Redesigning Collaboration Tools to Enhance Social Presence in Online Learning Environments

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Abstract. This study aimed to investigate through a rapid ethnographic research the behavior of the main communication tools of collaborative learning environments (CLE) to foster students' social presence. Two research questions guided this work: (1) Are there limitations of synchronous and asynchronous collaboration tools in promoting students social presence? (2) Does extending social interactions to external collaborative tools from the CLEs contribute to the improvement of social presence of the students? This research provided support for the redesign of synchronous and asynchronous communication tools for the CLE Amadeus [1], in order to improve students' social presence in online courses.

1   Introduction

In an age where the Internet and web applications are fundamental for the development of human interaction, the landscape of education continues to change due to constant evolution of computer-supported collaborative learning. Collaborative Learning Environment (CLE) diminishes the barriers imposed by physical space and time between learners of online courses by offering ways of interaction, control, coordination, cooperation, and communication between the parties that make up the online learning [19]. The CLEs aren't simply channels for the transmission of information, but environments where users can construct knowledge through conversation and collaboration, providing many possibilities for user interaction through synchronous and asynchronous tools.

According to [2], student interaction in CLEs has implications on learner engagement and collaboration, while [3] associate online collaboration with improved

volume and quality of student involvement, satisfaction, engagement, and higher-order learning.

One of the most important and popular concepts to describe and comprehend how people interact in a CLE is the notion of social presence, which measures the degree which one learner considers another to be a "real person" within the virtual environment [4]. This degree of awareness can be influenced both by personal features and by tools provided within the environment that transmit social and emotional information about the other [6]. [7], [8] and [20] discuss the influence of social presence on the learning performance, and [3] relate the awareness of social presence with the degree of student engagement, satisfaction, collaboration and facilitation within online courses.

Some recent criticism and fears about the quality of the online courses are related to the significant communication problems between students in CLEs. In this sense, noise in the communication interferes with the quality of information transmission and generates uncertainties and misunderstandings regarding the content of lessons. Although several studies focus the prospects of the increasing number of synchronous and asynchronous tools on CLEs, little attention has been given to the evaluation of these tools: either in terms of usability or verified effective integration of these tools in the instructional design planned by the teacher.

The scant work available in this area includes studies by [9], [10] and [21], which use methods such as Heuristic Evaluation, the Assessment Method of Communicability and student's eye tracking pattern. Few works attempt an analysis from the students' and teachers' point of view about the usage of synchronous and asynchronous tools, about the extent of interactions using tools external to the CLE, and about the support offered to the teacher in terms of tracking these social interactions using the tools provided within a CLE.

2   Objective and Research Questions

The main objective of this work were to analyze the behavior of the teachers, tutors, and students using the CLE Moodle on a distance learning course at the Open University of Brazil and on a blended learning strategy using the CLE Amadeus, through a qualitative ethnographic research. From this qualitative analysis, propose a redesign of synchronous and asynchronous CLE communication tools in order to improve social presence in online courses. The research questions investigated in this work were:

1. Are there limitations of synchronous and asynchronous collaboration tools in promoting students' social presence? What are they?

2. Does extending social interactions to collaborative tools external from CLEs contribute to the increment of social presence of the students?

3   Research Method

The researchers used *quick and dirty ethnography* [11] as the primary method of qualitative investigation over the course of one month's time at the Open University of Brazil, with the goal of understanding the users' culture, motivations, and values, along with the socio-cultural context in which it is inserted. This method diverges from the traditional ethnographic research because it has a more direct focus on relevant activities and covers a shorter duration of time. It also may utilize assistance from key informers to gather multiple viewpoints, and computer assisted qualitative data analysis software to conduct collaborative analyses [12].

Researchers designed and provided a survey for higher education students at the University, and conducted semi-structured interviews with teachers, tutors, and students, besides a Daily Diary written out of observations made during the studies. Subsequently, every document was codified using the qualitative analysis tool NVivo [13].

3.1   Participants, Environment and Procedures

The research was conducted from August 2, 2012, until September 1, 2012 in a center of presence support of the Open University of Brazil. Two researchers performed the fieldwork four hours per day inside the natural environment of the users, in effort to understand the full context of activities. They observed daily interactions on the CLE Moodle, via an administrator's login and password offered by the University. Observations were logged into a diary during the fieldwork, and photos and movies were taken to capture the environment, people and interactions.

