

# Communication, visualization and social aspects involved on a virtual collaborative learning environment

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## Abstract

This paper discusses the influence of communication modalities and social aspects on the development of virtual collaborative distance education environments. We based this discussion on the use and development of TelEduc, a virtual distance education environment that has been developed since 1996 and through which many courses have been supported. We have used participatory design on its development and this method has evidenced social aspects that should be considered. Its last version has incorporated tools to support social aspects and to facilitate interaction, improving the educational process.

**Keywords:** Web-based distance education environments, information visualization, communication modalities, Internet, social aspects and collaboration.

## 1. Introduction

In the course of time, several resources such as mail, radio and television have been used in distance education. Depending on the course context, the attendance is more individualized, and a notion of community does not exist, like in courses by mail. Besides, since there is a variety of communication tools (email, chat, bulletin boards), Internet seems to be a very appropriate way for the development of collaborative learning environments.

In "real world" learning environments, proposed tasks involve information acquisition, communication and the interaction/collaboration between the individuals. Teachers can give classes through content exhibition, propose activities that can be accomplished individually or in group, organize discussions, evaluate students etc.

Students can actually participate in classes, proposing activities, exposing ideas and work results, forming groups with other students, and not simply interact with only the teacher. On that environment, the participants use face-to-face communication that supplies many visual clues as eye glance, gestures and body posture. With these clues it is possible to perceive, for instance, if a person is willing to talk, collaborate, discuss or work in group. Those visual clues help to generate the trust feeling among people, which is fundamental for collaboration.

The Sociology literature (Jensen et al., 1999) presents an important result on the effect of the communication in the cooperation and trust. When individuals are able to communicate, cooperation can increase significantly. We supposed that providing tools for communication in web-based distance education environments, the cooperation tends to be natural. However, we have noted that those tools are not enough to promote cooperation, because people need to first establish mutual trust, then to collaborate. Thus, we have not seen great interaction between students, and they talk to the teachers only, in any situation. There is no exchange of experience between students.

We have a feeling that those environments do not involve social and affective aspects that are important to build communities.

## 2. Virtual environments: communication, visualization and social aspects

The way people teach and learn has been changing. Teachers are trying to stop "giving classes", simply transmitting knowledge, and are beginning to share, change and build for and with the students. In that approach, teacher changes

his/her function of being the center element to become a facilitator, a driver to proposed tasks, (co) participant, advisor, observer etc. Besides, there are changes in their authority and control roles. The power given to the teacher is decentralized so that the students have the opportunity to control the direction of their own learning. Students change from simple "teaching" recipients, for active agents in the learning process, assuming more critical attitudes while contributing for the construction of their learning. This way, teacher looks at the student as a subject and agent in the formation process, implicating in a smaller emphasis in teaching and concentrating more efforts in a student centered learning approach, which could recognize meaningful practices that make sense to students. The teaching-learning process, in that context, starts to combine social (interaction, strategies etc.), affective (motivation, attitudes and personalities) and cognitive matters (intelligence, memory, attention, perception among other) (Sternfeld, 1996).

Observing the earlier versions of virtual distance education environments, we can notice that there was not worry about social and affective aspects. The main worries were to offer tools to make content available, support additional materials and tools for communication (Cerceanu, 1998; Oeiras, 1998). There was not, for instance, a space for people to write about themselves. This way, course participants had little information regarding others and the teachers. Those social and affective aspects are important to establish proximity relations among people so that they can identify common interests, discover new partners and form communities.

As the design of those environments does not consider such aspects, participants frequently comment about an isolation feeling (Romani et al., 2000), because they do not have resources that allow them to know who is in the environment in a certain moment; who could help them besides teachers and with whom they could do a work in group. When we enter those environments, we always have the same questions: where are the people? Who are they? What do they do? Consequently, we noticed that people hardly exchange, share and construct experiences.

One of the most important results of Sociology is the noted effect of communication in cooperation and trust. When the people are able to communicate in an appropriate way, cooperation

between them can increase meaningfully. Considering this statement, we can question how the choice of a communication modality affects that finding and how significant are the differences between different forms of communication. Jensen et al. (1999), point that this question is very important to develop cooperative environments.

In distance courses, cooperation is expected and trust is necessary to build communities. Being so, we ask: which representation strategies should be adopted? Which communications aspects should be considered for the participants to communicate in a satisfactory way?

Thinking about that questions, we have noticed that a lot of communication tools have been built-in in those environments without considering the context, the target audience and the intended use. Most of those tools present information in a sequential and textual way, which in many cases are not enough for speakers to understand each other. Face-to-face conversation has several modalities that facilitate transmitting information to our partners. Some of those modalities include spoken words, intonation of the speech, hands gestures, body posture, orientation, eye gaze and facial expression (Vilhjálmsón et al., 1998).

