Schools as Organizations
A Semiotic Approach towards Making Sense of Information Technology

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Abstract: Low cost educational laptops have the potential of transforming educational practices in the public schools from developing and emerging countries. However, in order to be effectively incorporated into schools' daily practices, technology has to make sense to the people that constitute these schools. This paper reports on the initial activities with the members of an elementary public school in Brazil, facing the challenge of constructing meaning for a new digital artefact. Concepts and practices from Organizational Semiotics (OS) and Participatory Design (PD) were adapted as a methodological frame of reference for the analysis of structure and context. Preliminary results indicate that, although originally designed for the business and work domains, practices from OS and PD were suitable and revealed information that other approaches would hardly reveal, regarding a prospective use of technology in educational contexts.

1 INTRODUCTION

Technology is everywhere in our lives, mediating our actions. Hence, the use of technology should be a powerful tool to provide access and to promote the construction of knowledge in the schools. This is especially true in the context of developing countries, where the opportunities of access to digital technology at home are scarce. However, to be incorporated into schools' practices, it needs to make sense to the community of users. Technology use should be transparent, providing teachers and students with learning opportunities, so that a digital culture might be created at school and perhaps disseminated to the schools' physical surroundings.

According to a survey conducted by the Brazilian's National Institute for Educational Studies Anísio Teixeira – INEP; and the Brazilian Ministry of Education and Culture – MEC (MEC/INEP, 2010) roughly 31,700,000 students are enrolled in the fundamental level, from which around 27,500,000 are in public schools. A survey conducted by the Brazilian Internet Steering Committee - CGI (CGI, 2010) indicated that while 81% of Brazilian public schools (including fundamental level and high schools) have a computer lab, only 4% of the public schools have a computer in the classroom.

Recently, a program from the national government has proposed the use of educational laptops in a 1:1 model and has been incrementally distributing the machines to public schools. The mobility of the laptop allows students to take it to their homes, extending the potentials of the laptop to the students' family. In a country where 55% of the population in general have never used a computer (UNESCO), that initiative might represent a relevant step towards more access to information and knowledge, i.e., a fairer society.

For a new digital technology to be effectively incorporated in educational contexts, it must make sense to all involved parties and it must consider their habits, abilities and organizational culture. On that ground, we believe that the process of bringing this new artefact of technology to the school context must happen under a socio-technical approach. This situation presents the research challenge of formalizing models and techniques to promote understanding of the situated scenario towards meaningful use of technology in schools.

In January 2009, 500 XO laptops were donated by the One Laptop Per Child (OLPC) organization and are being used at a school in the suburban area of the city of Campinas, in São Paulo. This project is a research effort that runs in parallel and independently to other government's initiatives. In

the approach adopted by the government, to insert the laptops at schools, a same methodology is imposed to all the schools from different regions of the country. Differently, our approach acknowledges the situated character of the problem and constructs a methodology based on a joint effort of the different parties involved: researchers, designers, developers, educators, school staff, and students.

Taken the school as a complex organization, the frame of reference to our work is based on methods and artefacts of the Organizational Semiotics (OS) (Stamper, 1993 and 1993b), combined with techniques inspired by Participatory Design (PD) (Muller, 1993). Both OS and PD are articulated to compose the collaborative practices of Semio-participatory Workshops (SpW) (Baranauskas, 2009) conducted within the school.

This paper presents our findings from the initial stages of the process of clarifying the problem of technology embedding in a fundamental public school in Brazil, on the grounds of OS. The paper captures the impacts of the SpW based methodology and discusses results of the first workshop. Five other workshops were conducted in the school during the year 2010 and four in 2011. The paper is organized as follows: related approaches are reviewed in Section 2. Theoretical and methodological framework adopted by the project is detailed in Section 3. Section 4 describes the planning of the workshop. The workshop itself, with its results and discussion, is detailed in Section 5. Section 6 concludes.

2 RELATED WORK

Since the proposal of the XO laptop by the OLPC in 2005, many initiatives have taken place to investigate its use at schools. Not only the XO laptop is being target of studies, but also similar technology that has been proposed after OLPC.

From a pure technical perspective, Moody and Schmidt (2004) present the advantages of wireless networks in education and numerate some concerns to be addressed before the wireless networks are implemented at schools.