The researchers conducted a survey of 89 students: 69 of these were enrolled in eight distance learning higher education courses distributed across five different cities, and 20 were enrolled in a technology course at the university that utilized a blended learning strategy. The CLEs used were Moodle and Amadeus, respectively.

Researchers applied Semi-structured interviews with the coordinator of one of the higher education courses that used Moodle, with the coordinator of a center of presence support, with three teachers (two used Moodle and one used Amadeus), and with five tutors and four students of the Open University of Brazil. To gain a better understanding of the virtual behavior of students using the CLE Moodle, key informers were used and daily tracking was executed and compared with the *in loco* observations.

4   Qualitative Data Analysis

Following one of the principles of the Quick Ethnographic Research, a specific software for qualitative analysis was used, NVivo 10, to encode collected data during the interviews, photographs, videos, and observations. Besides that, an extract of the

answers given by the students during the survey was quantified. This analysis was the basis for the redesign process of internal and external communications tools for the CLE Amadeus.

4.1   Survey

The survey was intended to get a general vision of how students interacted with the CLE. The major focus of this research was to identify the tools used for the construction of the social interactions. 95.7% of respondent answered that they used the discussion forum to communicate with other students, teachers and tutors, while 78.2% used the direct message tool to maintain communication. Additionally, 56.5% wanted online social networks integrated with the CLE, in a way to facilitate and promote greater interactions among participants in the distance learning process. 46.4% of the students answered that they felt some need for a synchronous collaborative tool in the CLE, in which the most mentioned was the chat.

63.8% of the students replied that they accessed the CLE daily, 31.9% accessed it at least three times a week, and 4.3% do so less than three times per week.

When surveyed about their usage of online social networks, 85% of the students responded that they used at least one social network, and most of them used at least two. 53.6% used the online social network Orkut, 76.8% used Facebook, 53.2% used Twitter, and 11.6% used MSN.

Of the students that claimed not to use any social network, 20% replied that they do not participate in the discussions proposed by the teacher in the CLE Moodle, versus 5.8% from the set of the surveyed students. 50% of the students that didn't use any social network do not communicate with other students using CLE Moodle during the course, against 43.5% of surveyed students. 30% of the students that didn't use any social network would like to have chat tools available, against 46.4% of surveyed students. And none of the students that didn't use any social network would like to have social network associated with CLE, against 53.6% of surveyed students.

These numbers show that students that use online social network daily also use more CLE synchronous and asynchronous communication tools. Integrating tools external from the CLE, such as online social networks, it can potentially increase the quantity and quality of the interactions, once the member network increases and exceed the limits of the already formed group.

4.2   Encoding Documents Generated in the Ethnographic Research

To analyze the research questions that guide this work, the documents generated in the ethnographic research were encoded using the computer assisted qualitative data analysis software NVivo 10. Pictures, videos, semi-structured interviews transcripts, and observations diary provided a large and rich volume of data. This was complemented by the student survey.

The data was encoded considering five nodes: (i) User experience with tools that promote social interactions in CLEs; (ii) Teaching presence: awareness and mediation; (iii) Extension of the social interactions beyond the CLE; (iv) Social

presence of the teacher perceived by the students; and (v) Online teaching Practice to promote social presence. The codes were analyzed considering the research questions.

Reserch Question 1. To examine how collaborative tools on the CLEs can limit the social presence of the students, teachers, and tutors, the researchers analyzed their usage of several different tools. Table 1 provides some excerpts of responses that illustrate teachers' and students' opinions on the limitations of the discussion forum to promote social presence:

Table 1. Excerpts of the interviews with teacher and tutors about limitations of discussion forum to promote social presence

Source	Excerpts
Interview: Tutor 5 CLE used: Moodle	"[…] tutors and students use a lot of Twitter, Facebook and MSN, we often have to begin a discussion in a social network and then take it to the discussion forum in CLE."
Interview: Tutor 3 CLE used: Moodle	"They use so much the forum. I believe that some of them do not use this tool in a proper way, as well as other tools of the Moodle. A topic needs to be created when a new question must be done; otherwise you have to leave a comment in an already existing post."
Interview: Tutor 4 CLE used: Moodle	"I see that the students always prefer to create new topics to catch the attention of the teacher, thinking that if they leave a comment on an already existing post, the teacher will not consider it. It's difficult to see so much topics and replies, difficult to identify who had replied who."
Interview: Tutor 4 CLE used: Moodle	"[…] Even a student can begin creating a topics and everything unroll from then. Sometimes it can confuse the head of the students, because they don't know what that topic is about. […] For many times I saw that a question raised in a topic had already been answered in another topic, many times the same question."
Interview: Teacher 1 CLE used: Moodle	"It's difficult to understand the nesting of the posts in the forum (indent style); it's not simple to understand who is replying who."
Interview: Teacher 3 CLE used: Amadeus	"I always have to enter each forum when I login the platform, because there's no notification if there's a new message. […]"

