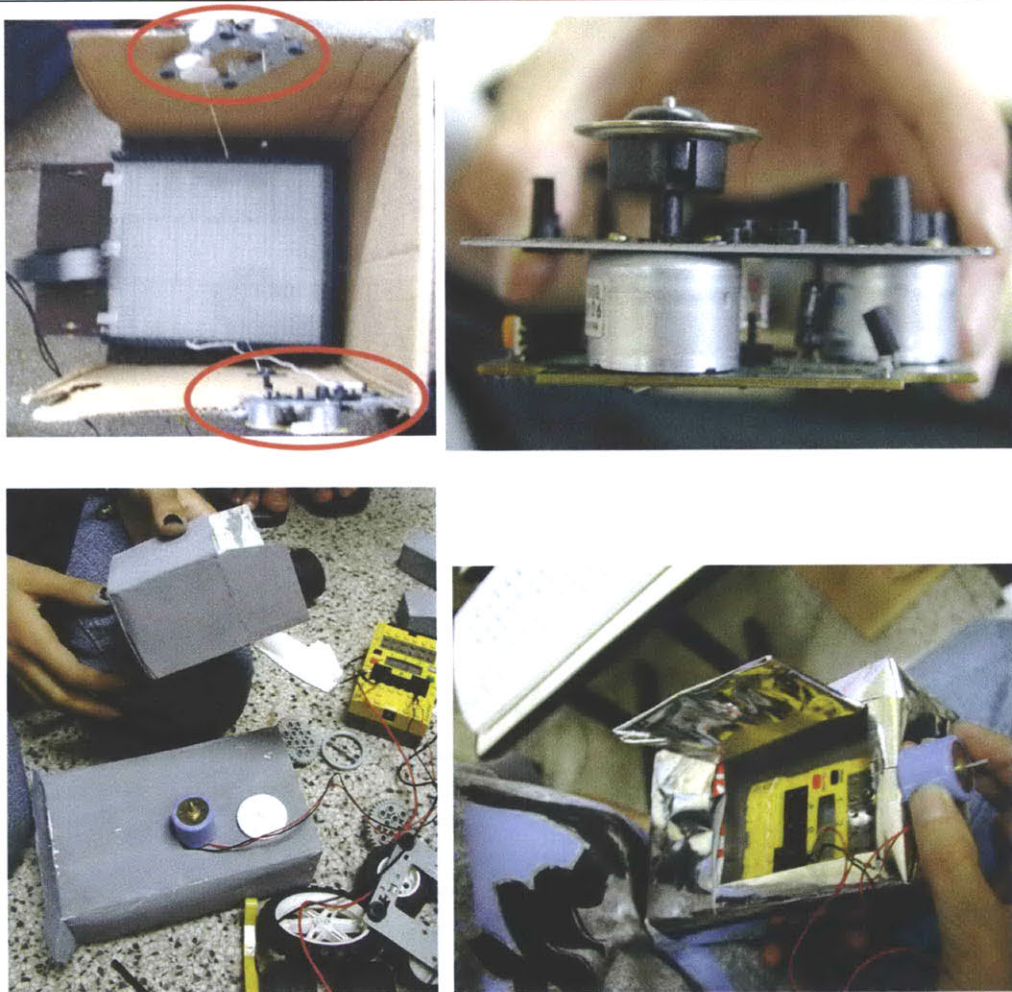
Seymour Papert and David Cavallo often cite the idea of augmentation of computational resources: instead of 15 PCs, you could have fourteen and 10 robotics kits for the same price, doubling the number of students that can use the technology. I would like to go one level beyond: instead of the 10 robotics kits, enough for 30 or 40 students, we could have 9 kits and 10 low-cost materials kits, as well as an endless quantity of broken and found materials that kids bring from home, extending the learning experience to more than a hundred people.

3.3.4. Second great barrier: control over the equipment

One of the obstacles seemed to be smaller, for the moment. But there was another one: the certainty that kids would break all the equipment. Our radical posi-

tion, as always, was that everyone could use whatever they want in whichever way.

In Artur Alvim this was a shock. Sueli used to be very rigorous about using the computers, and told me about all the dangers of letting them fool around with the equipment. She was responsible for the room, and was aware that if something would break there, no replacement parts would ever come[24]. It was natural that they felt afraid of things breaking.

However, as always, students could get all the equipment they want and would take maximum care of it. Sueli saw this happening and radically changed her mind. There is something fundamentally powerful in free access and self-regulation: if you demonstrate that you trust the students at the point of leaving an expensive piece of equipment in their hands, for them to manage and schedule, it is a seductive argument to engage and to trust.

Interestingly enough, in a completely different setting, the same issue was raised. In the Bradesco Foundation school, there was no shortage of equipment. The school had an impressing electronics lab and two well-equipped computers labs. They did not have the problem of lack of maintenance.

The situation was the same. Teachers were scared when we just left all the equipment open for the students to use. Again, more than half of the students cited the "freedom to use the equipment" as one of the two things they liked the most in the workshop. I should add that they worked very hard and did nice projects over the week, and were not just using the equipment without 'purpose' all the time. Nevertheless, the perception of the teachers, and their recommendation in the final meeting we had, was that:

■ The students do not do any planning; they have never worked like that, so they do not know how to plan things.

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[24] Accordingly to the teachers, most maintenance contracts did not work anymore or were not renewed.

- We should not leave the equipment "loose" in the hands of the students, they mess it up, we should have a scheduling mechanism to organize this.

- We should work more on the planning side, they should plan first and then execute, they should divide the tasks in a better way. [ParticipantsBD2 2002]

However, there was no scheduling problem with equipment. The most I had to do was to ask the kids to write on the white board their names and which camera they had, as well as what time they expected to return it – just to help the other groups.

Both in Artur Alvim and Bradesco, the main argument was: students cannot do that by themselves. Of course, it is normal to desire some security over expensive equipment in a country with high crime rates. But the control over the equipment was just a symbol. Whenever there is a limited resource, there will be regulation – the question is if this regulation will emerge from the users or dictated from an external authority. By extracting the possibility of regulation from the students, a fundamental part of the Learning Atmosphere is already set.

3.3.5. Third great barrier: I can't do it.

The workshops in Artur Alvim and Tatuapé started with the leadership from the technology coordinators and local teachers. They screened movies and played songs to motivate students to reflect on their city. However, when they had to show the technology for the kids, they turned to me. As the days went by, I realized that some teachers were getting more and more distant, relying on me for all the technology problems. Kids did not require their help as often and I felt that they were uncomfortable with the situation. One of them said to me that

> Of course that's great, but that's because of you. You are an engineer, we cannot do it. We don't know how to solder, how to do those things.
> [ParticipantsAA 2001]

The kids were also dependent on me for many things, as I was always available to help. I realized that this was not good, because our goal was not to prove that our methodology was good: it was to build capacity in the local people to run things. One day I arrived 30 minutes late because of the traffic, and everyone was

waiting for me to start working. I said that they could start working regardless of my presence, but some said that they needed me to start. Later, the teacher also said to me that the students were very happy that I called to school to tell that I would be late.

One coincidence helped to clarify things. I had to miss one day of the workshop to finish the proposal for this thesis. I called and asked the teacher to explain the situation and to work with them.

On the next day, I had an extremely gratifying surprise. They worked on projects and were, in fact, glad that I missed one day. In the final interviews, some of them remembered well that day:

> The day you didn't come, I thought it would be difficult, but in fact it was not, we don't need to keep calling Paulo, we realized that we could solve things by ourselves. It was not a mess, each one made their own little mess.[25]

> It was good that you missed one day, we realized we could do this as well. We had planned one thing and did another.[26] [ParticipantsAA 2001]

The teachers were also surprised. They said that it was extremely empowering not to have me for one day, because they had to help kids and learned a lot in that process. That day was a turning point for Sueli, the computer teacher of the school (POIE), who was very resistant in the beginning, but quite passionate by the last days.

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[25] Dia que faltou, achei que fosse ia ser um dia difícil, mas vi que não, foi um dia normal, que a gente não precisa ficar chamando o Paulo, a gente viu que poderia resolver as coisas. Não chegou a ficar bagunçado. Cada um fazia sua baguncinha.

[26] Foi bom você faltar um dia, a gente viu que a gente poderia fazer também. A gente tinha planejado uma coisa e fez outra.