From a socio-technical perspective, Cervantes et al. (2011) analysed the social and technical infrastructures that support the use of low cost laptops at schools. That was done by observing the activities that took place at elementary schools in Mexico after the laptops were already distributed. The authors described, based on what they saw in the schools, how the available infrastructures (both from technical and human perspectives) shaped the use of the laptops.

Also describing the laptops use after its implementation, Flores and Hourcade (2009) report on the experience in Uruguay. The government in Uruguay has distributed laptops to every child in the public elementary school of grades 1-6 in the country. The authors describe the first year with the laptops at the schools.

In the Brazilian context, Corrêa et al. (2006) conducted surveys similar to market researches. Qualitative (interviews) and quantitative (forms) approaches supported the investigation on the acceptability of low cost laptops among teachers and students before introducing the laptops to the interviewees. This descriptive study collected and reported on teachers' and students' beliefs on the impacts of digital technology at school.

The important difference between the approach of Corrêa et al. and ours lays on the role that teachers and students play in the project. Instead of passive informants, we take teachers, students and other members of the social organization formed by the school, as active partners. More than eliciting participants' concerns, our objective is to promote a collective awareness, encouraging a collaborative prospection of ideas and solutions, creating together more meaningful uses of digital technology, even before the arrival of that technology.

Expanding from the situated context of educational laptops to the general use of Information and Communication Technologies (ICT) in educational settings, Lim (2002) also argued for the importance of taking socio-technical perspectives. Based on the Activity Theory, the author proposes a theoretical framework that shows the connection of ICT with learning and the sociocultural setting. The garden-as-culture metaphor from Cole (apud Lim, 2002) is adopted to provide a broader view of the school and educational system in the society at large.

Although OS is not mentioned, the author's (Lim, 2002) figure displays some ideas that are similar to those present on OS artifacts: in the framework from Lim, the garden metaphor with the activity system is shown as embedded circles, with the society as the outermost circle. Those more formal structures are on inner circles; and the activity system itself as the innermost circle.

Explicit reference to OS is made in the work of Melo et al. (2008). Different design techniques and artifacts are combined into the model that the authors propose for the design centred in children's participation. The work of Melo et al. (2008) had its focus on the process of design for and with children

towards interfaces that made more sense to the children

Our work faces the challenge of providing more meaningful appropriation of technology within a school community. The simple injection of a foreign technical device into a community's life seems easier but the adjustments demanded by this approach might feel less natural. Our pursuit aims at promoting a collective construction of meanings towards more natural housing of the new technological tool, having the entire community – with teachers, students and other members – as actors.

In this endeavour, we adopted a theoretical and methodological reference based on Organizational Semiotics (OS) and Participatory Design (PD). Even though both OS and PD have origins in industrial and business areas, we argue that they can be successfully applied in educational contexts, guiding the process of technology assimilation to more meaningful results. The principles and some instruments from OS and PD applied in this project are detailed in the next section.

3 METHODOLOGY

3.1 Organizational Semiotics

OS views information systems as organisations, composed of socially established models of behaviour, beliefs, perceptions and values (Stamper et al., 2000). In this approach, the design of technology starts with the understanding about the sense that the community of users make of signs and how the organisation is structured.

According to Stamper et al. (2000), any organisation can be described in terms of the norms that govern the behaviour of that social group. The authors suggest that such norms are applicable to different types of taxonomies. One possible categorization is by the level of formality of the norms. In this case, the categories are: technical, formal and informal. Strictly precise norms that can be expressed as instructions to be followed by, for instance, a computer, comprise the technical norms. The written norms (i.e., bureaucracy) are the formal ones; and all other norms that people know and live according to are the informal. These levels can be represented as the layers of an onion, where the technical systems are embedded inside the formal and informal organisation. The Semiotic Onion (Stamper, 1993b) comprise the technical, formal and informal layers of real information systems.

Another possible way proposed by Stamper et al. (2000) to classify norms is according to their role in relation to signs and their functions, which can be organized using the Semiotic Framework (Stamper, 1993). The authors indicate that this taxonomy helps understanding the impact of information technology when that technology is the cause of organisational change. The Semiotic Framework from Stamper organises the properties of the signs into six levels (three more levels than the usual semiotic division of syntax, semantics and pragmatics):

▪ Social level: for a sign to be fully understood, as argued by Stamper (1993), one needs to understand its potential or actual social impacts. That includes concerns about ways of behaving, sets of values, shared models of reality, etc.

▪ Pragmatic level: for a sign to have a use, it must have an intention, shared by its creator and its interpreters. This level involves the understanding of context and forms of communication.