In addition to the discussion forum, the Message tool is one of the most used on the CLE Moodle. The teachers, tutors, and students reported many limitations. Some of them perceived the need for a synchronous communication tool, a feature not found in the Message tool; besides of the impossibility to send a message to more than one person, and users perceived a difficulty communiting during the course, as evidenced in the following excerpts:

Table 2. Excerpts of the interviews and observations diary about limitations of Message Tool to promote social presence

Source	Excerpts
Observations Diary: Researcher	"They insisted that there's a lack of a tool in which they can identify exactly who is online on the Moodle in certain moment."
Interview: Tutor 3 CLE used: Moodle	"When the student want to urgently get in contact with the teacher and vice versa, it's difficult to know if he is online, the presentation of who is online is about the last five minutes."
Interview: Teacher 1 CLE used: Moodle	"The access to messages is not so clear and there's no global vision of the messages sent during the whole course."
Interview: Student 1 CLE used: Moodle	"When we want to send a message to another person, the system changes the screen a lot of time, confusing the path back. It should be more practical."
Interview: Tutor 4 CLE used: Moodle	"On the Moodle if I want to send a message to a student of even everybody, I have to do it one by one. […]"
Interview: Student 2 CLE used: Moodle	"I send messages to another online user and usually I don't get prompt reply, I don't know if it was because the user is not online anymore or it's because he didn't see my message."

In many cases, cultural aspects lead online education students, and even teachers, to aim for the immediacy of face-to-face interaction found in traditional classroom courses. In this sense, many users become frustrated with the synchronous tools in CLEs. Students associate this tool with rapid feedback and constantly compare their needs with tools used regularly for communication with friends.

Students reported feeling as though they don't belong, feelings of isolation and distance from the teacher. This could be the result of students' perception of the teacher's inavailability and/or a delay in feedback, whether the result of limitations of the CLE or the teacher's planning and execution. The fact is that, in general, these factors negatively impact student satisfaction and the results of student collaborations and learning.

Many respondents—both in the informal chats with the students and interviews with teachers and tutors—raised concerns regarding the need for immediate feedback from the teacher and tutor. The following excerpts show their perception of the need for new synchronous tools and perception mechanisms in real time:

Table 3. Excerpts of the interviews and observations diary about necessities of new synchronous tools to suporte immediate feedback

Source	Excerpts
Interview: Teacher 2 CLE used: Moodle	"The update of the Chat on the Moodle is very slow, you have to keep clicking to update it."
Interview: Teacher 1 CLE used: Moodle	"The students ask my MSN nickname very much, I believe that is because it is a tool that most of them use."

Table 3. *(Continued)*

Interview: Tutor 3 CLE used: Moodle	"When the tutor or teacher wants to get in contact with an student with urgency, there's no way to know if he is online, because it only appears the users that were online in the last 5 minutes."
Observations Diary: Researcher	"The main complaint of the students is the lack of feedback when they need. They claim the lack of a tool in which they can identify exactly who is online on the Moodle in certain moment."
Interview: Teacher 3 CLE used: Amadeus	"The tools on Amadeus have limitations in the forum and chat. There's not a system of messages, so I have to use the e-mail system, that is, log out the platform."

Teachers and tutors feel a need for tools that promote healthy collaboration, especially among students. Many noted that several of the communication tools on the CLEs are not used, and that they prefer external tools that perform similar functions.

Table 4. Excerpts of the interviews about CLE communications tools being preferred by external tools

Source	*Excerpts*
Interview: Teacher 3 CLE used: Amadeus	"Unfortunately the CLE Amadeus does not give us a way for the student and teacher socially interact. I can't send a message for another person; I can't leave a comment on a specific post in the forum."
Interview: Teacher 3 CLE used: Amadeus	"I would like to do a work in group so the student could interact more. Maybe if the Moodle could give us more collaborative tools, the students would be more identified with one of it"
Interview: Tutor 3 CLE used: Moodle	"I think that the student needs to feel comfortable with the environment and with willingness to participate, without obligation, like for example when they use MSN or Facebook."
Interview: Teacher 1 CLE used: Moodle	"The level of interaction between teachers, tutors and students could be better. I believe there's problems with accommodation of some teachers, unconcern of the students and limitations of the CLE tools offered."