Figure 41
...ients presenting the work, in
... same room the Engineering
...lents had their car challenge,
one month before

One emblematic event on that same day was that some kids tried to plug to the outlet some 6 volts light bulbs, what resulted in a small explosion. I was not there, but the reaction of Sueli and the other teachers was quite different from the normal one, accordingly to the student:

> Last year one boy was playing with a ball, his tennis shoe went off from his foot, and hit a bulb. Everyone that was around went to the Principal office, who wanted everyone to pay for the bulb. You have to check who did it, what happened; you don't just get everyone around to pay for the bulb. This time, when we burned the bulbs, the teachers helped us find other ones.[27] [ParticipantsAA 2001]

That was evidence of the permanence of the Learning Atmosphere, even if the main facilitator was not there. Even without my presence, the teachers realized that it did not fit into that Learning Atmosphere to reprehend the students for doing something supposedly wrong.

Those events were proved the possibility of overcoming one of the main barriers that we often find when introducing new ideas in schools. By working together with teachers and kids and developing their fluency, we slowly build an environment that was much more independent from the 'external' facilitator than they

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[27] O ano passado o menino estava brincando de bola, soltou o tênis dele, acertou a lâmpada, quem tava em volta foi pra diretoria, queriam que pagassem a lâmpada. Tem que ver quem fez, como aconteceu, não é quem está em volta deve pagar. Quando queimaram as lâmpadas, o pessoal ajudou a achar mais lâmpadas.

suspected. On the day I missed the workshop, they finally realized that they could do things by themselves.

4 Discussion

Nunca fomos catequizados. Fizemos Cristo nascer na Bahia. Ou em Belém do Pará.

Perguntei a um homem o que era o Direito. Ele me respondeu que era a garantia do exercício da possibilidade. Esse homem chamava-se Galli Mathias. COMI-O.

Antes dos portugueses descobrirem o Brasil, o Brasil tinha descoberto a felicidade.

4.1. Overview

During the one year-period from August 2001 to July 2002, we have worked with over five hundred people in more than ten workshops in different countries. During this period, we have been through many experiences as facilitators, designers of learning environment and learners. Although those events happened in different countries and with very different people, with ages ranging from six to sixty years, there was a certain similarity in the spirit of all those activities. During the workshops, my personal impression was that there was something in the air – a look in the faces of people, the way of working, the way people talked and built relationships.

That "something in the air" was not only due to the choice of technologies, and the design of the learning environment. It was a sum of various decisions and design principles, some explicit, some incorporated in our research group for so long that they go unnoticed. There was a common aesthetic in the design of those environments.

The framework of the **Learning Atmosphere** is an attempt to understand the process of sculpting that aesthetic. I believe that the metaphor of the atmosphere is interesting for many reasons: first, an atmosphere can have micro and macro environments, which not only can be radically different but also can influence one another. Second, although atmospheres surround us, they cannot be touched. They are an organic, interwoven whole that contain many elements from which just a small part is known or visible. Finally, they are **multi-variable, meta-stable** and **hard to predict** systems. Being *multi-variable* means that many elements change at the same time or are interdependent. *Meta-stability* implies that all equilibriums are fragile – and a small change in one of the components can make the system change rapidly. Finally, being *hard to predict* does not mean that "anything goes", but that the mindset of single variable cause-effect is simply not applicable.

When we use the expression *Learning Environment*, it has sometimes the connotation of a physical entity or space, such as a school or a community center.

Learning Atmospheres surround learning environments, but contain other dimensions as well, which are related to the main findings of this research, that I would categorize in three entities:

- The choice of **what to explore and build.**

- The choice of **the tools to use.**

- The **affective interaction.**

The first entity is related to Freire's *generative themes*. The second is related to the presence of *multiple expressive tools and media*. The third is related to the evaluation of how *relationships are built along with a learning activity.*

Figure 42
The Learning Atmosphere

Multiple Expressive Media
diversity of tools for diverse expression

Generative Spaces
conviviality for construction

Relationship Building
affective and power interactions
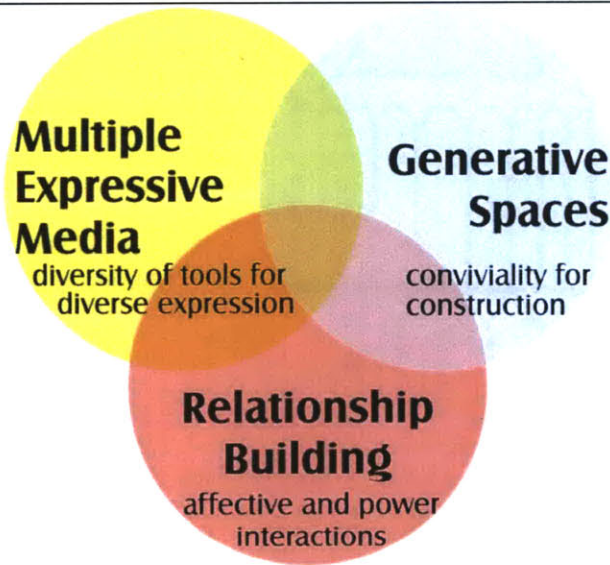
4.2. Generative Spaces – conviviality for construction

4.2.1. Goal

We will discuss in this section Paulo Freire's concept of generative themes, and two main ways in which technology can enhance and contribute to that idea, using the examples from the case studies.

4.2.2. Paulo Freire and generative themes

Freirean **generative themes** and his methodology for illiterate adults were certainly one of the most influential elements to most modern progressive educators. David Cavallo comments in his PhD thesis,

> The choice of projects and study by the learner is critical. We do not use projects merely as a means to get them to learn what we want. They are not pre-ordained, pre-planned, and prefabricated within a pre-determined, structured, rigid curriculum, used solely to teach a set of facts or concepts. Rather, their choice is an essential element to a positive, free, active engagement with their world. Instead of relying on the dictates of others, they take charge of their own learning and their own relationship with their environment and each other. [Cavallo 2000] p.206

Freire's methodology and ideas, having inspired many educators around the world, were reinterpreted in many ways. It is useful, therefore, to go back to his writing and extract the original meaning of the *generative themes.*

4.2.3. The methodology of the generative themes

In "The Pedagogy of the Oppressed", Freire explains in details his method for coding/decoding elements in the local culture and coming up with generative themes together with the community of learners. He stresses, in the whole process, the dichotomy between being immersed in one's reality (being only aware of your own needs) and emerging from it (making sense of your needs). He states that the learners can go from the "consciousness of the real" to the "consciousness of the possible" very quickly, as they perceive the "viable new alternatives" beyond the "limiting-situations" ..

Freire designed his method while working with adults from extremely poor regions of Brazil in the sixties. They were oppressed, poor and illiterate. Using language and literacy was an attempt to empower them and promote their emancipation, one of the few ways out of their social condition. However, when Freire's ideas are transported to the school, there is one big difference. Children are oppressed not only by society but also by the world of adults. What space do they have to perceive the "viable new alternatives", the "consciousness of the possible"? Unlike adults, *who are learning how to read and are making use of that*

knowledge simultaneously, children are often enticed into themes or projects that will have *no impact on their lives*, and no relevance to the lives of others. I often heard from students, when I asked about some project they were doing for a class: "it is only a school project – not serious".

The detailed methodology of Freire for the *generative themes* or *significative thematic* is a precious roadmap to bring together the learners and their life environment. Nevertheless, there exist textbooks with *printed* generative themes with guides for the teachers to conduct discussions. It is a contradiction in terms. The trivial take on Freire's generative themes is to propose a theme that is apparently close to social issues or community problems, but has no importance to that specific community in that particular period of time. Cavallo stresses this issue when commenting how a mere similarity to real world problems can be misleading [Cavallo 2000].

Freire himself went through this problem, in his early projects in Rio Grande do Norte [García 2001]. Samuel Perez Garcia warns from the danger of having the generative themes more in the agenda of the intellectuals and politicians than emerging from the learners. Freire eventually confronted that issue a number of times over the following years, and stood up against manipulation, as Heinz-Peter Gerhardt reports:

> The authors of the textbook [...] chose a political direction with five generative words: people, vote, life, health and bread. Freire opposed himself firmly to teaching ready-made messages for the illiterate. Ready-made messages would produce domesticative effects, either coming from the left or right-wing. Both sides would accept doctrines without criticism and manipulation would then take place. [Gerhardt 2000] [28]

A careful examination of Chapter 3 of "Pedagogy of the Oppressed" reveals that Freire's concept of generative theme was far more complex than listing suppos-

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[28] Os autores da cartilha [...] escolheram uma diretriz política de abordagem com cinco palavras geradoras: povo, voto, vida, saúde e pão. [...] Freire opôs-se, firmemente, ao ensino de mensagens prontas aos analfabetos. Mensagens prontas produziriam sempre "efeitos domesticadores", quer vindo da direita, quer vindo da esquerda. Ambos os lados demandariam aceitação acrítica de doutrinas e a manipulação teria início.

edly meaningful themes or words. He proposed a methodology, which could only be accomplished in immersive contact with the community and the learners. The researchers (*investigadores*) should get to know the community, interview people, and then go through a participative coding/decoding process. Finally, learners would engage in a new creative coding, explicitly critic and intended for action, in which the once illiterate assumes his/her condition of subject of his/her own life [Gerhardt 2000].