▪ Semantic level: this level is related to the meanings that are continuously constructed and reconstructed while people use syntactic structures to organize their actions.

▪ Syntactic level: concerns formal structures that maps or transforms symbolic forms. These are mechanical transformations and they are proper of software developers.

▪ Empiric level: this level includes the aspects related to telecommunication in general: noise, patterns, redundancy, errors, channel capacity, etc.

▪ Physical level: the physical properties of objects or events: equipment, hardware, physical structures, etc.

Together, the layers of the Semiotic Framework (also Semiotic Ladder) guide the understanding of how an organisation works. Moreover, it helps in analysing factors that might contribute to more successful processes (Liu, 2000; Stamper, 1993).

In the next sections we exemplify the use of the Semiotic Onion and the Semiotic Framework for the analysis of data collected from the activities in the school. Next we briefly describe two other artefacts that were explored collectively during the encounters with the community of users.

3.1.1 Stakeholder Chart

The various methods that compose MEASUR (Methods for Eliciting, Analysing and Specifying Users' Requirements), proposed by Stamper (1993), provide tools for better understanding organizations. Liu explains that, even when dealing with rather

chaotic problem situations, the methods allow gradual and precise clarification, until a set of technical solutions can be reached.

The Stakeholder Analysis Chart (SC) is one of the Problem Articulation Method techniques, from MEASUR (Liu et al., 2007). The actions of stakeholders, with their roles, interests and responsibilities, usually impact the result of a project. Because of that, it is important to clearly identify who the stakeholders are so that they are properly taken into account in the process.

3.1.2 Evaluation Framing

The Evaluation Framing (EF) (Baranauskas et al., 2005), differently from the Valuation Framing (Liu, 2001), is a technique that aids in the process of anticipating problems new technology might bring to the organisation, and prospecting solutions for them. The EF guides a reflection on issues and possible ideas and solutions related to each category of stakeholders raised through the SC. In the workshops that we describe in this paper we have used the EF to help the whole group in the identification of the main issues related to this specific context of new technology and educational change.

3.2 Participatory Design

The Participatory Design (PD) has its origins in Scandinavia in the late '70s, appearing in the workplace to promote more democratic insertion of technology among those more affected by it (Schuler and Namioka, 1993). Brought to the design context, the involvement of the users in the design process contributes to the motivation of participants and to greater satisfaction with the outcome, since all are co-authors of the resulting system.

Several techniques have been proposed to allow this interaction between designers and end users, and to allow the participation of users in all stages of the design process. Among the techniques used in PD, we can mention games, plays and different levels of prototyping. Muller brought together and listed several of these activities in (Muller, 1993).

3.3 Semio-participatory Workshops

The insertion of digital artifacts in the educational environment demands a vision of its socio-cultural context (Lim, 2002).

The articulation of methods from OS with principles and practices from DP represents a

powerful tool for the process of understanding the social context while involving the target community in the course of actions. This articulation was materialized in activities that were carefully tailored for each community who joins the SpW (Baranauskas, 2009).

OS was proposed in the context of information systems and business organisations. PD has also its origins in the work field contexts. However, the combination of OS and PD has shown important results in other knowledge domains and practice areas. For example, Neris el al. (2011) report their actions during the design of an inclusive social network, involving a community of young adults and seniors from a low-income neighbourhood. Other successful examples include practices related to the domains of critical systems (Guimarães and Baranauskas, 2008), geographic information systems (Schimiguel et al., 2005); (Escalona et al., 2008), iDTV (Furtado et al., 2009), among others.

Those results encourage us to use the presented methodological frame of reference to bring awareness and collective discussion within an educational organisation, involving school-age children and their fellows (teachers, parents and other members of the school). Together, we have been engaged in the process of constructing a more meaningful use of technology. The next section describes how these methods and artefacts have been collaboratively articulated in our scenario.

4 PRELIMINARY PRACTICE

The first encounter with the school's community took place even before the arrival of the laptops at the school. Researchers from different areas (computer science, pedagogy, multimedia, psychology, etc.) gathered with the members of the school, which included teachers, students, parents and other employees from the school (e.g., principal, pedagogue, cook, janitor). Also representatives from the secretary of education of the city hall were present. This first SpW had 60 participants and the composition of this group is represented in Figure 1.

The discussion on the new technology that was about to be used at the school would be richer if the participants could have a better idea about that technology. Because of that, the SpW started with what was called the "XO Mini Fair".