Research Question 2. [14] highlights that online social networks have been incorporating virtual communities and the Internet, becoming a "new" form of organizing interactions. The formation of virtual communities is increasingly common both in distance education and in blended learning strategies. Online social networks are also growing in general, and they are being used formally and informally in the learning process.

Teachers tend to ignore social interactions in these external tools, sometimes because of the difficulty in tracking and integrating them with the existing toolset in CLEs, and sometimes because of prejudice or institutional rules that insist on disregarding this important means of promoting social presence in all areas, including education.

Despite this reluctance, and sometimes at the urging of students, teachers surveyed in this study did in fact use social networks like Facebook, Twitter, and MSN in the

Table 5. Excerpts of the interviews about the use of online social networks in the distance learning

Source	Excerpts
Interview: Tutor 5 CLE used: Moodle	"I made groups on the Gmail. I always do it every semester. If not the interactions do not meet the expectations."
Interview: Tutor 5 CLE used: Moodle	"[…] unfortunately there are students with a low frequency on the Moodle and every day they are checking their e-mails. […] Obviously that the main way is the Moodle, but if the student do not use it, we have to have another ways to reach the student."
Interview: Teacher 1 CLE used: Moodle	"Next semester I'll use the Skype instead of Moodle's chat."
Interview: Teacher 1 CLE used: Moodle	"The students ask my MSN nickname, I believe that this a tool used by the majority. […] I can't run away from the tools the students are used to use."
Observations Diary: Researcher	"I interviewed two presential tutors and tried to observe how they interact with the CLE, which are their priorities. They use a lot e-mail and social networks."
Interview: Teacher 3 CLE used: Amadeus	"They report they find me much easier through Twitter or Facebook instead of Amadeus, perhaps because the way of perception on the Amadeus is not trivial."
Interview: Teacher 2 CLE used: Moodle	"There's work in groups, but the students prefer to interact among them through another tools instead of the Moodle."

distance learning process. Considering the importance of collaboration, teachers use these tools to build a community feeling, as we can see in the following excerpts:

The teachers and tutors made attempts to integrate online social networks with the CLE, though in ad-hoc way, to transport messages from online social networks to the CLEs and vice versa. We can see this behavior in the next excerpts:

Table 6. Excerpts of the interviews about the transport messagens from online social network to CLE and vice versa

Source	Excerpts
Interview: Tutor 5 CLE used: Moodle	"There was a student that sent a message to me; he was online on Facebook, wanting to ask a question. I said to him to copy and paste on Moodle. It's an orientation question."
Interview: Teacher 3 CLE used: Amadeus	"I saw mentions in one of the discussion forum happening through Facebook. Why do not integrate it? Why not use the Amadeus for this discussion?"

In order to break down the barriers between actors in the online education process and encourage students to minimize their social limitations (e.g. fears, shame, and distance), teachers and tutors interact with their students using collaborative tools outside of the formal education process, as shown in Table 7:

Table 7. Excerpts of the interviews about eliminating the barrier among actors in the online education process

Source	Excerpts
Interview: Tutor 5 CLE used: Moodle	"Because we create bonds through Facebook, Orkut and Twitter, the students feel more comfortable to ask me some things because they already know me."
Interview: Teacher 2 CLE used: Moodle	"I join some social networks […] and some students have the tutors and teachers as friends on the social networks."
Interview: Teacher 3 CLE used: Amadeus	"I use Facebook and Twitter. Most of my students do not follow me these social networks. I encourage them to use it, but I ask that they post their asks on the CLE

In the informal conversations, teachers and tutors said that since these tools are not integrated into CLEs, they are more difficult to track and monitor. As Teacher 2 stated, "At the same time everything is registered on the log, while other external tools can't be, they are not part of the student's profile on the CLE."

5   Design Method

Activity theory is a key concept in the humam-computer interaction area, as an approach to fill the gap between theory and practice. It provides perspectives about human activity and a set of concepts to describe it. An activity consists of subject(s) and objective(s), artifacts, community and its rules, and the division of labor. In other words, through Activity Theory, human practice is studied locally, inside its context, and incorporating all socio-cultural factor that affect it [16].