Freire never proposed that the researcher (*investigador*) should not contribute with his/her own themes and ideas (the *temas da dobradiça*, or connecting themes), but he made it clear that the proposition should emerge within a specific context, and link themes already pointed out by the learners as meaningful. He also never proposed that the researcher should get to the classroom with a list of possible themes in order to achieve a curricular item.

I arrived in Heliópolis with a set of ideas that I wanted to explore: energy, society of consumption, sustainable development, awareness of everyday life technological objects. I thought those ideas were important and I hoped they would be meaningful for the students.

I interviewed people, talked to the school principal, did some research about the community. I learned about the accidents, the lack of safety in the energy connections, the abandonment from the government, and the strength of the community. Up to that moment, it was a classical application of the Freirean methodology. But how did the presence of digital technologies change the process?

4.2.4. Can it happen without technology?

The first important change was that the students and I could engage in the research about the *generative themes* **together**. This is also because the kids are quick at picking up and appropriating the technology

Having multiple expressive media and technologies at hand (without much formality and bureaucracy), they could engage in different explorative projects in ways I could never imagine myself. As a result, the first phase of the Freirean *themes'* research was done *together* with the kids, using video, pictures, robotics,

modeling and measuring tools. Together, we got to know about the history of the community, the local radio, the misery of the Bridge, the unsafe energy connections etc. While observing their use of tools, I was also learning about their culture, their life and their talents. Together, we came up with generative themes – which in turn inspired many of their projects. It did not mean that my role was passive. Although we were researching together, I (and the other facilitators) tried to show children what was possible with all the tools we had, give ideas for projects, suggest connections etc. It is important to point out the difference between generative themes and project ideas. By going to the community and doing research, we were informally collecting the most meaningful issues for their lives and the community. A second step was to reflect on those issues and come up with project ideas – which required a more active role from the facilitators. The **Jornal da Escola** (the School's Newspaper) was a classic example: we went to Estado together, the students were disappointed and decided to act upon their concerns by themselves. When it came to the implementation, I took them to the newsstand, we bought a newspaper, discussed together how to edit and design a newspaper, and then they went to do it. At that point, at least temporarly, they transitioned from being observers to being producers – before the process became sustainable in the form of a project, I had to have a more active role.

The question that arises here is: could not all this happen without digital technology? At first sight, we could simply take kids to the *favela*, interview people and take notes with pencil and paper. That would certainly be possible. That is where the idea of the **Learning Atmosphere** comes in handy: the atmosphere in Helió- polis, with easily available digital equipment, community leaders coming to talk, freedom to choose projects and a convivial environment was all an integrated whole. The presence of digital cameras and robotics was not just an element that could be introduced or removed, as a variable in an equation. The availability of unusual equipment brought an extraneous touch otherwise impossible, in the Trojan Horse sense – once "domesticated", it became a great object to play with. Also, we have to consider their prior attribution of social value, potential, and meaning to this valuable equipment.

Many interesting projects began with some students curious to explore the equipment, without any previous rigorous plan. That is normally regarded as unacceptable in schools, but is, in fact, how most children learn to operate a computer. Other students were excited by the opportunity to do something concrete, something different from pen-and-paper activities, or just the desire to explore video-making, for instance. As a result, technology within the Learning Atmosphere framework is not just a tool with a specific goal, but part of a greater whole.

A good example of this was the use of digital still cameras. Most kids would engage quickly in playing around with the digital camera just because it allowed an instantaneous view of the picture just taken. That was the entry point for many of them, who ended up doing photo-novels, photojournalism and claymation. The camera is not there just to take pictures, but also as a playful object. My point here is that there is nothing wrong with that – quite the opposite.

It was unfortunate that, during most workshops, some teachers were always there to complain that kids were just messing around with the equipment, using the cameras with no goal, no direction, no planning. One of their recommendations was to demand from students a plan prior to getting any equipment [ParticipantsBD2 2002]. Play in their eyes, is a hindrance to learning, it has to be "regimented". Nevertheless, some teachers knew (and told me) that most kids learned computers only *fuçando* (fooling around). They often asked the kids for help in dealing with the computer – but could not allow them to learn in that fashion once the activity became official.

The epistemological status of the teachers' comments is revealing. It is not only compatible with the traditional school paradigm, but with the way parents regards school. David Cavallo reports that in Thailand parents complained about one workshop that he conducted, saying that the children were only having fun and thus could not be learning [Cavallo 2000]. The idea is that playing around is bad

and leads to nothing[29]. The epistemological belief of the teachers is that there must be concrete goals, plans to get there, and orderly sequences of knowledge construction. The idea that "you cannot learn 'x' without learning 'y' first" was quite strong – and reflects the way the teachers learned what they know. However, when you open up generative spaces and children engage in projects, the idea of a formal and unique sequence does not fit at all within the atmosphere.

During the same meeting, teachers affirmed that they "already had the whole planning for the year". Any other new activities or workshops would only be possible for the following year. In fact, teachers themselves are evavaluated for having very concrete goals, yearly plans and strict class schedules. Thus it is understandable that they expect the same from the students, seeing no sense in the messiness or in other possibilities. One of the biggest breakthrough in our workshops is when initially reluctant teachers allow themselves to let go and start genuinely enjoying being a "playful learner" again.

The more tools available are, the more likely it is that people will find entry points that resonate with them. As a result, asking if pencil and paper could have replaced the video camera in Heliópolis becomes somewhat meaningless within the **Learning Atmosphere** framework. The technological apparatus becomes a core element, that contributes to the spirit of the workshop. It cannot be isolated from the whole. Seymour Papert, in "Computer Criticism vs. Technocentric Thinking" [Papert 1985], discusses this issue when commenting on some of the criticism commonly made to Logo.

> The crucial [for the conservative mindset] experiment [...] is based on a concept of changing a single factor [...] while keeping everything else the same. [...] This is the methodology of and educational activist: [...] one introduces Logo and then works as hard as possible to make all other things as different as possible.

Another element is that the presence of objects that have to be shared creates a new dynamic, which is inexistent in regular classroom. In the traditional setting,

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[29] We are not advocating fun for its own sake, out of the context. It is also true that fun approaches leading to nothing are also common.

everything is symbolic on paper; there is no opportunity to develop democratic control. We have things that allow you to set rules for democratic usage. Democratic control is building democracy as a way of thinking. [Papert 2002]

4.2.5. New ways to act in the world

The second important change is that the tools and devices we brought to the workshop were not just "unusual", they were also rich and unique media for expression, building and simulation/modeling. In this sense, they open up new ways to act in the world. The digital technologies we favor help kids give new forms to their imagination by making "what could be" tangible and shareble. As Edith Ackerman says her paper "Piaget's Constructivism, Papert's Constructionism: What's the difference?":

> [Piaget and Papert] remind us that learning, especially today, is much less about acquiring information or submitting to other people's ideas or values, than it is about putting one's own words to the world, or finding one's own voice, and exchanging our ideas with others. [Ackermann 2001b]

Imagining solutions for the city, was intrinsically leading to social research, reflection and intervention. The latter aspect – intervention, making something *for real* – was an *intrinsic part of the Freirean method* for illiterate adults, as they could use their reading and writing skills in everyday life. David Cavallo's work in Thailand describes many projects with this idea of affecting real life [Cavallo 2000]. Despite rhetoric to the contrary, the epistemological stance underlying traditional school practiceis that knowledge is to be deposited in the kids' heads for an (unlikely) future use.. Students are never ready, never prepared, never mature enough to put the knowledge into use, and consequently never considered capable of deciding what they should to learn. Freire was also aware of that and declared, in his Pedagogy of Autonomy:

> Why not profit from the experience that the students have in living in abandoned areas of the city to discuss, for example, the pollution of the rivers and the low quality of life of the population, and how the big trash deposits endanger the health of people? [...] Why not establish an intimacy between the curricular knowledge and the social experience that the children have as individuals? [Freire 1996]

We consciously challenged the previous mindset by proposing workshops whose purpose was to propose real-world solutions for the community. The dynamics of implementing (or not) viable solutions is also meaningful. The possibility to do real research, build models, prototypes, interactive simulations or documentaries adds a new perspective, typically non-existent with conventional materials, and opens up the possibility to act in the world beyond just the initial idea. Besides, it is exactly when ideas have to be implemented (both in the prototype-level and the real-world level) that new discoveries arise and deep, trans-disciplinary learning happens. Cavallo comments that this is an attempt to put together two very precious notions seldom seem together in school environments: first, Hegel's idealism, and second, Dewey's pragmatism, in which every voice deserves to be heard, and the majority decides [Cavallo 2002]. As a result, the Generative Space it is not only for up-in-the-air exercises of imagination, searching the ideal, but also a space infused in praxis, in democratic decision-making, in real life.