The mini fair allowed participants to have their first contact with the XO laptop. For this event, eight XO laptops were distributed among four stands. In the first stand, participants had the chance to

manipulate the laptop, finding out how to open it, how to close it, use the antennas, rotate the screen.
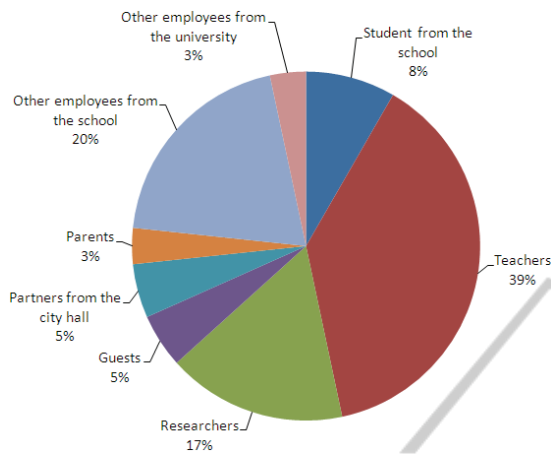

Figure 1: Participants of the SpW and their roles.

At another stand, the features of XO's webcam were explored in activities where participants were able to take pictures and make short videos. The other two stands examined the chat activity and the educational game *SOO Brasileiro* (Silva et al., 2008). Figure 2(a) illustrates a moment of this activity in one of the stands.

Each stand had at least one facilitator, i.e., one of the researchers who would be available to assist participants in their interactions with the XO whenever needed.

After the XO Mini Fair, the whole group gathered together again and videos were presented. The first video was composed of extracts that formed a shorter version from a video available on Youtube (http://www.youtube.com/watch?v=ZwQOibphtjc). This video showed the experience that a public school in another State in Brazil was having with the use of XO laptops. The second video presented some of the initiatives from our research group related to low cost laptops and the main features of the XO laptops.

After all participants were familiar with the laptop and some of its possible uses, they were invited to discuss, in smaller groups, about the impacts of bringing that technology to the school. Posters had been previously prepared, depicting the empty artifacts of SC and EF. Due to the size of the group (60 people), they were distributed in three smaller groups. Each group had one poster of each artifact; and participants expressed their thoughts writing in post-it's that would be fixed on the posters. In each group, a facilitator led the activity, eliciting responses and attaching the post-its on the charts. Figure 2(b) illustrates a moment of this

activity.

After all charts were created, the entire group got together again and the results were discussed; each group summarized their results on the activities.

Towards the end of the SpW, participants were invited to take a moment of introspection. They were asked to write, individually and anonymously, adjectives or complete sentences that reflected their perceptions and expectation about the project. The activity was not mandatory, but the majority reported on their impressions.

5 RESULTS AND DISCUSSION

The XO Mini Fair was an attempt to diminish participant's anxieties about the technology they were going to receive in the school. Participants visited all stands and learned how to manipulate the laptop and how to use some of its main features.

After the SpW, researchers analyzed the material produced during the workshop. The tables that were filled separately by all three groups were combined into one consolidated table.

The charts displayed participants concerns related to varied subjects: safety issues (e.g., precaution and protection of children carrying a laptop from home to school and vice-versa); training (e.g., how to train teachers, students, parents and other users); operational issues (e.g., how and where to store all machines, how to distribute them among the children, maintenance issues); among others. Figure 3 illustrates the main issues discussed in the groups, represented and sorted according to the levels of the Semiotic Framework. By observing the summarized general results of the SpW in Figure 3, we can realize how the use of SC and EF helped the group to become aware of issues ranging from the physical to the social domains. Technology related projects are usually directed mainly towards the IT levels (physical, empirics and syntactic levels of the Semiotic Framework). In the context of our project, the concerns with human information functions (the social, pragmatic and semantic levels) are of vital importance. For the technology deployed to make sense, and thus be incorporated into community practices, it is necessary to address issues of higher levels of the framework as well as the issues related to the lower levels. For example, since the number of students in the school exceeds the number of machines, deciding how to distribute the laptops will have an impact in the schools' culture and habits. The infrastructure of the schools (e.g., number of sockets at a classroom, electric capacities, etc.) may

Figure 2: On the left, (a) participants of the SpW examining the XO at the mini fair; and (b) one of the groups constructing the Evaluation Framing with post-it's.