The use of text on most communications tools is because, when they were developed, the interfaces of the systems were textual. As Internet is a virtual space with countless resources besides text, we can think about different and more significant representations for that mass of data. The literature (Tufte, 1983, 1990; Card et al., 1999) presents several information visualization techniques that allow us to see information hidden or unavailable in the textual representation. Those techniques can help to minimize people's cognitive effort and give them subsidies to perceive the social world of the course. With the facts, comes the question: how can we choose the appropriate communication modality that can support the interaction between all participants?

We need to rethink the design of those environments, considering the questions we have pointed. The next section, presents tools that were incorporated in the TelEduc environment attempting to minimize these problems.

### 3. TelEduc's tools: Profile and Portfolio

TelEduc is an environment that has been developed since 1996 and has been supporting several courses with contents from different areas. Basically its structure includes tools for making contents available, proposing activities, suggesting additional readings and supporting communication between course participants, such as bulletin boards, email and chat. After some experiences and the familiarity with TelEduc, teachers and students have felt the need to know more about each other, like their academic formation, physical appearance, hobbies and spare time activities. As a result, we incorporated the Profile tool in TelEduc. Using this tool, participants (students and teachers) fill out a form with questions that build their profile. Teachers can orient the profile elaboration, in accordance to the essential of the course context. Like this, profile types vary from one course to another. Despite the textual description, participants can include their pictures, so they can have physical clues of their colleagues (Figure 3.1).

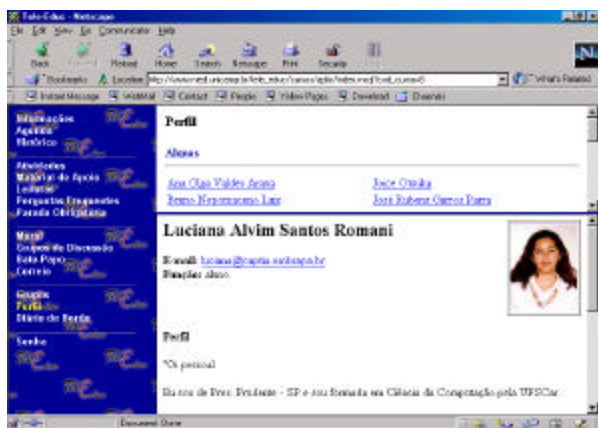


Fig. 3.1 Profile tool

Recent experiences have shown that people used this tool a lot and that they were interested in seeing their partners' pictures to have an idea of the physical appearance of each one. Students became confident to put their pictures in the Profile tool because in the beginning of the course, all teachers have placed their pictures too.

The Portfolio is another tool that has been helping to unchain collaboration (Figure 3.2). This tool is like an individual directory where students can insert the result of their works and tasks. Each item of Portfolio can be seen by all, only by the teachers or only by its owner, depending on how it has been configured.

That tool allow teachers to include annotations for the student, which can help them in their learning process. Students' progress in the course is registered and can be retrieved as an important resource of reflection for the student and teacher. This way, teachers can help students showing them the best direction to improve their learning.

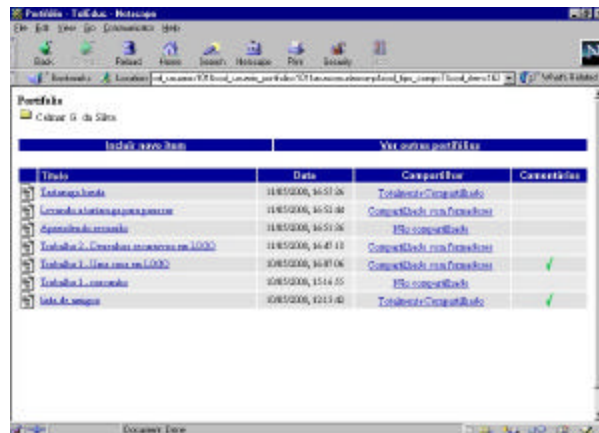


Figure 3.2 Portfolio items

In a recent course, people were expecting to know and exchange experiences related to their work. Teachers requested that each one detailed information such as academic formation and professional experiences in their Profile. As some of them did not filled out the Profile, the Portfolio helped the students to know the work of their partners and to begin to exchange experiences.

