The internet goes to school: mastery and appropriation of cultural tools[1].

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Abstract.

Environments of the internet are defined in terms of using cultural tools and of the properties of mediate action. The introduction of the internet in a school during an in-service program is described, from which one gathers evidence of the determining functions of purposes and uses of cultural tools by agents in the processes of meaning construction, and of appropriating electronic mail by the teachers and by the institution. The discursive modalities observed in the dialogues are analysed to account for the internal and external actions performed by the teachers, from which the interaction between discursive and mediated action structures are discussed, as well as the functions of dialogue and cultural tool in the meaning construction. Reasons for developing in-service programs on using the internet, within schools, are given and justified on the basis of the transformations observed in the teaching and learning environments.

Keywords: discourse, in-service program, internet, mediated action, school.

The objective of this article is to describe and analyze the process of the introduction of the internet in a school community, and to verify how the mastery and the appropriation of cultural tools and the purposes of mediated action account for this process. The dialogues produced in the interactions between teachers, researchers and the telematics environment are taken as core to analyze mediated actions by cultural tools in an in-service program. From the description and analysis of this process, the conditioning elements of the mastery and the appropriation of cultural tools are identified, having as assumption the concept of telematics environments.

In the first part, an introduction of the theory of mediated action is made, focusing it under the perspective of human actions. Moreover, in this section, we discuss how the concepts of mastery and appropriation may result in categories for analyzing actions that are developed in school. Afterwards, environment and ambience are defined, taking into account the concept of cultural tool, as to apply them into the analysis of mediated actions. In the methodology, we present the situational context of putting into practice the in-service program, from which the research stages are described and the criteria of collecting and analyzing data are defined. The actions performed by teachers in typical situations in the school context are then analyzed under the perspective of how the subjects interact using cultural tools, what allow us to characterize the process of introducing the internet in the focused school and what is recognized as conditioning factors of the mastery and the appropriation of cultural tools by teachers and by the institution. In the discussion, we present a set of arguments that sustain the idea that the introduction of the internet in schools may be understood on the basis of elements of the theory of mediated action, with special emphasis on interactions produced by agents-acting-with-cultural tools. Finally, we propose some directions that lead to other investigations about the processes of appropriation of information and communication technologies in school, with the theoretical and methodological support of the theory of mediated action.

The theory of mediated action

The idea of mediated action that we bring to this article arouses from James Wertsch´s studies, discussed in his book Mind as Action 1998. Linked to the sociocultural tradition, the author bases himself upon authors such as Vygotsky to deal with the process of internalization, Bakhtin to discuss dialogy and genres in discourse, and mainly in Keneth Burke to focus on the multiple perspectives of human action.

Wertsch brings from Burke his approach to analyze the human action that this author developed to describe drama. In the analysis of human actions under disciplinary focuses, Burke suggests the existence of two categories of questions, one of ontological nature and the other of methodological nature (Burke, 1973). Such analyses are used to attaching to a certain element constitutor of human action that represents the object of study in a disciplinary perspective. Burke proposes a total of five elements that form a pentagram of terminal screens (Figure 1), through which the disciplinary studies analyze fragments of action. Thus, the study of human action under a certain analytical perspective is guided by a certain terminal screen and by its terminology, which select partial fragments of reality.

Burke criticizes this analytical conduct of focusing the reality by means of terminal disciplinary screens, and he suggests an approach that is capable of linking the perspectives, without reducing ones to the others (Wertsch, 1998, p. 7). This approach is expressed in the methodological conduct of treating the elements of the pentagram as hypothetical constructors, considering their possibilities of transformation and bands of combination and then analyzing how these constructors can explain the human actions (Burke, 1969, p. xvi), what implies rejecting them as simple reflections of reality. This sense, the investigation of the human action would be conducted by a tool - the pentagram – that, since it links the five elements, it would permit a multifocused and integrated analysis of the human action and of its motives.

Figure 1. Pentagram of terminal screens of human action

Element	Question	Nature of the question

Act	What was done	Ontological
Purpose	Why it was done	Ontological
Agent	Who has done it	Methodological
Agency	How he has done it	Methodological
Scenary	When and where it was done	Methodological

(adapted from Burke, 1969 p. xv; 1973, p. 68).

Certainly, the complexity of this multifocused analysis could thwart the study with the risk of making it superficial and relativist. It is this way that the focus in the mediated action becomes attractive. Once it is considered the tension agents-acting-as-cultural-tools (agencies in Burke´s terminology) as unity of analysis, we might maintain ourselves engaged with the principle of investigating the action, situating it in its cultural and institutional context. For this reason, it is necessary to recognize that the irreducible tension 'agents - cultural tools' can be representative of the mediated action, and can, therefore, be adopted as a unity of analysis capable of explaining satisfactorily diversified human actions, such as those that take place in school. Under this perspective, to know who performs the action or who speaks in a dialogue is necessary to consider not only the isolated subject, but also mediational means that he uses to act or speak. It is before the indissociability between agent and cultural tool that we start to consider how the meaning construction by the agents occurs and how the school community masters and appropriates the communication and information technologies, recognizing that both the meaning construction and the appropriation of cultural tools are coupling processes that might be understood in the perspective of the mediated action.

To deal with the meaning construction we consider incomplete the concept of internalization, mainly to bring up the opposition between internal and external processes, what we reject in favor of a relation of coupling between internal and external actions performed by agents using the cultural tools. Considering the idea of zone of proximal

development, Bruner mentions that he has identified a possible contradiction in Vygotsky´s thought. As ZPD deals with consciousness and control, Bruner asks: how could learning anticipate the development, if consciousness and control are acquired after the function having been spontaneously internalized? Bruner solves the apparent contradiction observing that the ZPD is correlated to the acquisition and to the conscious control of any function. This control will only manifest in the learner when the function reaches the status of tool. Before that, the tutor will serve to the learner as indirect form of consciousness or will be sharing with him the tool capable of controlling the action (Bruner 1985, p. 24-25). Bruner calls forth the notion of "scaffolds" to refer to this role of the tutor, concept developed in a seminal work about the role of tutoring in the solution of problems (Wood e col., 1976)

This way, we considered that the notions of mastery as 'to know how to use the cultural tool' (Wertsch, 1998, p.50) and appropriation as 'take something from the other and make it his own' (p.53) are more adequate to explain the process of meaning construction by individuals, by means of internal and external actions mediated by cultural tools. In the case of the present study, we considered that these actions are coupled to the process of appropriation of the internet by the school. Therefore, it is by the comparative analysis of the performed actions by the teachers in the course of an in-service program, by means of a tutoring program involving teachers, tutors and guided-study that we will find elements to account for two processes, one of socio-cognitive nature and the other of socio-cultural nature. Thus, our problem is to explain how the mastery and the appropriation of cultural tools sustain the meaning construction by teachers acting in the intra and inter-mental plans, how these actions are guided by an in-service program and how they guide the introduction of the internet in school practices.

As in Vygotsky's approach, the theory of mediated action conceive the semiotic systems as determinant of the process of meaning construction, since it regonizes them as a genuine human construction developed in the course of the histories of the species, of the society, of the individual and of the action itself. Within these systems, the verbal language stands out, once it is by the mediation of orality and of writing that occur not only the majority, but

also the main and most meaningful human actions. It is taken for granted the centrality of verbal language in human actions that Bakhtin´s ideas concerning the dialogy and the genre in discourse are incorporated into the epistemological picture of mediated action.