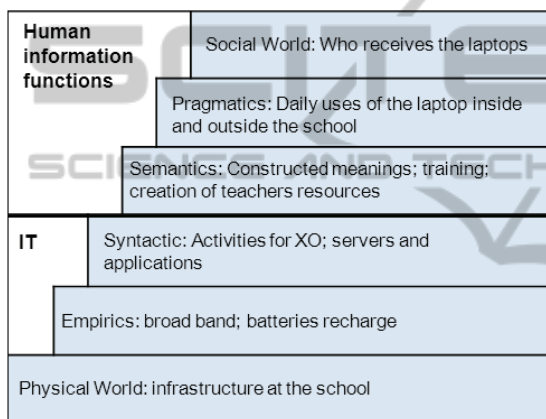influence the daily uses of laptops.

Figure 3: The Semiotic Framework (Liu, 2000) organizing the main ideas related to the project.

Figure 3 will be further discussed later in this section. Following, more details on the results from the workshop is presented.

5.1 Findings from the Artifacts

The SC was originally designed to be used by the developers of informational systems themselves (Kolkman, 1993). In our approach, the artifacts were used collaboratively in a participatory practice during the SpW, where researchers and the school's community interacted together. All participants recognized themselves as protagonists in the action of deploying low cost educational laptops at the school.

5.1.1 The Stakeholders Analysis Chart

The different groups presented similar results and they are summarized in Figure 4. On the background, the figure shows part of the model of

Stakeholders Analysis (Liu, 2001); and the table on the foreground shows the main stakeholders elicited.

The *contribution layer* lists those directly involved in the course of action. The core of the analysis was the Project as a whole. Besides those that are part of the this school's community, also other schools were listed on this layer. Those schools that have already been experiencing with the use of educational laptops were seen as possible contributors, as a source for inspiration and example.

For the *source layer*, the list of possible suppliers and clients elicited during the SpW was divided in two categories: those who could be a source of information for the project and those who would provide the necessary material infrastructure.

Also the responses for the *market layer* were grouped in two categories: the collaborators or competitors from within the school's walls, and those from beyond the school's walls. This illustrates how participants are able to see beyond their own and near environment, understanding that the impact of the Project might extend beyond the school itself.

Due to time limits, and also due to the rich discussions raised on these first layers, some of the groups were not able to discuss the outer layer related to *bystanders and community*. Nonetheless, the few responses concerned basically the possible formal means of communication from the community outside the school and other formal organizational structures.

5.1.2 Evaluation Framing

After identifying who were the agents that either would be involved in or affected by the project, the same groups discussed the issues and possible ideas related to each layer of stakeholders. The complete transcription of the issues and ideas raised summed
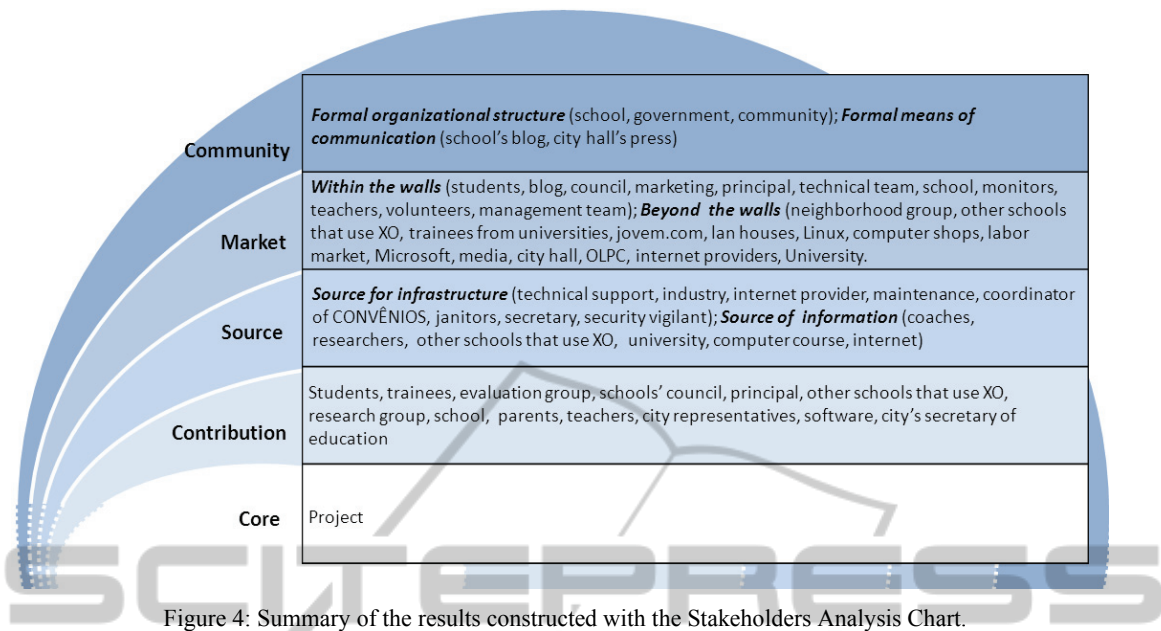
Figure 4: Summary of the results constructed with the Stakeholders Analysis Chart.