In the Estado de São Paulo electronic archive, where we went to do investigate the history of Heliópolis, all the machines were already prepared to do research about one subject, with specific keywords that should not be changed. We had a hard time convincing the employees of the archive that we wanted to do research about *anything* meaningful to the projects. It seemed that they were used to research that leads to results that everyone already knows. As Seymour Papert states,

> This is the common constructivist practice of setting up situations in which students are expected to make their own discoveries, but where what they "discover" is something that the teacher already knows and either pretends not to know or exercises self-restraint in not sharing with the students. [Papert 1999]

To sum up, those two innovations conveyed by technology, add an important new dimension to the Freirean *generative themes*. Those ideas were present in Freire's work, but the tools were not available at that time.

4.2.6. The building of a generative space

In the context of our own work on digital fluency, the concept of a **Generative Space** can be described as follows: designing a space where tools are easily available, the control of them is delegated to the kids, where students have freedom to choose their projects, where different media is at hand, where engaging in different and/or simultaneous activities is in the culture, where imagination meets praxis.

Our contribution goes also in the sense that, in order to build a generative space, attention must be paid to certain critical details. We term them details because they have routinely been overlooked and disregarded in schools. They could, however, be incorporated into the atmosphere, as it already happens in other settings outside the school, such as a theater group, a soccer team or a jazz band.

One canonical example is the control over equipment: just the fact of having a sign-up sheet for the equipment, controlled by someone from the school staff, affects seriously the atmosphere[30]. On the other hand, in some settings, equipment might be too scarce or the risks too high – one possible way out is deciding democratically (proposing and voting) how the equipment or the activities will be conducted.

Stephen Ball, basing his reasoning primarily on the Foucault idea of management as moral technology, states that the teachers are increasingly subject to systems of administrative rationality that takes away their voices in the process of making important decisions, that could happen collectively without any disadvantage. [Ball 1993]

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[30] During the Winter Institute, in Curitiba, the equipment was controlled by the receptionists of the event, supervised by staff from the Secretariat of Education. We found out that, as battery life of the digital cameras was short, the chief-receptioninst decided (on her own) that only the adults should be able to get the cameras.

4.3. Relationship building (affective and power interactions)

4.3.1. Dependency-generation pathologies

José Cukier, an Argentinean psychoanalyst, has extensively studied the psychopathologies originated from school [Cukier 1996]. His psychoanalytical approach is useful to understand some of the typical phenomena we faced at a personal level. Relationship building is a far more complex issue than being "nice" to students. Cukier warns us against the demagogical and charismatic educator, who focuses only on the affective link with the students, through seduction, neglecting the educational goal and the content. Page: 109

Also this undermines the autonomy of the learner as learning becomes associated with being taught by the charismatic as opposed something the learner does and controls [Cavallo 2002]. Fernando Almeida describes how school stimulates a kind of schizophrenia and cynicism in the students, by having them learn to assume different personalities all along the day. [Almeida 2001b]

Between the two extremes, the traditional authoritarian teacher and the charismatic leader, there is space for less pathological transactions. The popular mindset has it that teachers should be nice, but "have discipline". We believe that a better way is not to average the authoritarian style with the seductive way, but to rethink the mental model we have for teacher-student relationships. In an atmosphere where power relations are more flexible, it is not harmful for the teacher to be charismatic at times, or even more rigid. Teachers are not saints with infinite patience just as students are no angels with pure intentions. The important part is to be clear about the power that each one holds - and to negotiate its "distribution" overtime and across people - flexibility and changing roles are what is key here. Also, it would be false to deny the power of the teacher in a learning environment - but that power can be used to set a basis for democratic usage of it. In other words, the way out of the vicious circle is using the power position of the teacher to establish democratic values - and the personal satisfaction that will come from this will be more rewarding to the teacher than holding his/her autocratic position.

4.3.2. Choosing projects and tools

The choice of the projects, when there is openness and appreciation for different media, follows students' interests. This does not mean that the teacher cannot suggest or influence that choice – because he/she might know the student as a person. We let them choose their projects and their tools, within a set that we bring and that we believe in. We often expand this set based upon the interactions with and interests of the group. However, it does not consist in simply telling them that they have freedom to do that – we have to demonstrate that this possibility exists and open up the **generative space** – otherwise the students would not venture into his doubtful endeavor. We do not and can not start from zero: when we start a workshop, no matter how different it will be, we are dealing with students who have been in school for a long time and know how to navigate there.

Learning this navigation process, as we observed, happens in a series of incremental tests or iterations, or, in other words, assimilations and accommodations. One of the things school is good for is to create environments for learning survival strategies. Teachers and principals like to believe that they are teaching children how to behave and to respect authority. In fact, students learn also how to bypass authority and find a way around rules. The apparent respect for the teacher authority is, in many cases, purely strategic. Students will not necessarily open themselves to a new methodology or a new way of working unless they witness some real situations of conflict and a different, democratic, respectful way of solving them.

4.3.3. Banking relationship-building

The popular view is that relationships or mindset are built incrementally (a series of small facts that add up little by little) or by decree ("I decided today to like and trust that person"). In my opinion, that relates to an unexplored side effect of Freire's idea of banking education: banking relationship-building.

Students are not only passively engaging in relationship building, just reacting to the propositions of the teacher. They are also proposing tests at all times, al-

though subtle. One of the most important learning processes that I went through, after all the workshops, was exactly to improve the sensitivity to those tests. Sometimes they come in the form of questions about the equipment, sometimes personal questions[31], sometimes about their projects, a picture of a friend, the way they dress, a poem they wrote etc.

All of those questions, normally regarded as unimportant (as they do not relate to the actual content to be learned), are part of the relationship building that will result in the necessary trust for students to engage in activities that they are passionate about. The important point here is that *most of those tests happen informally,* in side conversations, in one-to-one interactions.

4.3.4. Can I use your computer?

One situation we faced in every single workshop in Brazil was the control over the equipment. Some would ask for permission, some would just grab cameras and go take pictures, some would ask for explanations about the operation of the equipment.

We had modern digital equipment, not available for kids in their everyday lives. That is a fundamental test, both for the students and the teachers. The first group was expecting prohibition; the second was annoyed by the lack of control. In both of the Bradesco Foundation workshops, although no damage happened to the equipment, one of the main comments of the teachers was that "We should not leave the equipment loose in their hands".

A similar phenomenon happened with Sueli, the computer-lab responsible of the Artur Alvim school, in São Paulo (as discussed in the Case Studies chapter). A big part of her training to become the computer-lab responsible was about keeping the equipment safe from the kids. She was also terrified to see children using the equipment in a more free way, although the eventually changed her mind.

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[31] Typical questions include: "How is it like to live in another country?", "do you miss you family?", "Do you have a girlfriend?", "When are you coming back?"

A third example is the methodology that a very popular educational toy company in Brazil implements and recommends to schools, to assure that no piece of their construction kits are lost in the classroom. Children count all the pieces before and after using the boxes (which takes 30% of the time they have to use them), under the rationale that public investment cannot be wasted.

Interestingly enough, in none of the workshops there was any damage to the equipment. David Cavallo also reports that in the project he conducted in the Maine Youth Center (a juvenile jail), no damage or theft happened in the two years of the project [Cavallo 2002].

Obviously, there is a concrete issue about maintenance of the equipment, but we found that to be much more a mindset than an objective issue. However, the proof of how those things change depending on the **atmosphere** happened in Artur Alvim, São Paulo, when the kids exploded some bulbs by connecting them to an outlet. It was the same Sueli (who was against free access to the equipment) that, instead of reprehending, went with them to find new bulbs for the project. It is also important to note that I was not in the school on that day.