Discussing the main concepts of Bakhtin`s dialogical theory, Wertsch observes that the heteroglossia, the appropriation of words of the other is conditioning of the meaning in any speech act. According to Bakhtin, "the language is not an abstract system of normative forms, but a concrete heteroglossic concept of the world. Every word has the 'flavor' of a profession, a genre, a tendency, a party, a private work, a singular person, a generation, an age group, the day and time" (Apud Wertsch 1998, p. 77)

Bakhtin gives us the exact dimension of the centrality of heteroglossia in the process of meaning construction as he treats the form and the function of enunciative schemes of the cited discourse as determinant elements of active and appreciative apprehension of the enunciation of the other. If in the limit, the enunciation is the product of voices that dwell the inner of the discourse, form and function of the enunciation should exert regulative influence upon the internal processes of meaning construction, once "who apprehends the enunciation of another is not a mute being, lacking words, but, on the contrary, a being full of internal words. All its mental activity, what can be called 'the perceptive depth' is mediated for him by the internal discourse and it is through this that occurs the junction with the discourse apprehended from the external functions. (Voloshinov, 1997, p. 147).

If the understanding is forged in the internal discourse, its link with the other´s discourse is found in the unit of active apprehension, formed by the effective comment and by the inner response, two operations that can only be isolated for analytical ends. Therefore, it is in the analysis of the locutions that dwell both the inner and the external discourses that we will search for evidences of appropriation of forms and private discursive functions. Beyond the content and the forms of the discourse, it is necessary to spread the focus of the analysis to the situations in which the agents perform the actions, being those performed in the stage of the conversation or in the use of the computer, which is the new tool of mediation responsible for the enunciation of other voices. This way, it is recognized the situated

nature both of meaning construction and of the speech acts, and it is indicated that the constitution of the scenery, one of the terminal screens, now accounts for the presence of a propagator means of other semiotic systems that makes it by means of a typical ambience.

We should also consider as means of comprehension of the process of meaning construction, the proposition of functional dualism suggested by Lotman to explain the interlace of texts in a cultural system (Lotman, 1988). For the author, every text serves at least two functions: to express meanings and to generate new meanings. Taking the locution as a private case of text, as Lotman does it, it is accepted that to accomplish the first function, it will be necessary that the locutions have a maximum degree of univocality. The same way, it should be considered the internal heterogeneity as a property of locutions, whose function is to generate new meanings. Discussing the notion of functional dualism as an evidence of dialogicity and the authority of locutions, appointed by Bakhtin, Wertsch suggests that the locutions can accomplish these two functions, what implies to recognize a dynamic tension between both (1991, p. 79). It is this tension that we search for the dialogues to verify how the actions of meaning construction occur.

The ambience of the internet

Few people notice the innumerable interfaces which operate each time they access the internet, whether they are 'hard' or 'soft'. A great number of users do not use the keyboard in their accesses, as many of them already have their favorite address book organized and perform the commands using the mouse. However, there is no doubt that it is the screen that holds greater attention and leads the actions of the internet users. These three interfaces are the ones that are the most visible among the hard interfaces that are part of the scenery of the actions of the internet user. They mediate the basic operations such as the performance of commands, which occupy the first level of a series of soft interfaces or applications. Beyond the commands, there are the applications of our object of interest, such as those responsible for the formation of a telematic ambience, through which the internet users perform the actions mediated by cultural tools.

As the attention of the agent is focused on the screen and on the iconic, imagistic and textual objects that are presented in it, when not in the sound effects from the sound boxes, the great majority of the applications are submerged and out of his control, what is beneficial at first sight, as it permits that the goals of the actions are guided by the agent, in combination with co-agents and with cultural tools. In spite of the benefit, in many situations the changes occurred in the ambience are not perceptible, when, for instance, the action causes the change of the screen or alterations in the interior of the screen itself.

One of the reasons that make us consider the necessity of bettering the concept of the cultural tool is the effects on the mediated action caused by the combination of various layers of the interfaces, mainly on the goals of the agents and their impact on the mastery and the appropriation of the cultural tool. Nevertheless, the main reason for us to reelaborate the notion of the cultural tool in the light of the theory of mediated action is the nature itself of the actions performed in a desterritorialized and virtual environment. Certainly the desterritorialization and the virtuality of the internet alter radically the nature of the human actions, mainly because they result from an unusual combination of properties and functions of cultural tools. Considering that this proposal of reelaboration occurs in the surrounding of the goals of investigating the effects of the appropriation of the internet by the school, we will only consider the mediated actions with direct effects on the school context, such as to communicate, to inform, to simulate, to publish, and to teach and learn.

Firstly, it is necessary to reassure that the cultural tool can only be considered as such when the agent makes use of it to perform an action, what Wertsch called the irreducible tension agent - cultural tool (1998, p. 25). This way, during the edition of a message it is the e-mail cultural tool that is in use, as well as during the selection, organization and reading of the messages, the agent performs these actions with the same cultural tool. For each one of the actions, the e-mail serves distinct proposes that in most cases are subordinated to a hierarchically superior propose, such as to send a message, what is not performed by the dyade agent - cultural tool, but by an independent application. Thus, the actions of editing, reading, selecting and organizing the message are performed by the agent using the e-mail

cultural tool, whose multifunctionality, desterritorialization and virtuality, integration with other interfaces, such as of sending and receiving messages, keyboard, screen and mouse, produce in the scenery of the mediated action what we call the *communication environment*.

Another important property of the cultural tool is the fact that it potentiates the transformation of the mediated action (Wertsch, 1998, p. 42). Thus, when the browser cultural tool is used to select, organize, present, and search for information, these actions that were performed by means of other mediational means are transformed. As the integration of the scriptural-audio-visual means and the applications of local and remote search of key-words are exclusive properties of the browser, it is possible for the agent to combine them with previous proposes or to define new proposes for the action. In any of the cases these new qualities of the cultural tool influence with less or greater intensity on the mediated action, depending among other factors on the degree of the mastery and the appropriation that the agent performs on it. Such unusual combination of functions and properties gives to the browser the condition of unique *information environment* with high potential to transform the mediated action.

The materiality is a property inherent to any cultural tool, once the function of transporting the signal only takes place if there are material basis for that. From all the unfoldments of the integration of semiotic means, the simulation of patterns is perhaps the one that stands more out due to exactly the capacity of the browser, for instance, to provide a material basis for the realization of this type of action. The combination of graphic registers, charts, movement of objects gives an effect of realism to the simulated model that only materializes itself as the agent acts with the cultural tool of simulation combining each one of these functions and properties. Again it is an unusual combination of properties and functions that make the internet an *environment of simulation* through which mediated actions are performed with potential semiotic value to construct meaning.