Table 1: Examples of the ideas elicited by the use of the Evaluation Framing.

Stakeholders	Issues	Ideas and Solutions
Community	What is the government's role in the project?	Technical support from the Municipal Education Secretary
Market	How to provide internet access to the laptops?	Extend wireless network.
	Publicity: how to spread the word about the project?	Write reports about the experience; Use the school's official blog.
Source	How to provide training to staff for the usage of the laptops in the school?	Student monitors as assistants.
	Maintenance: how to fix software and/or hardware problems?	Provide specific courses for teachers, students and other interested in helping with the maintenance of the laptops; Search for agreements with partners from outside the school.
Contribution	Distribution of the laptops: since the amount of teachers/students is greater than the amount of available laptops, who receives the laptops?	Share laptops among siblings; share laptops among children from different shifts.
	Children's safety: is it safe for the children to go home carrying a laptop? Would the parents allow it?	Parents signing a Terms of Conditions of Use; Meeting with parents; Parents accompanying children to and from school.

more than five pages of texts. Table 1 lists one example of issue and possible solution related to each layer of stakeholders.

The concern with the distribution of the laptops among students and teachers prevailed in all groups. The school has more than 500 students, plus more than 30 teachers; and there were around 500 laptops available to be shared among them. Different ideas were discussed, including: sharing laptops among siblings or among children from different shifts (at this school, grades 1-5 attends the morning shift, while grades 6-9, the afternoon's).

Regarding the stakeholders from the source layer – in this case, more specifically, source of

information – some participants discussed about the learning curve and who would provide teachers with the necessary training.

5.2 Expectation and Perceptions

The adjectives and sentences written at the end of the workshop portray the beliefs, expectation and perceptions that participants had about the project and the XO laptop. The full transcript of participants' expectations, as well as the transcription of all issues and ideas elicited, shall be available on a technical report.

From the transcription of participants'

expectation and perceptions, a tag cloud was created. Figure 5 illustrates the words and their occurrence (how frequently the words appear in participants reports).

As the project was at the core of the discussion, the word "project" was the most mentioned one, and it was taken away from the list so that all other less mentioned words would be readable in the resulting tag cloud. Positive adjectives were also frequently mentioned, e.g., "great" and "good". The general opinions expressed revealed participants' interest and excitement for the new arrival, which was denoted by terms like "interesting", "innovative", "challenging", "motivation", "cool", "fantastic" and "happy".

Albeit naïve, one hoped for changes to "better lives" simply by the presence of the laptop itself. Others demonstrated being aware that the proper use of the laptops might promote deep changes in the school, changing paradigms and impacting the entire school's systems; and they were also aware that this does not happen overnight, but instead, as a result of a long process that demands conjoint actions ("Innovative, however, a long path lays ahead before being totally functional"; "(…) interesting, but demands more detailed planning to work (…)"; "(…) if well organized (…) a mechanism to promote the involvement of the community with the school.")

From the 60 participants, two questioned the outcome or purpose of the project. One concern was with the improper use of the internet. The other made use of a metaphor from the bible, questioning whether the project was not trying to "throw pearls to pigs".

5.3 Analysis Summary

The insertion of the laptops that was about to take place at the school was an act that would take place at the technical layer of the Semiotic Onion. This occurrence would demand that norms be created at the school to rule the use of the laptops at the six levels of the Semiotic Framework, as summarized earlier in this paper on Figure 3.

5.3.1 Social Level

From a social level perspective, one of the rules that needed to be decided regarded sharing laptops: who would share the laptops and how was it going to be controlled. One idea that was positively taken by most of the adult participants was sharing the laptop among siblings. It seems feasible and practical that if brothers and sisters attend the same school, in

different grades and shifts, they could perfectly share one laptop. That idea, however, would not work in practice. Students revealed that **the relationship they actually have with their** brothers and sisters is not always friendly enough to keep that norm working well.