Her testimony, in the first days, show that her caution with the equipment was because she was also under pressure. Being a former teacher of Portuguese, she decided to apply to be the computer room teacher for a career change, and for some other small compensation. She was not a technical person in the beginning, and received a very technocentric training that stressed the care with the machines above all. John F. Covaleskie, in his study *"Power goes to school: teachers, students and discipline"*, presents an interesting example from McNeil, that shows teachers more as victims of the system:

> The common hypothesis is that teachers are the least intellectually sophisticated of the professionals (if they are professionals at all). [...] it is often suggested that teachers do not know the fields they are supposed to be teaching. [...] McNeil presents a very different picture of teachers as competent, interested, and interesting professionals. [...] Her explanation of the sort of shallow disconnected teaching students see in the classroom seems entirely consistent with Foucault's view of power: the institutional arrangements [...] makes even the most able and intellectual of the teachers she observes generally tone down their teaching to the level of the approved curriculum

materials. Many teachers have personal interest in real political, economic, and social issues, which they leave at the schoolroom door. [Covaleskie 1993]

4.3.5. Sueli, the transformed computer teacher

Sueli was not only worried about the equipment. She was also inspecting the groups and pointing the finger at the "lazy" students that were "just going around taking pictures". Some kids were actually fighting with each other after being "accused"

After seven days, she looked like a different person. Her colleagues were surprised. The transformation of Sueli, whom was enormously excited by the end of the workshop, sitting on the floor with the students and helping them with the projects, was a consequence of two conscious moves on our part. First, the **Learning Atmosphere** set a rupture, a displacement in her way of working. The mess of the computer room, kids running around, projects moving forward - she had a concrete experience working with the kids, and reconstructed some ideas that she was taking for granted about the technology (high cost, fragile, children cannot touch). Second, we proposed that the second round of workshops would be in the schools, with real teachers and not an artificial setting, outside the school. I paid special attention to use a lot of found and familiar materials. Sueli and the kids were surprised with the very cheap price of the electronics parts I bought for them. The kids brought broken toys from home and used the parts in their projects.

To break the mindset about the equipment, the first thing I did was to open my notebook computer and leave it on the floor. The digital cameras were there as well. That seemed to have a deep meaning for everyone. In the final interviews, about 65% of the students mentioned the freedom to use the equipment as the thing they liked the most. It was striking that, although they did great projects, learned a lot about different fields, the thing they remembered the most was that I let them use my computer and my cameras, without pressure, sign-up sheets etc.

But that is not enough. Sometimes three kids want to use the same camera. Then, again, we can take different roads: imposing a rule, favoring good behavior or being receptive for their seduction. They all carry dangerous discourses.

> Discourses are not about objects; they do not identify objects, they constitute them and in the practice of doing so conceal their own invention (Foucault *apud* [Shaw 2002])

4.3.6. When being rewarded is a tragedy

We witnessed unfortunate consequences of one of them: favoring good behavior. In most of the workshops the choice of the students was a reward for previous good behavior. Teachers and principals wanted the best students to receive the MIT workshop as a prize. They picked students that they liked (although we asked for a random or voluntary selection) or those that seemed to be good at computers.

Edilene and Mauriza, picked from their 8th grade school in Heliópolis, were happy to be chosen in the beginning. But they quickly realized that the rest of their regular class stopped talking to them. Edilene sent me a letter one month after the workshop, saying that she had no friends in her classroom anymore, as they were ostracizing her and making fun for them being chosen for the workshop. For a 14-year old girl, I can imagine few worse experiences.

Details like these are fundamentally important. The logic of the adult world seems to be to reward the good examples, hoping that the others will be inspired and follow. In reality, things work in the opposite way – the privileged one is punished by his colleagues.

Michel Foucault analyzed extensively the role of discipline and punishment in many institutions, such as prisons, schools and mental institutions. One of the common characteristic in those institutions is that power operates automatically: the feeling and the fear of being watched all the time causes the incorporation of the rules dictated within the environment - the panoptical metaphor [Singer 1997]. Foucault contradicted the idea that school evolved following a rational mindset for the good of learning or the students. He states that during its evolu-

tion, the negative side predominated, and the main goal was neutralizing and normalizing children, through discipline, punishment, and constant surveillance. One of his important conclusions is about how power is increasingly invisible in modern society, but always present, and needs less and less demonstrations of force to ensure that the rules are fulfilled (*apud* [Singer 1997]).

> This is accomplished mainly through discourses within the schools - what can be said, what cannot be said, who may speak and who may not speak, when they may speak, how they may speak, whose voice are heard and whose voices are silenced. Thus, discourse is interwoven with power and knowledge to constitute the oppression of those "others" in our society, serving to marginalize, silence and oppress them. [Shaw 2002]

Bob Moses, who started the Algebra project in United States, to address the exclusion of minorities from acquiring certain kinds of knowledge, paid special attention to some hidden elements as well.

> "Culture" is not visible. What we see are ways culture manifest itself. [Moses *et al.* 2001]

Some of those hidden elements of the culture of the schools could be more important than the explicit rules. Foucault cites the architecture and the bureaucratic organization as classic ones. Durkheim agree that rewards and punishment are not symmetrical in our society [Singer 1997]. Helena Singer comments that rewards are the complement of punishment, but are far less important in schools. Grades, honors, prizes, are rather an instrument of the intellectual culture than of the moral culture.

Two other examples help clarify this.

■ In the Bradesco school, where there is no tuition, there seems to exist a subtle message about good behavior: the school is free, you cannot pay for a private one, so you better behave here or get out. During the final discussions, one teacher raised the point that:

> ...some students were given the chance to participate in the workshop and were not participating seriously - some are not working the way we expected them to. [ParticipantsBD2 2002]

In most schools, students with good grades or appropriated behavior were chosen for the workshop. It had two side effects: pressure them to continue behaving well and not taking risks, and being ostracized in their classrooms. Both were negative, and not only did *not* set an example for other students (as expected) and damaged the conviviality of the workshop. The teachers had the power to choose the students, but they could have use that to set up a democratic space for decision – but their choice was not in that direction.

4.3.7. Excluding the bad students

Again, part of building the atmosphere is challenging and disrupting the current assumption. In the Artur Alvim workshop, after I realized that only the "good" students were invited to the workshop, I met with Sueli and suggested her to get a group of supposedly "bad" students as well. She agreed. Two kids came, and even having two days less than the others, did a great project and no difference in performance or behavior was observed at all, although in the beginning they doubted they could keep up with the others (which relates to the internalization of oppression, as Foucault proposes [Singer 1997]). It took some time for them to realize they could do as well as the other, but even though in the final presentation one of them was almost paralyzed by fear – she has never stood in front of the classroom to show something she built.

4.3.8. Creativity, exposure and provocation

In the beginning of the workshop, we normally tell students that they could engage in projects of their choice, that they can do whatever the want etc. Their first test about our real intentions is smart: "would those guys let me touch the equipment?" Thus, on top of the natural curiosity and excitement with the new tools, there is a strong symbolic and provocative element.

There are many reasons for advocating that a good, respectful personal relationship is one of the fundamental components of a successful environment. One is that personal exposure is hard for children or teenagers. To expose one's feelings and ideas is to appear unprotected to the world. If there is a negative answer, communication stops, and they feel hurt. Sometimes students do not have the

domain over the language of science and express ideas in an unexpected way – often perceived as strange and impossible by teachers. One interesting example, that happened in the Bradesco-Campinas school workshop, in June 2002, was that many kids complained that teachers made fun of their idea in the beginning of the week, and that hurt them a lot. By the end of the week, when the project was ready and successful, teachers came to praise – but students did not forget the initial disdain of their work. In the same workshop, another group revealed during the final interviews[32] that they wanted to do a video about the farm where the school was, but the teacher did not consider the idea feasible. Her suggestion was to use the Espion boards to monitor for five months humidity and temperature in five different point of the farm[33]. The students' project seems to me much more feasible.

Any creative activity is a radical exposure to others – creation involves digging deep for ideas, life history, hidden desires, dreams and projects. A mean comment or a disrespectful approach has the potential to close those doors for a long time.

Therefore, a good relationship begins with respect and openness. If those beautiful words are not translated into reality, no matter how fancy the technologies are, the results will be disappointing. Diversity is not only about races and religion, but also about ages and culture. Breaking expectations about the control over the equipment was an efficient (and consistent) way to begin this relationship[34].

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[32] Every student was interviewed in the following way: I gave a list of questions to them and a digital voice recorder, and they recorded the answers with the promise that their name wouldn't be disclosed (in case they wanted anonymity).

[33] That school is located in a farm.

[34] In fact, I always mentioned to the students that it was more likely that I would break the equipment than them, which is true. Over the last year, no equipment broke or was lost in the workshops.