Taking as reference the properties of the mediated action, it is still necessary to consider the implications of the use of internet cultural tools on the relations of power and authority that

set themselves up in school. Our argument centers in the fact that the authorship and publication tools at disposal to the internet user create conditions for his voice to raise beyond the school walls. This is a condition that can alter substantially the relations of power and authority in school and in the classroom, if we consider that the control on the authorship and the choice of audience are prerogative of an agent that performs the power by means of his actions and of the instruments that he has at hand, as it is indicated, for instance, by the studies about the uprising of the press in the Middle Ages (Eisenstein, 1998). It is again the symbiosis of applications and their properties that reveal the innovative character of several internet authorship cultural tools. Through them, the agent not only edits and gives shape, but also publishes and selects the audience of his hypertext; this way controlling all the stages of the enunciative process without needing to submit to the analysis of the censors. Gathered these functions of the cultural tool, they constitute the *authorship environment* that will only take part in the scenery to transform the actions of power and the relations of authority in school once the agents master and appropriate themselves of the authorship tool.

Combined among themselves, the functions and the properties of the cultural tools produce environments that are part of sceneries in which the mediated actions are performed. In the school case, the combination of these environments calls forth the formation of *teaching and learning ambiences* that will be as diversified as the purposes and the forms of combination are. It is still necessary to insist that both the functions of the tools and the combinations of environments are conditioned by the purposes that guide the agents in the course of the action. However, it is also necessary to consider the hypothesis that the mastery and the appropriation of the cultural tools of the internet by the agents and by the school must shape the structure of the actions and guide their purposes. Thus, we will be concentrating our analysis on the actions performed in the external and internal plan, trying to identify what cultural tools are being used, who the agents that use them are, what purposes guide their actions, in what environments and sceneries the actions develop, to identify how the mutual influence of the internal and external actions determine the process of appropriation of cultural tools by the agents and by the institution. Thus, we will start to

talk about the scenery in which the in-service program and the investigations developed, and then we will specify the procedures of the analysis.

The in-service program and the data collection

With the implementation of a local computer network in the middle of 1998, the teachers of Escola Arte-Ofício (EAO)[1] started to have access to the internet from the classroom areas[2] and from an incipient informatics laboratory. The school that is located at a university campus in the city of São Paulo has good physical infra-structure of buildings with classrooms reserved to each discipline, laboratories, vegetable garden and it maintains some partnerships with the departments of the university. The majority of the teachers work full time and have a specific position in the board of the university career. They are also used to participating in the in-service programs and some of them are post-graduated.

The beginning of the development of the in-service program - the so-called Telescola – coincided with the implementation of the local network and the access of the school to the internet and had as its main objective to disseminate the use of the internet among teachers and other professionals of the pedagogical area. The basis of the in-service program consisted of a guided study carried through the school semester with the help of a tutorial. The tutorial was organized in modules format with the contents referent to the main internet services: e-mail, discussion list, chat room, browsing, search engines and hypertext edition. A glossary with the main terms used during the guided study was also organized. Introductory texts, report, presentation, references and a chronogram for each of the stages of the program were produced.

Weekly, there were tutoring meetings among teachers, once in the role of students and once in the role of tutors and researchers. From these meetings it was extracted a number of informal interviews called this way due to their non-structured character and due to the fact

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[1] The names of the institution and the teachers were changed.
[2] The teachers of the school are organized into eight areas: 1 to 4 years, Portuguese, foreign language, art, physical education, human sciences, sciences and mathematics.

that they occurred in situations of study in front of the computer. Monthly, teachers and researchers got together to discuss general aspects of the in-service program in the so called group interviews and specific aspects of the internet use in school that due to their semi-structured character were called formal interviews, whose agenda was built on the basis of thematic contents previously established. At the end of each semester the teachers presented their work in hypertext to their tutors and to the future participants of the program.

The Telescola project consisted of three consecutive semester phases. For the first one, teachers from the science and mathematics areas were invited: two female biology teachers, a female chemistry one, a male and a female mathematics teachers. A term of compromise was negotiated between the group of teachers and researchers, in which the rights and obligations of both parts were agreed upon, as well as the calendar and the meeting timetables. Also during the first phase of the project, a list of the teachers´ and researchers´ electronic addresses were set up. This asynchronic forum of communication served mainly for the purpose of the work organization, queries and answers upon the content, information exchange and experiences with the use of the net. Some thematic discussions was also carried on.

The second phase of the Telescola occurred in a similar way to the first phase, mainly to the guided study. Each tutor-teacher started to guide two teachers[3] and the researchers were taken from the role of tutors. Monthly group meetings that had the participation of teachers (tutors and learners) and the researchers´ team were carried on. Still, in this phase, the tutors-teachers and the researchers got together twice a month to discuss the process of tutoring. This group also had the aid of an electronic forum for specific discussion.

In the third phase that had a total of 17 teachers skilled to guide, it was possible to spread the program to all teachers and other interested professionals. The tutoring process developed in a similar way to the one developed in the previous phase. In this phase,

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[3] One of the tutor-teachers guided four teachers.

however, there were no face-to-face meetings of the tutors and researchers´ group; only an electronic forum of the tutors was active. The monthly group meetings were organized in two periods due to the incompatibility of the teachers´ timetables. Forty professionals were graduated and only four teachers decided not to participate.

The formal and informal interviews were saved in audio tapes and the group interviews were saved in video tapes that were later transcribed. In the first phase 39 informal interviews were saved, 18 formal ones and 5 in group. In the second phase, 4 group interviews were obtained and 11 meetings between tutor-teachers and researchers were registered. Besides 8 group interviews, the third phase also produced four semi-structured interviews with tutor-teacher. A great number of questionnaires, messages from the electronic forum and Web pages are also part of the huge volume of data collected between August 1998 and March 2000.

Given the longitudinal and broad character of the research, several analytical cuts are possible, and for this work we decided to focus on the dialogues produced in the guided study meetings between the researchers and the teachers when they were in the roles of learners and of tutors. As our intention is to identify in the teachers´ speeches the evidences of how meaning construction and the mastery and the appropriation of cultural tools are correlated, and how these processes might explain the appropriation of the internet by the school, the selection of dialogues (Sequences 1, 2 and 3) firstly obeyed the criteria of representativeness of the situations of the guided study, in which the teachers interacted with the tutorial and with the tutors to learn how to use e-mail. Thus, this first criterion selects the communication environment created by e-mail and selects the actions most representative of the set of the actions observed in the first phase of the in-service program in which clues of meaning construction were detected. To segment the sections of the guided study in episodes and these ones in sequences, we identified speech acts that clearly indicated frontiers in the discursive movement, observing the regularity of the thematic pattern and the discursive structure and adapting the criteria developed by Lemke (1990) in his analysis of science classes.

The second criterion serves our interest in further examining the processes of mastery and appropriation of the cultural tool by teachers, through which we selected pieces of group meetings (Extracts 1 and 2, and Sequence 4) that bring us elements to characterize these processes. In this case, we tried again to guide ourselves by the representativeness of the dialogues and by a characteristic recurrently observed in the teachers´ speeches, the indirect discourse. Finally, we selected an episode (Sequence 5) that gathered several evidences of a certain level of appropriation of the internet by the school, in which all the tutor-teachers and the researchers participate, already in the second phase of the program.

The locution, in the case of extracts and the chain of locutions in the case of sequences are taken as unities of analysis. In all cases, the locutions are considered in their situational dimensions, of content and of interactions between the voices that dwell the teachers´ discourse, considering the principle that all locution is a response to something and that it guides itself to some interlocutor. So, the analysis considers structural and functional aspects of the locutions, trying to situate them in the flow of internal and external dialogues as to identify the functions of the speech together with the functions of other semiotic systems in the meaning construction and the appropriation and mastery of cultural tools.