Activity theory provides a method to structure, clarify, and comprehend data gained by field observations. It also provides a philosophical and interdisciplinary framework to study different human practices, helping designers to capture the users' current practice and construct models for future activities [5]. This design method utilizes the Engeström Triangle to model activities.

Although countless papers presents solutions for the software design based on the Activity Theory, especially on Engeströn's diagram, there are a few limitations on evidence [15]: (i) propencity to represent only the objects shared through collectivity, leaving aside the other objects on many interaction levels; (ii) human practices are multi-task, in other words, people perfom simultaneous actions and (iii) the non-representation of the activity as it is developed through time and division in more atomical levels like action and operation.

Considering the analyzed data and the elements defined from the Activity Theory, the researchers constructed informal narrative descriptions showing human practice situated as it occurs in the present moment, and created future scenarios to determine the potential impact of their innovation. Those narratives tried to reach different levels of analysis through the Hierarchical Structure of Activity, finding the routine tasks of the teachers and students, in other words, the operations performed without the necessity of consciousness upon it [17]. The design process was finished with the construction of prototypes using the tool Balsamiq Mockups.

5.1   Models and Prototypes

Initially, the Engeström Triangle modeled all the identified activities. Therefore the researchers needed to discern from the collected data what could be considered an activity, according to Activity Theory. Each was then described in terms of subject, tools, objectives, community, rules, work division, and product. This modeling was fundamental to refine, organize and compare the raw data collected. Figure 1 presents the Engeström Triangle of the Social Interaction activity through the asynchronous Discussion Forum of the CLE.
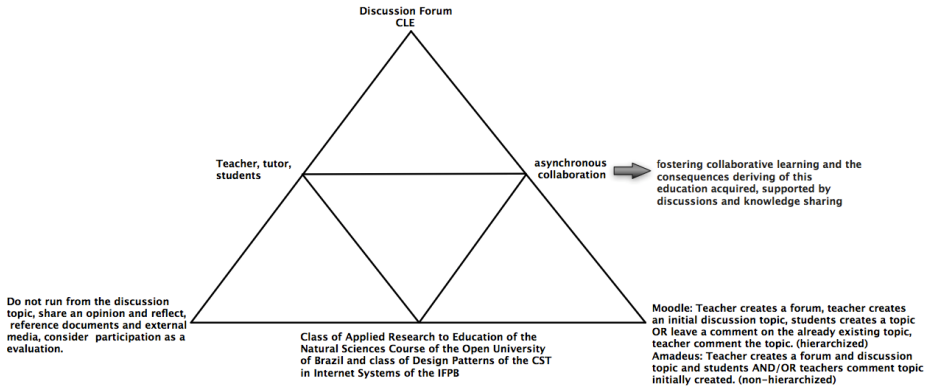
Fig. 1. Engeström Triangle of the Discussion Forum Tool

Figure 2 presents the Engeström Triangle of Social Interactions activity through the synchronous and asynchronous Message tool in the CLE. The Social Interaction activity through the tools externally integrated to the CLE wasn't modeled through the Engeström Triangle because the instances of the investigated CLEs on the ethnographic research didn't offer this integration.
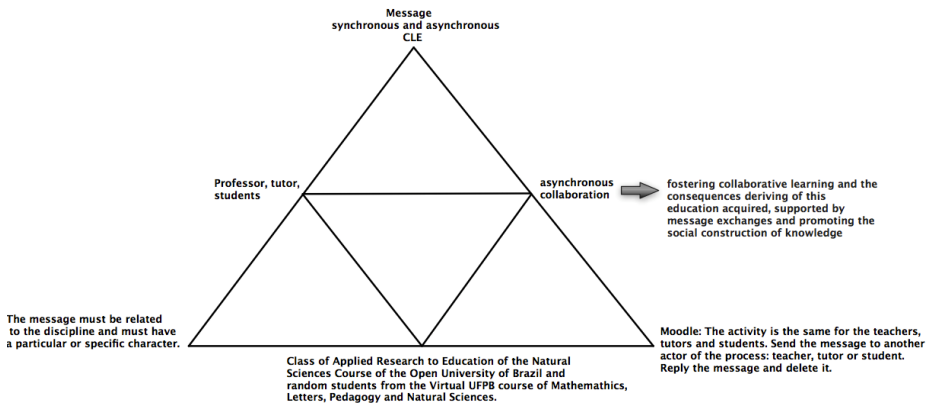
Fig. 2. Engeström Triangle of the Message Tool

The next step was to construct the actual scenarios describing these activities. The aim was to link every identified element on the Engeström Triangle in one informal narrative description to improve the visualization and understanding of the development of the activity and the levels of analysis that activity theory offers. From these actual scenarios, we identified problems and user needs, and built tables in which the necessities corresponded to each phase of the activity (table of user's needs). Table 8 presents an excerpt of the actual scenario and the user requirements of the Social Interactions activity through the asynchronous Discussion Forum in the CLE.