4.3.9. Bypassing authority

Another interesting example of the importance of trust and relationship building happened in the April 2002 workshop for the Bradesco Foundation. One group was doing a project about trash recycling. One of the girls was interested in doing video. I suggested that they could use video to talk about recycling in the school. They said that the recycling project at the school was cancelled, and there was not much going on about it. They liked the idea of the video and learned to use some essential features of Adobe Première in 20 minutes in order to compile and edit their videos. By the end of the day, they had a very nice three-minute documentary – except that the video was not about recycling. Realizing that it would be a risky idea to talk about the aborted school's recycling project, they slightly changed the script, started the video talking about recycling, but switched the theme to the cleanness of the school, showing the high number of trashcans, interviewing students and proud teachers about how the school is kept clean and organized. In the end, they had a documentary that did not put them into trouble (but indirectly criticized the school). We cannot be sure if it was a conscious desire, but the strategy certainly resembles what Brazilian artists and journalists did during the military dictatorship to criticize the regime[35].

That event relates to the Foucaultian idea of the Panoptical, but in a different way. It shows that students are aware of the implicit discourse – and more aware of the power relations than the school would know, as Covaleskie affirms:

> From the students' point of view, teachers exercise power intermittently, over specific parts of the students' lives, and from positions of great visibility. As [..] Foucault would predict, the school becomes a site of resistance and outright rebellion precisely because it is a site of sovereign power. As the teachers act to impose control overtly on the students, the students can see that they are being forced to act in ways they would rather not. It therefore seems logical for the students to resist and/or rebel, and they act logically. [Covaleskie 1993]

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[35] Some newspapers published cake recipes in their front-page, exactly to let the readers know that something was missing there.

Another example happened in June 2002 workshop in the Bradesco School. In the first day, teachers insisted in dividing the groups in a way that would separate allfriends. Students protested. Teachers replied that, by forcing them to work with random partners, they were preparing for the real workplace. The students were unhappy. The teachers were inflexible.

However, over the next day or two, students began to undermine the scheme, either by just switching groups or by not doing anything in the group. Two days later, the teachers were forced to let everyone switch groups. I even suggested to one student, who was very sad about being separated, to do an underground project with his best friend. He was very receptive about the idea.

Figure 43
Toilet in Bradesco Foundation and AIDS project in São Paulo

The last example of this category was a project about recycling toilet water. They build a big toilet and incorporated robotics into it. Although they worked very hard, the group could hardly stop laughing when talking about the project. I had the impression that they were delivering a message about resistance and irony by choosing such a theme – or just happy for being able to build such an embarrassing object in a school environment.

4.3.10.   Hidden culture of subversion

The Bradesco School had a hidden culture of resistance and subversion. Who would guess that, in the school where discipline is a big concern and the image of the Bradesco Bank is at risk, students develop so many ways out of hard situa-

tions (*jeitinhos*)? Not only that is considered negative by the school, but it is not used as a useful element in the learning atmosphere.

Interestingly enough, few people used found materials in the workshops in Bradesco. One reason was that the school had better equipment. Also, the equipment was very organized. Everything was orderly distributed and had a purpose. The electronics lab had perfectly organized bins for all kinds of components. The arts room was clean and tidy. In fact, Bradesco schools are proud of their organization, cleanness and standardization all over the country – which is, of course, in the atmosphere. Thus, repurposing materials and using broken equipment resonated much more in the public schools in São Paulo.

However, both elements (repurposing of material, subversion, connection with the community) are extraneous to the school grammar. At the same time, students (and teacher as well) were very proud of the *jeitinhos* (creative solutions) they came up with, either to overcome lack of materials or to bypass authority. The result of that battle is known. Unfortunately, both students are frustrated and we lose a context that could leverage learning in a powerful way.

4.3.11.   Democracy or meritocracy?

Meritocracy seems to be one of the cornerstones of status and reward in schools. We observed many examples of how meritocracy turns into exclusion and destroys the learning atmosphere.

Still, in any learning environment, there will be conflicts. How do we solve them? How to decide who has the camera? The way the teacher/facilitator decides those things are also iterative tests for the children. They understand the decision process and adapt quickly.

In our experience, students realize quickly how to get what they want: either by seduction, praising the teachers, making him/her guilty etc. However, I had real power: I could decide who would use the equipment, how we would organize, how we were going to work. A hypocritical way to do things would be to pretend that I had no power, no veto, or was just an observer. However, I did not want to

make kids depend on my decisions and feel disempowered about taking their own.

The solution was to *use my power to share power.* I decided to use my position to establish a principle: *there will be no privilege here.* I was not giving out my influence on kids or pretending that I did not care about the equipment or the work. However, by setting up a principle, I shared with them the remaining decision power. When they asked about the camera, I gathered them and asked to propose different criteria, and vote. Alphabetical order won most of the times – and most kids stopped asking me for things. However, some kept calling me and to day that they wanted the camera ahead of others – I used my power to re-establish the criteria the majority has decided, and my personal belief about privilege. Not all students were satisfied with that, but they understood that neither seduction nor praising would work, but only engaging in the democratic negotiation. As Watson declared in 1957:

> A teacher may be, for example, a direct love object, a strict super-ego figure, an ego ideal, or an ego-helper. Almost regardless of what the teacher intends to be, each pupil will, at first, project upon his teacher a role which arises out of the experience of that child with other significant persons. [...] Whether the pupil learns, and what he learns, depends in large measure on a variable factor which pedagogy has blithely taken for granted. [Watson 1957]

The idea of a **Learning Atmosphere** implies that "details" are as important as most explicit core principles. The iterative relationship-building process, observed in the fieldwork, reveals that children are actively learning how to navigate in new learning environments. The depth of their involvement depends on the way they perceive respect, openness to diversity, trust and real decision-making.

4.4. Multiple expressive media (diversity of tools for diverse expression)

4.4.1. Goal

In this section we will discuss how the multiplicity of expressive media and technologies affects the learning atmosphere. We will pay special attention to the need adaptation of the tools to the local context, research on low-cost alterna-

tives, use of found and broken materials as well as mixing and matching high and low-technologies.

4.4.2. Technologies as humanizing tools

One of the Bradesco Foundation teachers, during the evaluation meeting, stated:

> "...we should not use technology for its own sake. What are they really learning with those technologies?" [ParticipantsBD2 2002]

The popular view about technology, as we saw in some private conversations with teachers and staff, is that it is a risky tool. Although we should know about it to operate in the world, technology takes away good things about physical presence, personal contact, manual work etc. Some would agree that technology is good to learn to get a job, but in general, it is a threat to our human condition. This is a comprehensible concern, as most technologies come from other countries and do take jobs of people, in Brazil. Technologies are also often non-affordable in poor areas.

However, technology can also be a fundamentally humanizing tool, if we remember Pierre Lévy's statement: *"it is the intensive use of tools that constitutes humanity as it is"*. To us, having multiple technologies within a learning environment is exactly augmenting and making possible many activities considered as inherently human: creation, expression, interaction. It is precisely the monolithic use of one single technology allied to one kind of epistemology, which control is not also in the hands of the learners, that is dehumanizing. It is not the machine that dehumanizes, but the person in control, who extracts the power from the learners at all levels. Of course, we can have a great sculpture, flute or moviemaking class, but we cannot assume that everyone has to be interested in that. Having multiple media means that you can have aggregate more people to the activity, see the synergies come up, see people transitioning from one media to another. The activities we promoted are not meant primarily to teach people a particular skill. In Heliópolis we clearly saw the difference between a segregated moviemaking workshop and moviemaking inside the overall context.

By offering multiple technologies and media we are offering more than nice technological gadgets – we are providing the tools that we believe to be potentially humanizing in an atmosphere to support such development. We do not bring all technologies in the world, but a subset that we believe are more expressive and constructive. In addition, the presence of multiple expressive media is not important to train students to use technology, but as the Brazilian psychoanalyst Nize Maria Pellanda states:

> "We do not learn about reality by direct experience, but through reconstruction. For reconstruction to take place, we need a full interior symbolic apparatus so that we could make sense of experience. An atmosphere poor of signs reduces the chances of flexibility in the interaction with reality and lacks raw material for us to rebuild the universe inside and outside of us."
> [Pellanda 1996], p. 239

Although digital media offers revolutionary possibilities for learning, it does not follow that it is the media of choice for all projects. An important distinction has to be made: the *presence* of **digital technology** is fundamental, but its *exclusive presence* is not necessary. The presence of **digital technologies** mixed with **traditional, familiar, hi-tech, low-tech media** is more powerful In Heliópolis we observed that students would stay for days working with paint and clay before engaging in some technological endeavor. Also, some kids did not engage at all in projects with technology, and yet had very good projects. In Fundação Bradesco, almost all the projects started with arts (sculpture, making models of the city), and then incorporated technology. Painting and sculpture were much better, familiar entry points for those students than robotics. However, we often imagine that projects start with arts and "evolve" to be more technologically-intense. That is not a good model. A better way to see it is that they start with arts and feel tempted to incorporate technology (and the other way around), as the atmosphere favors all kinds of mixes and matches of medias, collaboration between groups, change of plans, unplanned discoveries etc.