In what is concerned with the codification of transcriptions, the use of breaks '(…)' indicates the occurrence of longer pieces whose content is summarized in the analysis. The bracket is used to indicate situations of over position of speech acts and the parentheses describe some meaningful occurrence to characterize the action. Quotes are used to indicate read pieces from the computer screen. Extracts and sequences are identified in the beginning by date and type of event from which they were taken. Teachers and researchers are identified by letters and their names were changed.

Episode Analysis.

The initial tutoring meetings were important to start the dynamics of the interactions of the guided study and, thus, allowed us to observe how teachers-learners and tutors interacted

around the computer. Thereafter, we analyze pieces of dialogues extracted from tutoring episodes that in turn constituted the sections of the guided study.

Sequence 1: All we've seen today.

+Date: 08/11/98
+Informal meeting.

1. DD: So, take a look, all we´ve seen today. Dani?
2. MB: Dani is a nickname.
3. DD: Yes, a nickname.
4. MB: OK.
5. DD: Hydra?
6. MB: It is the subdomain. And is here the domain? (pointing to the screen)
7. DD: Yeah. What is hydra?
8. MB: It's the server.
9. DD: Exactly. Commercial, br. Alright. OK?
10. MB: Yeap, ok.

The sequence begins with a speech act that calls the teacher's attention 'so, take a look at it' followed by the announcement of the review of what has been said. The dialogue between DD and MB happens within a discursive modality known as I-R-F, where I corresponds to the beginning of the exchange, in these cases in the form of a question; R refers to the response; F to the feedback (Sinclair and Coulthard, 1975; and Mehan, 1979). In all the three exchanges, DD, who is the tutor, begins with questions whose answers she already knows. By means of her own electronic address example, the tutor asks, validates and corrects the teacher's answers. Therefore, the function of these IRF patterns was to check the comprehension of the concepts discussed throughout the tutoring session in which the teacher and the tutor negotiated the meaning of the electronic address.

In this meeting, it was developed from the very beginning a style of asymmetric interaction in which the teacher, who was sometimes learning, answered the questions and was evaluated by the tutor. From this sequence, it is noticed that besides the locutions, gestures of indication also support the interaction between the teacher and the tutor. The indication, a resource hugely observed in the tutoring sections, was sometimes mediated by the gesture of pointing, sometimes by the arrow of the mouse. Soon after answering a question, MB, the tutor in turn 6, asks about the domain, pointing to the screen of the computer, in a gesture that reveals her attention to the tutorial and directs the attention of both to the screen of the computer. Then, DD asks again about what MB had already classified as subdomain and after that she gets an answer that makes her happy. The tutor adopts, therefore, a strategy of insisting on the question to correct the teacher. In turn 9, the tutor qualifies the server as commercial and still refers to the domain 'br' in a clear allusion to the tutorial. The interaction is considered asymmetric as DD and MB were in agreement with the tutor being the source of reference of information needed to construct the meaning of electronic address. However, the asymmetric nature of the interaction did not inhibit questions and the teacher's anticipations guided by the tutorial. This aspect seems in relief in sequence 2.

Sequence 2: It's this what's gonna appear.

+Date: 08/11/98
+ Informal meeting.

1. RJ: Ok. So when you click on new message, it´s gonna appear for.
2. LH: Right. You´re gonna type the address there.
3. RJ: Ok. The clipper is what?
4. LH: The clipper is when you´re gonna attach a file.
5. RJ: When you attach, OK. And this one here?

6.   LH: This one is the subject. You indicate by the subject. Normally, the subject you put a… you click here in the window file, there you type a word that the person is gonna identify what it is about, and then, you click here inside, in the white area and there you compose your message.

7.   RJ: Start to write, OK. "For. Here you should fill with the address. Subject. It can be filled or not, but it´s fruitful that it's addressed to someone". And "text box. Where you´re gonna write". That's OK. There send is that end.

8.   LH: That's it.

9.   RJ: "After all is done, click on send. Composition screen". (press the mouse and access the new screen). "The screen below is the reproduction of the normal screen for the composition of the messages...".

(...)

10. RJ: This is what it´s gonna appear, isn´t it?

11. LH: This is what is gonna appear. This is the whole screen, where ya [gonna].

12. RJ: [Hah, OK, I´ve got it].

The teacher RJ started the sequence 2 with a movement that directs the tutor's attention. This act performs the function of asking as RJ requires an opinion about her statement. As far as turn 7, it is observed three I-R-F changes in which the teacher begins with questions, but she does not evaluate them. In this case, the movement of exchanging feedback transmits to the tutor the information that the message was received. Therefore, who has the control of the sequence is the teacher guided by the tutorial, once she directs her questions to the tutor, in accordance with the information shown in the computer screen. In her longest answer, LH directs the teacher's attention to the screen of message composing that, then, starts to read the tutorial in turns 7 and 9. In these turns, the teacher takes the role of narrator and reads the information that was shown in the previous IRF patterns. The last sentence is read in another page and focuses the teacher's attention on a figure that represents the environment of composing a message, or else, the 'normal screen for the composition of messages'. The effect of the simulation of the composition environment produced by the figure is caught by the teacher who has her perception confirmed by means of a last I-R-F pattern.

In this interaction, inverted I-R-F patterns are observed, that is, who is in the role of learner begins the exchanges with authentic questions, whose function is to obtain the tutor´s answers (Giordan, 2004). Such questions are the result of the dialogue between the teacher and the tutorial, once they are clearly guided for the understanding of the icons and the words that appear in the interaction with the tutorial. During the reading, RJ begins a process of meaning construction by appropriating the voice of the tutorial through an internal dialogue, in which the gathering of words and images is guided by the voice of the tutorial. This process spreads itself through the locutions produced by the teacher who attempts to transfer to the dialogue with the tutor the questions initiated in the interaction with the tutorial in the form of inverted IRF patterns. In this dialogue between the agents, the voice of the tutorial also reverberates in the tutor, who guides herself both by RJ´s questions and by the iconic and imagetic marks of the tutorial, as the terms of indexation 'here in' and 'here inside' in turn 6 show up. Therefore, there is an explicit guidance of the teacher and the tutor by the enunciation of the tutorial, which determines the flow of the dialogues.

It is within this gathering of voices that the teacher and the tutor negotiate the meaning of electronic mail weaving a discursive structure in the form of IRF patterns, as it happened between MB and DD. If in the second sequence, contrary to the first, the participation of the teacher is active and determines the inverted nature of the IRF pattern in both cases the discursive movement indicates that the meaning construction is coupled to the appropriation of the tutorial's voice, as this one guides the agents' attention, being in the narration or in the indication, an internal dialogue is developed between each one of them and the enunciation of the tutorial. At the same time it operates as a structural factor of the discursive modality, the internal dialogue performs an important regulatory function in the process of meaning construction, sustaining, thus, the agents' action with the cultural tools that are in process of mastery and appropriation. In the next sequence, the teacher MC performs through the electronic mail a mediated action in which it is possible to observe another typical situation of meaning construction.

<u>Sequence 3</u>: Can I write in capital letter?

+Date: 08/12/98
+Informal meeting.

1. MC: Good! Now this way, here to write, can I write in capital letter, small, or it's OK to write everything in small letter?