Table 8. Needs and User Requirements of the Discussion Forum tool

Actions	*Needs and User Requirements*
The students create a new topic or comment on in a previous topic as if it was the same action and has the same objective.	[REQ1] Only the teacher and tutor create a topic, initially, the students comment the main topic or the comments of other students, depending on its objective.
The forum interactions was made through the comments to the initial topic or to another comment posted by the teacher, tutor or student, promoting social interaction and collaboration. The visualization of this nesting is indispensable so the student to understand the content of the discussion and participate. The nesting in the Moodle is not easily comprehensible and it does not exist on the Amadeus.	[REQ2] Structuring the forum through the nesting of commented messages, in a way to made clear for the users who replied who. To enable that exclusively the teacher or tutor create the first topic and all the involved ones in the learning process can comment in unrestricted forms any comment made on that forum, providing a maximization of the social interactions.
On the CLE Amadeus, to realize how much messages exists in a certain forum, one has to access it.	[REQ3] Showing in the description of the forum the number of messages still unread on it.
It's possible that one discussion in one forum restricted to the actors involved in a certain subject can be enriched if transmitted also to a social network, where the mediator in this case would be the student building this bridge.	[REQ4] Provide the student or teacher to carry through one single click, a post from the discussion forum to Twitter or Facebook social network. There will be need for a configuration of the association of the login on the CLE with the login of Twitter and/or Facebook.

Table 9 presents an excerpt of the actual scenario and the needs identifies through the Social Interactions activity by the synchronous and asynchronous Message tool of the CLE:

Table 9. Needs and User Requirements of the Message tool

Actions	*Needs and User Requirements*
It was noticed through the observations and interviews a lack of awareness of who is online in the platform, since it gives you the information of who was online for the last five minutes.	[REQ1] Real time awareness of online and offline users. The list might not appear entirely in the screen, it might be reserved a space for a number or names and the others would be seen through scroll bars.
Interviewed users feel the need for a clear and specific space to send messages to online and offline users. There wouldn't be the need of pop-up screens, blurring the user's attention.	[REQ2] Clicking in one of the users of the list, online or not, a message box would be opened under the name of the user allowing the sending of the message. There's a space to enter a title and another one for the body of the message. There should be one Send and Cancel button.
It's not possible to send a message to all users; it has to be done individually.	[REQ3] Possibility to send a message to all users of a course at the same time.
Students reported the need to perceive incoming messages instantly, reporting the idea of instant messaging tools.	[REQ4] Awareness incoming messages instatly. Bellow the opened message there's one Delete and Reply button.

Table 10 presents an excerpt of the future scenario and the identified need for the Social Interactions activity through external tools integrated into the CLE. Twitter was selected for the integration with the CLE Amadeus, though it is adaptable to any tool that provides social interactions.

Table 10. Needs and User Requirements of the integration of the CLE with online social network

Actions	*Needs and User Requirements*
It was noticed that many students, teachers and tutors used online social network such as Twitter, Facebook and MSN to socially interact with subjects related to the course.	[REQ1] Integrate the CLE with online social network tools, offering ways to associate user login of the CLE with logins from the online social networks.
There is a limitation to access online social networks at the same time teachers suggested the social interactions to be done through the internal tools of the CLE. Many students insisted in using online social networks to communicate specially with the teacher and tutor.	[REQ 2] Due to the integration, while entering the CLE the user automatically and individually visualizes the posts related to the registered social network. The update of the visualization inside the CLE must be automatic.

The main purpose of prototyping is to allow some aspects of the future system to be evaluated by real users in an iterative, quick, and cheap way, before the system is formally installed. The CLE Amadeus interface is horizontally divided into three

parts: at left is the main menu showing the Twitter feed of the current user. The screen in the middle – the main screen – presents the interface chosen in the main menu, which can be a discussion forum, or can show all the received messages, for example. On the right we see the participants of the course, online or not, and any unread messages.