This evidence of collaboration was seen in the final reports of the course. The students liked that tool for several reasons, such as the possibility to comment other Portfolios, to see other solutions to problems and to receive teachers and partners comments. They affirmed that this exchange contributed a lot to their learning. In that course there were some students that began to participate only after it had already started. For them, the Portfolio was a tool that helped to know what had been done so far, what teachers were expecting of a task and what were their comments.

Other attempts to exchange experiences were proposed by students through the communication tools (email, discussion group, chat). However, they had no success.

These experiences have shown us that the current environments still need appropriate tools that allow and stimulate the building of a community. In the next section, we point some strategies that we are developing with the purpose of promoting the collaboration.

#### 4. Some directions: visualization and co-construction

After we experienced several courses in the position of teachers and developers of TelEduc, we noticed the need to look after several social and affective aspects as motivation, interaction, attitudes and personalities. Those factors are fundamental to make possible and to facilitate the building of a sense of community in distance courses in the Web.

Several strategies can be adopted to minimize this problem. One of the most important strategies is the study of the interaction that takes place in the courses through the analysis of the data generated by the communication tools and that are stored in TelEduc databases. Through that analysis we can extract significant information that allows us to think about alternatives for the redesign and/or proposition of new tools. However, it is difficult to identify which information is the most representative and pertinent, since the interfaces of the current communication tools present the content in a sequential and textual form (Figure 4.1).



Fig. 4.1 Email Screen

We can, indeed, represent a conversation in an infinite number of ways. The essential problem is to identify the salient data and to represent it accurately and intuitively (Donath et al., 1999). Using techniques of information visualization, the InterMap tool has been developed to represent the data of email, discussion group and chat tools. InterMap shows a graphic map that represents the courses interactions. With this tool, we can see the information that is hidden or that is unavailable in a textual representation.

InterMap uses graphs to represent the interaction between individuals (Figure 4.2). In those graphs,

the vertices symbolize the participants and the edges represent their interactions. Teachers are represented with blue and students with orange.

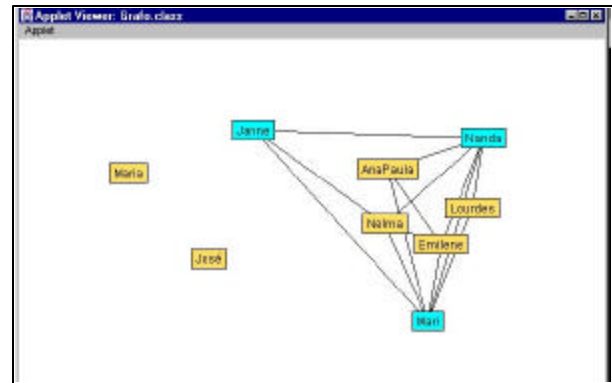


Fig. 4.2 Representation of email interaction

With this map, it is possible to identify the individuals who interact more in the course and also those that rarely show themselves. This visual representation allows us to see details of the interaction that pass unperceived in the current tools. With the sequential and textual representation, it is easier to remember the students that sent more messages even if those messages are not pertinent. But we rarely remember those ones that send few messages. The graphic representation of the abstract data gives more subsidies to identify problems still unveiled. Therefore, they present a general vision of the complete mass of data and they can detail the information when demanded.

In addition, the visualization tool can be used along with techniques to propose situations that motivate the collaboration and the development of new relationships in order to inspire trust (Jensen et al., 1999). The use of these techniques can allow us to choose the appropriate communication modality for each context.

Another way to stimulate cooperative work is to provide tools that allow co-construction. In the Computer Supported Cooperative Work literature (Souza et al., 1998; Ellis, 1991; Phase(X), 2000) we can find several tools that were developed for group use. Even mono-user tools can be used for co-construction. It is possible using remote administration systems as pcAnywhere, a product of Symantec Corporation (Symantec, 2000).

#### 5. Conclusions

We believe that one of the right directions to improve web-based distance education environments is the concern about social,

affective, educational, technological aspects. Observing the groups' organization of Internet, we noticed that a great part of the interaction occurs through exchange of text messages, like in email, chats etc. That kind of interaction is very simple and it does not explore all the potentiality that Internet offers us. The Web is a new interaction space that should be explored and includes new possibilities and social responsibilities.

To overcome this challenge, we will have to understand what communication is and how it influences the building of virtual communities. New user interfaces have to be proposed using a task and user centered approach. It is important that the design of these interfaces approximate to the best form of communication: the face-to-face.

## 6. Acknowledgments

We would like to thank TelEduc development team, Institute of Computing - Unicamp, Núcleo de Informática Aplicada à Educação (NIED), Fundação Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES) and Embrapa Information Technology that have been supporting the accomplishment of this work.

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