2. NT: Exactly. There are some cautions. It is cool you write everything in small letter. Only obviously, in the beginning of the sentences, the beginning of the paragraph in capital letter, the rest in small.

3. MC: And also the name of the person?

4. NT: Yeap. These are the cautions.

5. MC: Here, can I use the comma?

6. NT: Yes, normal, as if it were a letter.

7. MC: Umhumh.

8. NT: It's like shouting to write all in capital letters.

9. MC: (typing a message) period. Kisses (indicating the end of the message). Funny, she lives in the United States; I´ve written to her (reading the message) Can it be this way?

10. NT: Yes. Do you wanna sign? At the end.

11. MC: Here you write Carolina. Right?

12. NT: Umhumh.

13. MC: Now I can send it. Now I close it. Right?

14. NT: Umhumh. If you have more messages to send to or to reply to, you always do this way.

15. MC: Good... "Replying the message". I´ve replyed it. Here comes the matters of caution.

In her first tutorial section, MC and NT are in front of the computer typing a 'letter' to the teacher's friend who lives in another country. In the first part of the sequence, that began with the marker 'now this way' and concluded with the tutor's comment about the huge

effect of all the letters in capital, the textual style of the electronic message is negotiated. Elements such as the organization of the paragraph, the shape of the letter, punctuation, greeting and identity of the sender are negotiated through the dialogue and gathered in a 'letter' which, therefore, starts to dwell the horizon of meanings of the electronic message genre. Again, the discursive modality I-R-(F) develops itself, this time, however, without the explicit presence of feedbacks. MC´s questions have the function of obtaining information about the elaboration of an electronic message directed to a person of her friendship circle, and get the tutor's answers in the sense that a text in the format of a letter is produced.

The situation of working around the computer still involves the fact that they are practicing an activity of the tutorial, whose propose is exactly to write an electronic message. In this situation, the teacher works on a real screen of the composition of messages, having in the back another screen of the tutorial that explains this procedure. In turn 13, right after sending the message, she closes the screen of her postal box and has again before her the screen of the tutorial whose steps are announced in turn 15. The sequence is, therefore, part of one of the activities of the guided study that leads the teacher to stay away from the tutorial and to guide the action of composing a message, differently from the simulated action of Sequence 2. In this action, the dialogue with the tutorial submerges and the teacher starts to interact with the tutor, who anticipates her answers to the questions about the style of the composition that will be presented in the next step of the tutorial, 'the matter of cautions'. The tutor's answers the MC demands at the same time that they guide to the tutorial, serving, therefore, as the link teacher-tutorial, in the flow of the dialogue produced between the agents and the virtual interlocutor.

It is in this movement of interlocutors´ exchange that MC starts to act with the electronic mail cultural tool aiming at communicating with a friend, at the same time that she performs a tutorial task. If in the sequences 1 and 2, the teachers dialogued with the tutorial and with the tutors, in this sequence the communication environment is a new direct interlocutor of the teacher with whom she starts the process of mastering the cultural tool, by means of external actions such as typing the message and performing the commands

(clicking on the icons), and through internal actions such as textual construction and selection of options of command.

Parallel to the interlocution with the electronic communication environment, the teacher established a dialogue with a tutor and with a friend who was distant in space, but close to the discursive movement. This proximity was probably the reason for the feeling of awkwardness announced by MC in turn 9. The internal dialogue and the dialogue with the tutor guided her textual construction in the sense of forming a concept about the style of the text to be used. It is in the second part of the sequence, started when the teacher begins to type the message and ended when she prepares herself to turn her attention to the tutorial, that becomes visible four different dialogues of the teacher. The dialogue with a friend is visible in turn 9, with the tutor between turns 9 and 15, with the communication environment, in turns 9, 11, and 13, and finally with the tutorial in turn 15. Therefore, besides the dialogues with the tutorial and with the tutor also visible in Sequences 1 and 2, the process of meaning construction of the electronic mail counts with two other interlocutors, the addressee and the communication environment. Through these dialogues, internal and external actions are performed and when they are coupled they sustain the process of mastery of cultural tool.

In the extract below, it is possible to identify another situation in which old interlocutors gained new voice and established an interaction rarely observed in schools.

Extract 1: New means, new dialogues.

+ Date 09/28/98
+ Group meeting.

RJ: Then I said: ah! I´m gonna send them an e-mail! Then I´ve sent them an e-mail, saying that it was cool what they´re doing there, that I didn´t understand quite well, that I did not know how to make the page, but that I had found the page that they´d made, and so. And

then, they´ve sent me an answer and stuffs: teacher RJ, they should know who I am, but I don´t know exactly who the boys are, do I? Then I thought it cool. And then, how do they say? Any problem you might … we´ll get by. Something alike, isn´t it? Then it was cool, I found it cool to find the school page.

Extract 1 is the final part of a narrative in which RJ describes for the group of teachers and researchers one of the practical activities of the tutorial, whose aim was to introduce some systems of organization and information search. In a specific directory about schools, the teacher found the school Web page that had been produced in experimental character by two students. In a general manner, it was observed that the teacher expresses satisfaction for having found the page and also for having communicated herself with the students. Besides the report about the practical activity with systems of organization and information search, the most outstanding element from the point of view of the discursive structure is the form used by RJ to report the dialogue with the students.

In this cited discourse, the teacher cites herself to describe her attitude when she finds the web page which was to send an electronic mail to the students, and the students to report their answer to her electronic mail. As the majority of the oral cited discourses, RJ´s locution is marked by her voice intonation that distinguishes cited voices and expresses her satisfaction. In the course of the narrative, she uses the cited discourse to analyze her interaction with the students, both in content and in the form by which the interaction occurred. Concerning the content of the dialogue, besides having expressed satisfaction with the students´ work, the teacher also referred to her lack of knowledge to produce a web page, but, anyway, she was able to find the page. RJ analyses before the group her own learner condition, giving visibility both to her limitation and to her conquers. As she cites the students, she points out what truly expresses a change in the relations between the teacher and the students. First, the electronic mail is able to identify her before the students whom she doesn't directly know. Second, the students put themselves at her disposal to help in her difficulties with the internet. It deals with a rather unusual interaction in the school institution.

Regarding occurs the form of the interaction with the students, it is important to point out from the point of view of our argumentation about the process of mastery and the appropriation of cultural tools that the action of sending a message was performed during one of the suggested exercises in the tutorial, while the teacher devoted herself to the guided study about the systems of organization and information search. Thus, even being motivated by internal factors, the action of sending the message to the students resulted from an external action previously structured and guided to the information search whose purpose was different from this new one by which a dialogue with virtually unknown interlocutors begins by means of electronic mail. It is, therefore, acting with the electronic mail that the teacher transforms the character of the former action, changing the information environment to the communication environment and altering the aim of the mediated action. The use of the electronic mail in a non-premeditated situation signals RJ´s new stage in the mastery of this cultural tool in which the operations are already performed with success and in an independent form, and the teacher and the cultural tool can attend a diverse purpose of the action that had been performed. It deals with an autonomous use of the cultural tool even though it was called forth by an action originated from another action organized by the tutorial.