The prototypes presented in Figure 3 refer to the modeled activities from the ethnographic research: (i) social interaction activity through the asynchronous tool of communication Discussion Forum and (ii) social interactions activity through the external tools integrated to the CLE.
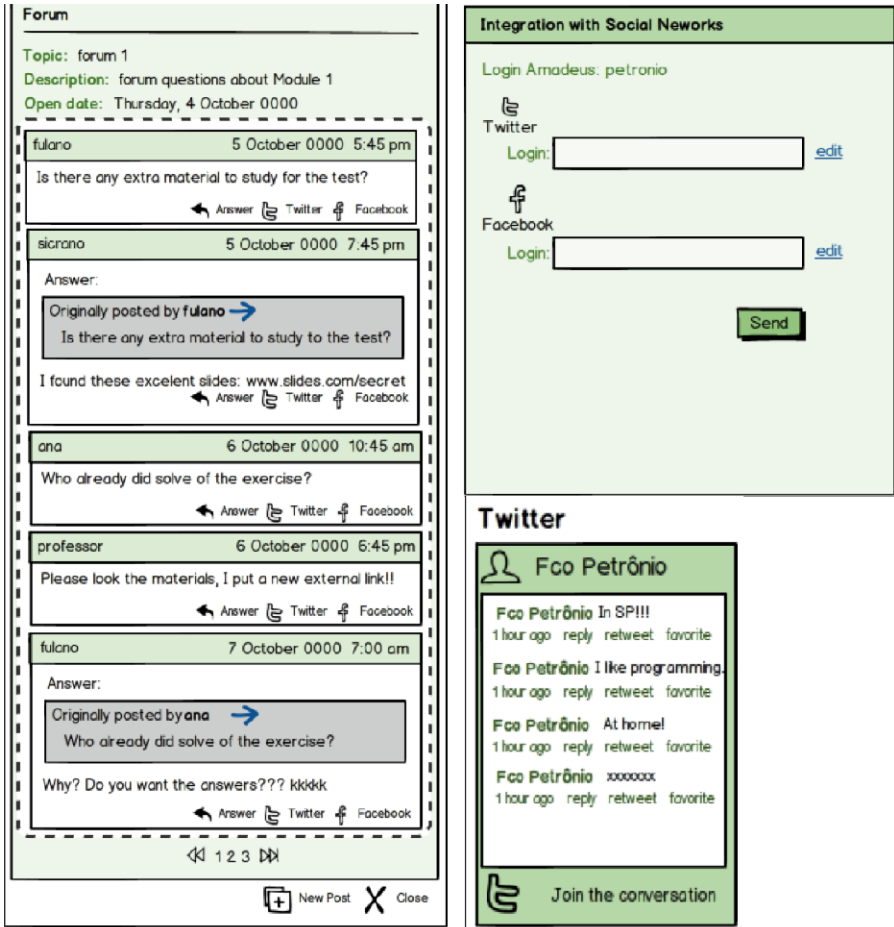

Fig. 3. Forum tool communication and twitter integration prototypes

The prototypes presented in figure 4 refer to the Social Interactions activity in the synchronous and asynchronous communication tool Message of the CLE.

5.2   Social Presence Evaluation

Prototypes were evaluated using the Focus Group technique. Focus groups are usually run with 5-8 people and sessions last about 1-2 hours, including a demonstration (and hands-on) of the prototype or system, followed by a discussion. The discussion is led by one of the researchers based on guidelines, trying to answer important research questions. The advantage is that feedback (e.g., on potential issues) can be provided in very early stages of the design process.