4.4.3. The myth of the digital

Lev Manovich, in **"The Language of the New Media"** [Manovich 2001], clarifies many of the myths about new or digital media, and what they really bring to the table.

Manovich states that there are at least six different popular explanations about what new media are, many of them wrong. We always associate digital images, with degradation-less copying, high quality or random access and interactivity – most of those notions are fundamentally wrong. Random access was available in cinema already, analog image has better quality than digital, and most compression algorithms used nowadays degrades the image. As a result, when we talk about "multiple media", it is important to state what we mean.

We tried to be very eclectic and not "religious" about *being digital.* Most schools in São Paulo, for instance, have old computers, not appropriated for video editing. Instead, we showed the students how to edit from the camera to a VCR – an old-fashioned and analog way to do it, but available for some. Almost every school has a VCR and some have video cameras, but it will take time for them to have workstations for digital video editing. I also showed how it is done digitally from my notebook, and some students used it to edit their videos – but one computer was not enough for all of them.

Moreover, some tools have to be digital to offer enough of a displacement, some do not. When we use a video camera in the workshops, for instance, there is no significant difference in how the camera records the information to digital (DV) or analog (VHS, Hi-8) tape (except a better image quality). In anyway, we will have to connect the camera to the computer to digitalize the footage. We can also edit using two VCRs. We would rather use analog video than no video.

4.4.4. The culture of repurposing

As a result, especially in public education systems, flexibility is a key point. We did not want to deliver the message that we were forcing the Secretariat to buy a certain kind of equipment. Thus, mixing familiar, found, broken materials was extremely important not to give the impression that we were talking about turnkey

or prohibitively expensive solutions. Many people in the Secretariat of Education did not believe in the long-term viability of the project because of cost concerns.

At the same time, Brazil has a deep tradition of re-purposing objects and finding creative ways out of hard problems. It seemed like a perfect fit.

Since the first workshop, in Heliópolis, one main concern was to ask kids to bring broken/found materials from home. They disassembled and repurposed them. Edilene used a motor from a tape recorder to replace a US$ 20.00 Lego motor. Diego used a broken game controller to control his prototype house. Mauricio built an energy generator using found tubes and soda cans. It was so natural for them to do it that, after some days, they were bringing things on their own, getting advice from brothers, sisters and cousins, going around the school and collecting broken toys. Although they occasionally did the same for the Art class, it never occurred to them to use parts such as motors or lights. They knew very much how to re-use plastic bottles, wooden sticks or soda cans, but electronic equipment was regarded a black box. Extending that previous expertise to a new field only required a first impulse from me, and then happened on its own. That is where we clearly see the difference between painting and robotics.

4.4.5. Eclecticism and adaptation

Gleidiane, from the Heliópolis workshop, liked to paint. I saw no point in forcing her to incorporate technology in her work. It would probably make it bad painting. Claudino had the idea to do a checkers game, using cork. Maurício wanted to write poetry, Luis to be the reporter, Herbert to build cars, Roseli to sing and write about her church.

How could I reconcile all those interests yet maintain a certain coherence? *My answer would be that the unity should be moved from the tool or the content to the atmosphere.* That kind of coherence is, to my mind, more powerful because of its flexibility and adaptability. That was why I proposed to the staff of the Secretary of Education to stop naming the activities a *Robotics Workshop,* but *Project Workshop* instead. A workshop about a tool (computers, video, and robotics) is dependent on the availability of certain technologies and human resources. If we

focus on themes or content, we risk being too traditionalist, forgetting the technology and ignore the local context. Neither are good intervention models especially for countries like Brazil, with few resources and high contrasts.

The available tools and resources will change from place to place, but that is not a serious problem if the spirit remains. Some schools in São Paulo do not have video cameras, but have better computers. Some do not have digital cameras, but have a strong community link. Teachers teach in different schools within the same days, where students, resources and the neighborhood change completely.[36]

The risk of spreading ourselves to thin over a number of tools exists, but was not observed in any of the workshops. In most cases, as the case studies indicate, students choose one project and integrated the tools into it, rather than jumping from one thing to another and not accomplishing anything.

4.5. The "We already do that" phenomenon

4.5.1. Rationale

It has been a common phenomenon that people would claim to be doing similar things that we were proposing, in many different sites. This section discusses possible reasons for that and some strategies for stating the differences.

4.5.2. A small world

The "We already do that" phenomenon was so constant in all sites of our field-work that it deserves some special attention. In the São Paulo and Curitiba public schools, as well as in the Bradesco Foundation schools, after an initial presentation of our work we customarily heard:

Oh! We already do that!

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[36] The other element of unity came from Fernando Almeida. His opinion was that the link between the after-school activity that we were doing and the daily activities at the school was the community. After-school workshops fail to integrate themselves into the culture of the school unless a link exists – in this case, he believed that interdisciplinary projects, focusing on the community problems (as the "City that we want" project), within the regular class time, could be the connection with the workshops that we were conducting.

The "*that*" referred to many different things, as project-based learning, using Lego-Logo, learner-centered approach, working with Logo etc. It struck us that, although the principals and teachers were saying "we already do that", it was obvious that their schools seemed absolutely traditional, that they do not already do what we do. Also, after the workshops, their opinion changed completely (at least for most of them), and they realized that we were bringing in something different.

The Bradesco Foundation also had a "City" project, the São Paulo schools also were "Freireans" and "Project-based", the Curitiba schools were devoted "constructionists". However, my impression was that those initiatives were far more developed in the discourse level than in the concrete – in some cases, they were meant to remain in the discourse level. The Bradesco "City" project did not allow the kids to choose their themes. We did not observe any working Freirean project in São Paulo. In Curitiba, most teachers we had contact with were not at all familiar with the Logo language or the real practice of Constructionism.

This recurring phenomenon has many different explanations. We will comment come of them here, knowing that they all carry part of the truth. In our future work, we would like to examine in detail this phenomenon.

The first part of the explanation comes from Edith Ackermann:

> The flip side of embracing everything [referring to the Brazilian anthropo-phagic culture] is that there is no way to do it, unless you do whatever you want in the back. [Ackermann 2001a]

The appropriation of the discourse of innovative educators, such as Freire, Papert, Dewey, could be a way to accommodate new demands from society, parents and kids. The use of technology in education follows the same principle: appropriating the discourse and the techniques, yet maintaining the school praxis untouched.

The second part comes from the analysis about power relations and surveillance of Singer, Covaleskie, Shaw (commenting Foucault), Tyack & Cuban and Kelchtermans ([Singer 1997], [Covaleskie 1993], [Shaw 2002], [Tyack *et al.* 1995],

[Kelchtermans *et al.* 2001]). Foucault states that teachers, as well as students, are subject to a strict surveillance mechanism. They have to report to the school the progress of the curriculum. They have to deliver weekly lessons plans, reports, grades, expect pop-in walk-through inspections by the principal [Shaw 2002]. School as it is, accordingly to Tyack, "enabled teachers to discharge their charges in a predictable fashion and cope with everyday tasks. [...] Habitual institutional patterns can be labor saving devices" [Tyack *et al.* 1995].

A third element is that, especially in Brazil, teachers are poorly paid and often have to teach in two or three schools a day, teaching hundreds of students everyday. Recognition for innovation or extra effort is hardly compensated and, as Tyack says about the attempts of educational reforms in the USA that:

> Such alterations is basic practices have increased teachers' workloads, often without compensatory time or resources. [...] They could, if they chose, comply only symbolically or fitfully or not at all with the mandates for change pressed on them by platoons of outside reformers.

The fourth element, already commented in the Introduction, relates to the Trojan Horse opportunity. Schools are eager to implement technology and, up to a certain extent, innovation. All the public discourse around education is about improvement and change.

When we visit or work in those places, we are posing a threat on the local staff. They are being watched by their supervisors. The teacher is being scrutinized by the principal, the consultants by their hirers, the technology coordinator by the Secretary of Education.

In our first contact, we at times use expressions that are already widespread (even thought with different meanings) in the professional milieu, especially in Brazil: project-based learning, technology in education, community projects. For a teacher or a technology coordinator to recognize that he/she has no idea of what we are talking about, it is professional suicide.

Moreover, the profusion of trends, gurus and new fashions in education has the side effect of making different things share the same language. One of the contributions that I hope to achieve with this thesis is to propose some new terms,

such as **Learning Atmosphere** and **Generative Space**, that would help us differentiate ourselves in the world and deepen the interchange of ideas – to which having a more precise language is vital.