The last speech act of this extract, pinpointed by the term 'then', expresses the teacher's satisfaction about having found the school's web page during the performance of one activity of the tutorial. As she narrates her experience to the group of teachers and researchers, RJ reported the dialogue that she performed with the students, what is a strong hint that her satisfaction had resulted from this exchange of messages and not simply by the finding of the web page. The intercalation of her voice and of the cited voice to express satisfaction corroborates this hypothesis. The use of the cited discourse not just reports the dialogue between the teacher and the students, but also indicates that the communication environment sustained this dialogue. When she uses this discourse modality, the teacher denounces her intimacy with the electronic mail cultural tool, what becomes more evident when it is observed that this explicit reference of the use of the electronic mail was done during the narration of her experience with the use of the information environment.

Would be those, the typical situations that characterize the appropriation of the cultural tool by the agent? Our analysis attempts to clearly identify in which situations the agent-uses-the-cultural-tool, in such a way that the origin of the purposes of the action and the forms of the use of the environments characterize the degree of volition of the agent over the action. Certainly, his purpose was determined by internal factors, however, the electronic mail was used within an activity of the tutorial, indicating that the structure of the action was not just totally determined by the teacher, but it also had the guidance of the tutorial. In the following extract, we analyzed a situation in which we identify other elements that perpass the process of mastering the electronic mail and allow us to characterize another stage of this process.

Extract 2: From the telephone to the electronic mail.

+Date: 05/04/99
+Type: Multipliers´ meeting

MC: Guys, do you remember what I've done? I've marked; I've organized the course in the school via e-mail. So, I didn't know the person in the chemistry department. Practically everything was set via e-mail, guys. So, I think I've called her once. First contact was by phone, and then everything was via e-mail. Then I've only met her in the course. Do ya believe that? Then it's an example of how it is a super important tool.

Extract 2 is part of a sequence in which the teachers, now in the role of tutors, discuss tactics of motivation to engage the teachers-learners in the guided study. The tactics of motivation suggested by the group are meaningful examples of the use of the internet and the computer. As far as this locution, the examples had referred to the possible experiences of teachers-learners´ interest, such as to obtain and to organize the information obtained form the internet. This moment, MC uses a vocative followed by a question to mobilize the attention and to evocate the remembrance of the colleagues, with the intent of beginning an argumentation that builds itself on the experience report. The core of the argumentation is in the fact that she had scheduled and organized a course by means of the electronic mail

that is expressed in the form of the answer to her rhetoric question. Personal experience report is a discursive modality generally used to exchange information. However, its usage to discuss the importance of the tool reveals a capacity of discernment about the use of the tool that only justifies itself if the narrator is sure of the value and the effects from the actions performed by both, the tool and the agent. The discursive modality used in the situation of the dialogue with the pairs performs a rhetoric function of giving visibility to the mastery of the electronic mail cultural tool by the teacher.

In her experience report, the teacher used a direct discourse to refer to the communication with a guest by means of which she scheduled and organized a course. She mentions she had used two means of communication before meeting with an unknown person. In the first contact the phone was used and from that time on the exchanges took place by means of the electronic mail. In spite of these messages being the main source of data to evaluate the changes occurred in the process of organization of a typical school event, it is observed from the report that MC used the electronic mail to perform a collaborative activity, that until that time, was performed by face-to-face meetings or phone conversation. It is, therefore, using the electronic mail cultural tool that the teacher dialogues with an interlocutor external to the school to plan an activity that directly affects her routine and her classroom routine. From her report it is also possible to grasp that the use of the cultural tool occurs in a way completely apart from the tutorial, at least in what it refers to any of the purposes of the guided study. Therefore, it is observed that the structure of the scenery for the action of organizing the course was determined by the teacher's and her interlocutor's purposes, and also by the autonomous use of the cultural tool, that is, without recurring explicitly to the interlocution with the tutorial. This way, the substitution of the face-to-face meetings, the planning of the activity and the arrangement of the communication environment with the interlocutor are actions performed by the teacher using the electronic mail that make clear an advanced stage of the appropriation of this cultural tool.

One of the most important functions of the electronic mail is the possibility of the enunciation for diverse social groups, what expands the dialogic potential of the locutions

that circulate by means of this tool. In computational terms, this expansion is possible by means of discussion lists whose principle translates itself in the gathering of a set of electronic mails in a unique electronic-mail adding so many other functions as it is most desired to sophisticate the system of messages circulation (Giordan, 1998). So, the electronic discussion forum sustains a voice asynchronous meeting, by means of the locutions spread in the electronic messages. It is from the analysis of the teachers' reports about the use of this new modality of communication that we start to identify the indicative elements of the mastery and of the appropriation of the electronic mail cultural tool by the school community being studied. The following extract reveals a first stage of these processes.

Sequence 4: Because I look at it, I read the list.

+Date: 08/31/98
+Group meeting.

1. RJ: Then I was looking at JN, I said: folks! These people are very advanced.
2. MC: Don't look at it, don't look at it, forget it.
3. MG: Looking where RJ?
4. RJ: At the list.
5. MG: Ah! At the list?
6. RJ: At the list, because I look, I read all the e-mail of the list.
7. MG: OK.

This sequence appears at the very beginning of the first teachers and researchers´ group meeting in the first phase of the project. In this moment, RJ is telling the group what had been her difficulties with the guided study and soon after she had described the problems with the compatibility of the browser versions, she refers to the performance of her colleague JN.

As she cites JN, the teacher uses the indirect discourse not to refer to it, but to herself, in an evident attitude of analysis of a situation and of her role in this situation. RJ observes JN and indirectly compares the colleague's performance with her own, and is followed by MC that uses irony to support her analysis. The most expressive factor of this sequence, from the point of view of the process of mastery and appropriation of the electronic mail cultural tool, is in the fact that in her analysis, RJ had found in the electronic mail a tool constituent of the communication environment which allows to follow or, in the teacher's words, to look and therefore to evaluate comparatively her performance with that of her colleagues. RJ already recognizes a structural function of the new communication environment that is to promote the internal and external dialogues by means of gathering of voices.

The fact that RJ reads all the messages of the list means that she 'looks at' the locutions and makes of this look a new way of sustaining interactions that no longer resumes only to the face-to-face meetings as in this one in which she reports her internal dialogue. RJ reveals to us by means of the cited discourse that it is possible to hear the other's voice, by means of the messages exchanged via electronic mail, and take it as a constituent element of her internal dialogue. Even not being visible in this sequence, RJ also uses the tool to announce her locutions and thus to feed the dialogue with other agents. It is shown up in this sequence a factor that structures the meaning construction, an interanimation of voices in the internal and external levels that is now mediated by a cultural tool built in writing. Therefore, in the internet and especially in the electronic mail, the interactions to construct meanings occur by means of written and asynchronic enunciated locutions that find in the electronic forum a locus to congregate the different voices that enunciate them.

As far as the end of the first phase of the project, the electronic forum was used by the teachers with the main purpose related to the theme of the project itself. With the beginning of the second phase, another forum was set, gathering this time the teachers-tutors and the researchers, with the purpose of spreading to the electronic means the discussions about the process of expansion of the use of the internet among the other teachers and school staff. In the sequence below, extracted from a meeting between tutors and researchers, it can be

identified what we consider the main evidence of the appropriation of the electronic mail by the school, the setting of its own electronic forum.

Sequence 5: But folks, it is too many lists to participate!