The users of the prototypes evaluation were divided in two groups, the first with a teacher and two tutors and the second one with three tutors; everyone were interviewed for the ethnographic study previously presented. The participants of the evaluation interacted with the prototypes and clearly identified improvements regarding the limitations of the Forum and Message tools, as well as improved facilitation of collaboration from the integration of Twitter with the CLE Amadeus.
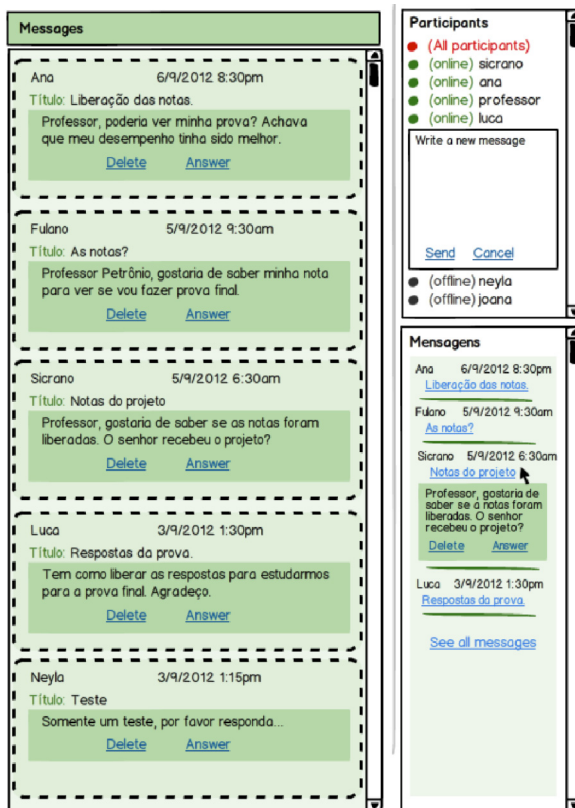
Fig. 4. Synchronous and asynchronous messaging

At the same time, the focus groups identified a few limitations on the prototypes, which could be corrected before the effective recoding, among them: (i) not allow the students to send messages for everyone on the course, otherwise the discussion forum could be avoided. Only the teachers and tutores could send messages for everyone. (ii) Remove from the forum messages, the button which allows a link between the post and the Facebook, since it wouldn't be already integrated with CLE Amadeus. Only the button for Twitter's link would be available, as well as the button for answering the post. The recommendations gotten on focus group were considered on the recodification of the CLE Amadeu tools.

In the recoding process, we have considered the needs identified in the ethnographic study, developed models and prototypes evaluation with focus group. After finalizing the recoding process, an experimental course about Python programming language was offered to 56 students of a college of technology. During the course, which took 45 days, a survey was applied to all the students enrolled at the 30th day. The instrument used was an adaptation of the survey developed for [19] to measure social presence on CLEs.

The results obtained showed a satisfactory degree of social presence among the students of the course on the CLE Amadeus. 84% answered that the online discussions helped them to learn; 96% felt that their classmates and teachers respected their opinions; 80% said that they have perceived the presence of theirs colleagues and teachers, and that in some way it have helped them along the course; 71% felt closeness to their classmates; 73% considered the energy of their classmates and teachers encouraged them during the course; 73% felt satisfied to have socially interacted during the course and 71% have perceived how their teachers and classmates reacted to their comments on the collaborative tools.

6   Conclusions

The methodology used for the development of this project proved to generate insights that led to the ideation for redesigning synchronous and asynchronous communication tools for CLE Amadeus. The qualitative method of quick ethnography offered a rich and complete understanding of usage context and helped to capture the analyzed environment more directly and quicker than would have been possible by other methods. The data were analyzed and encoded in a way to explore and answer the questions of the research, by using key informants, multiple researchers, and computer assisted qualitative data analysis software. It was done in order to minimize the limitations in traditional ethnographic research, such as field work overly long and time consuming, beyond the research focus wide open [18].

From the modeling based on the Activity Theory, we were able to build scenarios for the current observed situations that allowed us to identify user needs and to conceive the redesign of the communication tools. The prototype was developed through an iterative and incremental process, so each cycle could be evaluated and refined by users of the CLE Amadeus.

When finishing the iterative and incremental prototyping process, the redesigned collaborative tools were implemented and integrated into the CLE Amadeus. The researchers conducted a focus group with two teachers and four tutors in three sessions of two hour each. The participants of the evaluation interacted with the redesigned tools and clearly identified improvements regarding the limitations of the Forum and Message tools, as well as improved facilitation of collaboration from the integration of Twitter with the CLE Amadeus. The evaluation through the focus group provided a refinement of the usability of the produced interfaces.

Following this work, the redesign process, including the integration of the Twitter social network, has conformed to Amadeus SIMM, the module of the CLE Amadeus that monitors the synchronous and asynchronous collaborative tools such as Chat, Message and Discussions Forums, and it extends to external tools like Twitter [22]. Through these innovations, teacher can monitor group social behaviors like cohesion and heterogeneity, as well as individual behaviors related to each student such as their degree of interactivity, isolation, intermediation, prestige and engagement.

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