Thus, there are two multiple sides of the phenomenon. One is the anthropophagic trace in the Brazilian culture that tends to absorb all influences and theories. The danger, as Edith Ackermann points out, is to use that broad discourse to hide a very different practice. The other side is the news demands that are posed to teachers and schools at all levels, without the correspondent resources, which forces them to look for quick alternatives that might not be the most lasting ones (the reverse Trojan Horse effect). Finally, teachers and schools (as well as students) have already seen this movie: innovators from outside coming to tell them what to do. No matter how hard we tried to involve them, the truth is that a good share did not actively participate in the activities.

The problem about the "we already do that" phenomenon is that it is paralyzing. Some teachers and schools neither move their projects forward or support ours. Some believe that they are doing something really innovative and do not need our contribution. Others might not want our contribution.

The strategies that we used to overcome this phenomenon were partially successful. We did not expect to be a unanimous success. Teachers such as Suely, from São Paulo, Ricardo, from Bradesco, and Jordana, from Curitiba, went through a transformative experience motivated by their own beliefs and interests.

Using low-cost and familiar materials, designing the project in a participative way, using the equipment in a democratic manner, showing what is possible with the technology, being hands-on and heads-in, and showing fallibility helped create trust not only from/to the students, but from teachers and staff.

From all of those experiences, we believe that one important contribution was to show that we are not proposing an ideal, unreal teacher, without any authority, at the mercy of wild and limitless students, always saying "yes", always playful, and not concerned with content.

We are proposing to those teachers that the satisfaction of being a teacher is precarious if it remains on the punitive, authoritarian or charismatic level. On the other hand, we hope to have demonstrated that there is still a lot of joy and personal satisfaction in teaching, in building knowledge, and in conveying our personal experiences and passions to the students. Nevertheless, the source of that joy is an egalitarian relationship, mutual respect, friendship, trust and democratic conflict resolution.

Rather than being just a nice closing statement, we hope that the **Learning Atmosphere** framework can contribute to the understanding and implementation of new models for learning, in a sustainable way.

5   Conclusions

A alegria é a prova dos nove.

Contra a realidade social, vestida e opressora, cadastrada por Freud – a realidade sem complexos, sem loucura, sem prostituições e sem penitenciárias do matriarcado de Pindorama.

Oswald de Andrade (1929)

Em Piratininga, Ano de 374 da Deglutição do Bispo Sardinha.

The main goal of this thesis was to set up a framework to propose and analyze models of intervention in education systems, with a focus on Brazil. With this objective in mind, I proposed the **Learning Atmosphere** concept, with its three main dimensions of openness:

- Generative Spaces - *conviviality for construction*

- Multiple Expressive Media - *diversity of tools for diverse expression*

- Relationship building - *affective and power interactions*

The discussion of the case studies demonstrated the importance of these elements, and demonstrated the possibility of giving students a different and powerful experience that builds up from their local culture, history and expertise. However, broad brush strokes can not do justice to powerful ideas in learning.

The energy crisis in Brazil was the canonical example. I have lived in the same city for my whole life, knew the culture, the place, the history. Yet the perception by the students and residents from Heliópolis of the crisis was completely different. The impact was considerable, but in a different way. I had to understand what was important and familiar to them as a group and as individuals, such as the strong political engagement, the re-purposing of materials, the *jeitinho brasileiro*. But I learned that only building on a superficial view of local culture, by introducing learning methodologies such as project-based approaches, by making available potentially expressive technologies, was not enough to create the displacement that would make people pay attention, challenge underlying assumptions, and work in new ways.

Expressions such as "local culture" and "community development" became quite fashionable in the public debate around education. But local culture is not automatically positive. Community values are not all virtuous, as many author already demonstrated [Taylor *et al.* 2001], [Eiles 1996], [Chanlat 1992]. Catalysts are important.

It was essential, thus, to have a more textured, fine-grained approach, and identify also what was *not* in the culture. The challenge is to use technology, which

was extraneous and foreign, as a means to reinforce community's own livelihood, and create enabling spaces for mutual enrichment.

As a result, technology, and particular ways of using it, were the main elements of displacement. I showed how they play a central role in the process, enabling new, complex, diverse ways of learning and thinking, both on and off-screen, with familiar and unfamiliar materials, using high and low-tech tools. In addition, the atmosphere enabled new ways to simultaneously manage epistemological diversity, create trust and empower students and teachers.

I brought modern technological devices, but also trash and *sucata* (found materials and broken equipment), as a way to build on top of the culture of repurposing of materials (the *jeitinho*), but not in the usual way: we used it to do robotics, to create photo-essays, to build animations. I built on top of their strong community life and political engagement, but doing a news report with modern digital cameras. The learning atmosphere provided the necessary conditions to open things up, favor conviviality and create trust.

Here we come to a classic question concerning democracy and power: why would someone in a position of power share it? I witnessed that there is a way out of this vicious cycle. A teacher can have more personal and professional satisfaction by using their power to establish a democratic space to share it with students. The learning that takes place, as well as the friendship, respect and trust that builds up pays off greatly for teachers. The presence of technological apparatus, by reconfiguring and disrupting the learning environment, allows this process to happen.

The learning atmosphere generated the self-confidence and the necessary displacement that is fundamental in a country where the Oswaldian anthropophagi is rule, where innovations are received and quickly "tropicalized":

> We were never evangelized. We made Christ be born in Bahia. I am only interested in what does not belong to me. That's the law of men. That's the law of the anthropophagus.
> Oswald de Andrade (1928) *in* [Andrade 1928]

That was the most important lesson of Paulo Freire, when he wrote about literacy. Although his ideas have often been used in very different directions, Fernando José de Almeida gives us some hope:

> That happens with all of them, and not only Freire: Piaget, Vygotsky, Freinet, Dewey. People did the same with them: quick recipes, silly and fake results. But the worst is when the articulated discourse substitutes the practice, and a imposing, and autocratic reality comes, pretending to be about freedom, creativity, and democracy.
> The time between intention and gesture is the time of History. History that is not fate, but political struggle. Fight of people that are utopists, Paulos Freire's way, who know how to denounce inhuman and unfair realities, but also to announce a new world that could make everyone happier. [Almeida 2002]

Children and teachers know well the script of "change in education." We wanted to give them more than the script. We invited them to be actors, directors, scriptwriters, and collaborators.

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Manifesto Antropofágico

Só a Antropofagia nos une. Socialmente. Economicamente. Filosoficamente.

Única lei do mundo. Expressão mascarada de todos os individualismos, de todos os coletivismos. De todas as religiões. De todos os tratados de paz.

Tupi, or not tupi that is the question.

Só me interessa o que não é meu. Lei do homem. Lei do antropófago.

Estamos fatigados de todos os maridos católicos suspeitosos postos em drama. Freud acabou com o enigma mulher e com outros sustos da psicologia impressa.

O que atropelava a verdade era a roupa, o impermeável entre o mundo interior e o mundo exterior. A reação contra o homem vestido.

Nunca tivemos gramáticas, nem coleções de velhos vegetais. E nunca soubemos o que era urbano, suburbano, fronteiriço e continental. Preguiçosos no mapa-múndi do Brasil. Uma consciência participante, uma rítmica religiosa.

Contra todos os importadores de consciência enlatada. A existência palpável da vida. E a mentalidade pré-lógica para o sr. Lévy-Bruhl estudar.

Queremos a revolução Caraíba. Maior que a revolução Francesa... sem nós a Europa não teria sequer a sua pobre declaração dos direitos do homem. A idade de ouro a-nunciada pela América. A idade de ouro. E todas as girls.

Nunca fomos catequizados. Fizemos Cristo nascer na Bahia. Ou em Belém do Pará.

MAS NUNCA ADMITIMOS AO NASCIMENTO DA LÓGICA ENTRE NÓS.

Contra as elites vegetais. Em comunicação com o solo.

Perguntei a um homem o que era o Direito. Ele me respondeu que era a garantia do exercício da possibilidade. Esse homem chamava-se Galli Mathias. COMI-O.

O pater famílias e a criação da Moral da Cegonha: Ignorância real das coisas + falta de imaginação + sentimento de autoridade ante a prole curiosa.

Antes dos portugueses descobrirem o Brasil, o Brasil tinha descoberto a felicidade.

A alegria é a prova dos nove.

Contra a realidade social, vestida e opressora, cadastrada por Freud – a realidade sem complexos, sem loucura, sem prostituições e sem penitenciárias do matriarcado de Pindorama.

Oswald de Andrade (1929)

Em Piratininga, Ano de 374 da Deglutição do Bispo Sardinha.