+Date: 03/30/99
+Type: Tutors´ meeting

1.   JN: Now these things are gonna be reduced, because we, I was talking to Carol alright, we really created a list of Escola Arte-Ofício.
2.   RJ: You created another list? Besides the list, ah OK !?
3.   MC: Now we have three, 'teleaplica', 'telescola', and...
4.   RJ: Who is moderating?
5.   JN: It´s like this, I´ve made a proposal to Isaura, I´ve written the proposal, I´ve sent her, and she forwarded it to Mateus to be set in Liet, and then Liet, Mateus because it had to have someone I don´t know what, and I was assigned as [the list moderator].
6.   RJ: [But are you gonna moderate?]
7.   MF: That´s good news.
8.   RJ: So now we already can, but folks, it´s too many lists to participate!
9.   JN: [But a]
10. MC: [Have you seen what an important person you are?]
11. JN: But that it is like that, a thing is a list connected to a project, isn´t it? That you suddenly start to talk about anything, turn, miss the objectives.
12. RJ: Right but this one can be a list of information, isn´t it?
13. JN: Ah! yes, this is gonna be the idea, that this list replaces all those endless information that you have in the beginning.
14. MC: Then we´re gonna talk this way in the meeting, [read the list].
15. RJ: [Agree].
16. JN: Oh! It was already there, have you read it?
17. MC: Ah! let´s put the sign, could ya imagine, ya get a lollipop.

18. JN: I´ve already told Carol, an example of usage that is super important, then today we have a council, a school council, right? But it is not everyone who participates [then]

19. RJ: [Yeap], to report what had happened in the council.

Sequence 5 begins with the teacher JN announcing the creation of a school electronic forum. His locution results from a discussion about some contingencies of the general meetings of all the school teachers, mainly the excess of information. The announcement caused euphoria among the teachers, what it is viewed in the intonation and in the breakings of the locutions caused by the over position of the speech acts (indicated by brackets). The flow of the discourse is basically guided by locutions that aim to gather information about the characteristics of the new means of school communication that according to the teachers will perform a function complementary to the general meetings.

In the first part of the sequence, RJ and MC are initially attentive to the quantity of forums already created and soon after the group starts to exchange information about the name, electronic address, participants and other details of the forum which were omitted from the sequence. The reason of the attention with the quantity of forums is revealed in turn 8 in which RJ does not complete an idea to give way to her worry in having to participate in an excessive number of discussion forums. This speech act denounces a permanent characteristic of the process of the appropriation of cultural tools that is the fact of having always resistance of some type (Wertsch, 1998, p.54).

In the second part, JN, to identify himself as the list monitor, reports by means of a direct discourse the process of setting the forum standing out the interlocution involving him, the school director and the technician who works in the informatics services. JN legitimates his position of responsible by the forum with basis on his attitude of formally proposing to the director the setting of the forum, and also by the fact of being someone necessary to occupy the role of moderator. Such legitimacy is recognized both by MF in turn 7 and by RJ in turn 6 who anticipates JN´s conclusion, overlapping the end of the teacher's narrative with a question whose function is to confirm him in this role. MC´s question in turn 10 is addressed to JN also to support him.

Recognized the legitimacy, JN starts to answer to RJ´s worry about the excess of forums. From this moment on, the group concentrates on elaborating the purposes of the new forum, by means of the comparison with the situations triggered in the general meeting and by means of an intense process of negotiation. Initially, JN separate the purposes of the project forums from the purposes of the school forum that are in process of construction. Then, RJ proposes a function of information circulation for the school forum in which is approved by the colleague who identifies in this function a form of inhibiting the practice of reporting the 'endless information'. Continuing the comparison with the general meetings, the teachers adopt the indirect discourse in turns 13, 14 and 16 to refer to themselves in a hypothetical dialogue with their pairs. This sequence including the irony of turn 15, answers to the critics about the contingencies of the general meetings and simultaneously gives to the forum a function of diffusion of information. Then a second function starts to be discussed in turn 18, where JN retakes the narrative to refer to the school council and to the restrict participation of the teachers. RJ identifies for the second time another function for the forum that is to give voice to the school council, probably by means of the members.

The setting of an electronic forum constitutes the first mark of the process of the appropriation of the electronic mail by the school as an institution. Not only as an isolated act, or simply as the organization of a set of electronic addresses, the setting of the forum is the result of the initiative of a part of the teachers´ collective that encounters support in the school direction. The teachers that now occupy the role of tutors notice that in the usage of the electronic mail cultural tool is the possibility of by-passing problems identified in concrete situations of the school routine. It is also drawn a clear separation between the purposes of the project discussion forums and of this new forum, what signals the fact of the usage of the electronic mail be the result of the school own necessities and be, therefore, guided by the purposes of the actions triggered within the institution and no more by the actions of the in-service program. Gathered, all these elements indicate that for the school institution, the cultural tool has as function to make possible actions guided by their own

purposes that are, therefore, independent of the actions of the in-service program, what characterizes an advanced stage of the appropriation of the cultural tool.

Discussion.

According to what we indicated in the introduction, with this work we attempt to understand how does occur the mastery and the appropriation of cultural tools by teachers and by the school along an in-service program. We chose to analyze the situations of the guided study and the group discussion exactly because they give visibility, in the first case, to the individual process of the mastery of the cultural tool, and in the second case, to demonstrate the stages of appropriation in which both the teachers and the school were found. We will follow this same approximation to discuss the ways of appropriation of the electronic mail.

In the situations of the guided study, we have verified the occurrence of the discursive modalities of the type I-R-F that had both evaluative character (Sequence 1) and elicitative (Sequence 2 and 3). In Sequences 2 and 3, the IRF patterns characterized themselves for being inverted, on the contrary of the first one in which the tutor controlled the interaction flow. Besides these characteristics, the dialogues between the teachers and the tutors performed two main functions that characterized the actions taken in the sceneries of the guided study. In sequence 1, the visible propose is the negotiation of the meaning of the electronic address, which is associated to the function of the IRF pattern of verifying the level of mutual comprehension between the teacher and the tutor, what occurs transmitting the meanings by means of the locutions. Even with the exchange of roles between the teacher and the tutor in the control of the dialogue flow, the inverted IRF pattern served appropriately to transmit meanings. The difference between these modalities is in the fact that the flow of the dialogues not being determined exclusively by whom already masters the cultural tool, on the contrary of what has being observed in classrooms, once in spite of whom answers, the content of the answers indicates the intention of the agent in transmitting his value judgment about the theme. Following the principle of functional

dualism suggested by Lotman (Apud Wertsch 1991, p. 73-74), it is possible to declare that one of the functions of the dialogues is to obtain the maximum level of univocality between the locutions, what is performed by means of the transmission of the meanings by the locutions.

The second function of the dialogues becomes visible when the third interlocutor gains voice in the teacher's and the tutor's locutions, what denounces another structural characteristic of this gathering of voices, the internal heterogeneity of the locutions. Far from considering the tutorial as the enunciative voice of the shared meaning, both agents make dialogues with what Lotman qualifies as 'thinking device'. Under this perspective, the locutions are not receptacles or passive conductors, but they function as a generator and the essence of the process of the generation is in the interaction among structures, what Lotman compared to a semiotic system in function (Apud Wertsch, 1991, p. 75). Thus, the 'locutions' of the tutorial, as well as the ones of the agents, serve as thinking disposal for the interlocutors when the dialogues perform the function of meaning construction.