If the norm (formal layer) about sharing the laptops among siblings were decided and implemented without accounting children's opinion, conflicts might had led to a disruption at the social level (the social level of the Semiotic Framework, in this context, can also be seen as the informal layer of the Semiotic Onion).

The involvement of the children in the decision processes are important not only to guarantee that aspects from real live practices are accounted, but also because they – the children – are central to the entire project. The meaning the children, together with other members of the school, will make of the laptops will have social consequences and might determine the success or failure of the project.

As Liu (2000, p.111) argues: "Before introducing an IT system, there should be clear specifications of rules for business operations". These rules must make sense to those involved: "an IT system presupposes a formal system, just as a formal system relies on an informal system".

5.3.2 Pragmatic Level

At a pragmatic level, the use of the laptops should provide richer learning environment, promoting improved education. Another issue raised during the SpW regarded the lack of knowledge teachers had on the laptop. One of the ideas suggested that students who were more familiar with digital technology could provide support to peers and to the teachers. This approach might contribute to an important change: moving away from the instructional paradigm, towards more constructivist/constructionist (Papert, 1993) ones.

Learning about specific features of the laptop only for the purpose of learning about that technology might make less sense than engaging on the construction of knowledge supported by the use of the technology.

5.3.3 Semantic Level

In this process, the meanings that will be constructed (and reconstructed, in a continuous and iterative process) have an important role. "The meaning of a sign relates to the response the sign elicits in a given social setting"; moreover, it "frequently suggests mental and valuational processes as well" (Liu, 2000, p.30). Children might understand the laptops

Figure 5: Tag cloud formed with participants' adjectives and sentences about the project.

as a source of distraction and recreation. This can be a powerful learning tool if teachers choose to take advantage of what children most like doing at the laptop in order to create learning opportunities. On the other hand, recreational activities might be considered harmful and forbidden

Some of the sentences written at the end of the SpW suggested that it is important to discuss and review pedagogical projects, policies and practices of the school. Indeed the construction of meaning from the uses of the laptop might promote changes which will demand that norms be adjusted to the new reality.

5.3.4 Syntactic, Empiric and Physical Levels

The lower levels of the Semiotic Ladder provide support to the higher levels. The syntactic level houses concerns on properly understanding the rules (of interaction) that allows the use of the laptops. The operational system and the activities (applications) from the XO laptop have interaction metaphors that differ from the ones we usually see in personal computers or regular laptops. These differences might confuse those who are familiar to other computers' interaction language, but will be overcome as long as the activities are intended to a practical and meaningful use.

The last two levels, physical and empirical, are usually not the concern of users. However, they are important concerns and they were discussed by all groups. Although the XO laptop has the Mesh network that supports communication among the laptops even when no Internet connection is available, participants were concerned with wireless Internet access. Another concern was with the availability of enough electrical sockets to recharge all laptops in the classrooms. Such concerns were

easily addressed and solved.

6 CONCLUSIONS

Schools are complex social organizations that shape the future of generations. The insertion of a technological innovation within the school should not happen with the deterministic belief that technology develops autonomously and by its own logic. The belief should be towards an environment that is continually reconstructed in communicative practices among participants (mediated by technology). The Semio-Participatory approach, grounded in the Organizational Semiotics concepts, helped the group to face the challenge of changing old concepts. One of them is the concept that the school has to adapt itself to technological progress. Instead, the school is an organization that is capable of influencing the technological innovation, inside and outside its walls.

In the initial phase of the XO Project, the first Semio-participatory Workshop sought to clarify the problem and handle with general expectation about the project. The activities, guided by artifacts inspired from OS and PD, allowed the group to line up the different views (viewpoints of researchers, students, teachers and school staff) on the deployment of a new digital technology at an elementary public school in Brazil.

The SpW helped participants to have a broader view of the Project, and to articulate issues, ideas and solutions. Taking a participatory approach to this analysis was essential. This paper described the process of conducting the SpW, illustrating its planning, implementation, results and analysis.

The results indicated that the referential basis

and artifacts from OS and PD are appropriate tools for guiding a collective construction of meanings and norms regarding the introduction of a new information technology at an educational organization. Further work involves a reflection on the impact of such approach after 2 years of the project in the school.

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