It is in the interlocution between the voice of the tutorial and the teacher´s voice that it is possible to better verify the dialogic function of the locutions. In these interactions, the teacher confronted her vision of the world, and, therefore, their meanings about the electronic communication, with those transmitted in the tutorial, guided by the purpose of learning to use the electronic mail. To perform the actions it was necessary that in the beginning the teacher cited directly the tutorial, as in Sequence 2, recognizing its authority. In other situations, such as the one exemplified in Extract 1, the voice of the tutorial already appears within her locution by means of indirect quotation, when the teacher reports having said to the students that she had found the page that they had created, without mentioning how the action occurred. If we could observe the students´ voice and the analysis made by the teacher in that quotation, having as supposition that "the analysis is the soul of the indirect discourse" (Voloshinov, 1997, p. 159), we can also hear the voice of the tutorial reverberating in the interaction between the teacher and the students, once the location of the pages was an activity announced by the tutorial, and we distinguish it as a voice within

the locution of the teacher. It is this infiltration that indicates us having had the interanimation of voices of the tutorial and the teacher during that action.

For being considered practical activities in the production of the guided study, we could observe the presence of the internet environments in all the sections of the tutoring, in which the teachers themselves used the cultural tools to perform the actions. Having the browser, in Sequences 1 and 2 and the electronic mail in Sequence 3, being present in the sceneries of the actions, or having been referred directly and indirectly in the other analyzed episodes, it is a fact that these environments mediated concrete actions such as selection, organization, edition, reading and sending of electronic messages, as well as, search, reading, edition and publishing of Web pages. To perform these actions, according to what was also reported in Extracts 1 and 2, the agents combined the functions and the proprieties of the cultural tools with the general purpose of communicating with their interlocutors, being, therefore, cultural tools and purposes two determinant elements of the structure of the actions. In the same way, the cultural tools and the purposes combined themselves to the IRF pattern and to the quotation of the tutorial determining the structures of both the dialogues and the internal actions.

In the light of the proposition of the functional dualism, the analyses of the dialogues extracted from the situations of the guided study around the computer and from the group discussions indicate that both the univocal function and the dialogic function of the locutions determined the flow of the dialogues, which, by its turn, sustained the actions mediated by the cultural tools and also the meaning construction by the agents. It is this way that we considered the processes of the mastery and the appropriation of the electronic mail by the agents as having been determined by the co-occurrence of the internal and external actions, once the co-occurrence of the actions mediated by the dialogue and by the cultural tools presupposes the interaction of these structures.

We can discuss now the evidences that demonstrate the stage of the appropriation of the electronic mail by the school in the in-service program course. The first aspect to be considered is the fact that the program had practically reached all the professionals

involved in pedagogic activities. Even though the universalization of the usage of the electronic mail by individuals does not explain the appropriation of the cultural tool by the collective, the fact that the teachers were able to communicate by this means is the necessary condition to the setting of the electronic forum. This is a new space of gathering of voices that makes the communication 'many to many' possible, spreads temporally the interactions and it is able to interfere in other cultural tools already appropriated by the collective, such as the discussion agenda of the general meetings and the school council.

From the perspective of the mediated action it is licit to affirm that the purposes of the usage of the electronic mail, called forth by the group of teachers when the school electronic forum was created, do not depend on the actions of the in-service program and on the research performed by the in-service program. The new purposes serve in a first instance to the administrative needs and the school policies. Afterwards, with the creation of a forum about the prevention of the use of drugs in school, the cultural tool also started to be used with pedagogical aims.

Despite the fact that only the analysis of the mediated actions by the school forums can sustain the discussion about how the electronic mail interferes in the structure and in the proposes of these actions, we can state that the process of the appropriation of the cultural tool by the school had begun when the collective started to use the cultural tool with the own purposes of the institution, transforming the character of the actions that were already performed by the means of other cultural tools. Before this, only the individuals could have mastered or appropriated themselves of the electronic mail. From the appropriation of the tool by the school, another stage of the appropriation is demanded from the teachers that is exactly that of considering the purposes and the usages of the cultural tool by the collective in the performance of their own actions. This way, having observed that the usage of the electronic mail has transformed the character of the mediated actions in school is the main evidence of the appropriation of the cultural tool by the institution.

Implications.

Several researchers have shown that to construct meaning in the classroom it is necessary to consider the students´ voices in the role of active interlocutors (Coll e Edwards, 1998; de Laplane 2000, Macedo e Mortimer, 2000). If on one hand the setting of a dialogic atmosphere in the classroom opens new perspectives for the process of meaning construction, on the other hand, we are obliged to understand the aspects of the form and the function of the movements and discursive modalities that are inserted in the classroom. Thus, it will be possible to concede forms of planning the teaching considering the centrality of the mediational means in the process of learning, according to what has been shown in recent researches (Mortimer e Scott, 2002).

Despite the fact that the formation of discursive genres begin and continue to develop outside the classroom (Rojo, 2000), it is in this scenery that occur guided actions for meaning construction that aggregate scientific value to the students´ world vision (Candela, 1998; Wells, 1998). Therefore, if to know the world, it cannot exempt the interlocution of the student with the teacher and with the teaching support materials; it cannot either want to cease his interlocution with the 'strange' voices to the classroom. The same way, if we presuppose the permanent dialogue with the communities that are part of the student's cultural universe, it is necessary to introduce a level of interlocution able of approaching the voices of other communities involved with the construction of meanings of scientific cultures. To promote this gathering of voices has become a more and more complex task, especially because we have at hand a great diversity of enunciation means and because we are watching a revolution in these means.

If the internet starts to be part of the school scenery, it is necessary to consider then the form as it is being introduced (Lacerda Santos, 2003), as the new voices aggregated to the polyphonic ambience will interfere directly and indirectly in the discursive dynamic of the classroom and, therefore, in the meaning construction, because this is the revolutionary character of the internet, ie to dipose environments from which different voices are announced to transform the ways of acting in the school community. Therefore, against those who defend the dialectic position between information and communication (Belintante, 2002), we argue for the dialogic dimension of the communication and the

meaning construction as the main contribution to be created by the agents who appropriate this mediational means at school. What we defend in this work is that *the school going to the internet* must have as presupposition developing in-service programs for the teachers and for the pedagogical staff within the school itself, what is equivalent to considering in a first phase the movement of *the internet going to the school*.

As we have seen in the analyzed sequences and extracts, different discursive modalities sustain the dialogues that appear as the actions are developed with the purpose of promoting the appropriation of the internet by the teachers. In the situations of tutoring, in which the teacher occupies a position of learner, emerged evaluative and elicitative IRF pattern frequently observed in the classroom (Edwards and Westgate, 1994, p. 125; Mercer, 1998), as 'subversions' of this same modality (Candela, 1999). If in the role of learners the teachers attempt to take the control of the flow of the dialogue, why not to consider that the students take the role in certain situations in the classroom? This way, the actions triggered in an in-service program should not serve only to master a certain content or any cultural tool; they are fundamentally opportunities for the collective of teachers to reflect on the forms of approximation of different cultures, as it occurs in the classroom, where the polyphonic concert is a determinant factor of meaning construction, such as the one shown for them.

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