Abstract—This paper discusses the influence of social presence on learning in online educational environments and how enhancing social interactions can facilitate it. It argues that a theoretical framework can be used to propose design agents in the environment to promote interaction. An experiment based on an online course starting in March is described, which collects data on participants’ interactions.

Index Terms—online education, social interaction, social presence, reactive interface, design agents.

I. INTRODUCTION

There is much research on interaction in Online Education that shows its influence on students’ experiences during the course. Whether social interaction facilitates the involvement of students with the tasks or enhances the feeling of being part of a community, social interaction is the major factor that enables a positive experience on online courses.

To enhance social interaction a theoretical framework is proposed that describes embedded elements named design agents that promote interaction between participants. A design agent is a system ‘that can modify its expressive behaviour as the context changes’ [1]. Design agents note changes in the environment, induced by actions of the user, and thus cooperate among themselves to maintain a state of dynamic balance for a specified feeling. An online education environment will be constructed based upon this theoretical framework. The purpose is to let the environment be a facilitator of interactions.

The environment will be tested in 5 experiments during an online course of Cognitive Ergonomics, in two parts, which are offered to undergraduate students of Graphic Design at Universidade do Oeste de Santa Catarina, Brazil. Part 1 of the course lasts for 15 weeks, from March till June and part 2 from August till December.

The first experiment will start on 6 March 2004. It aims to collect quantitative and qualitative data about students’ interactions in the chat room, emails and forum and compare these results with the students’ perception of their performance. The theoretical framework will be constructed in parallel with the experiments.

II. SOCIAL INTERACTION

Social interaction is so usual in daily communication that people are not conscious of it. It happens as soon as two or more people get together, on a phone conversation or even when they run into each other by chance. Social interactions are realized in different forms and for that, different meanings can be applied. Whether it is a hand shaking, the way people stand or any other body language, it always helps people communicating, introducing him/herself, and even giving clues about his/her mood and personality. The forms that social interaction acquires and the way they are interpreted will vary with each individual, and this will happen naturally. Social interaction is essentially based on visual and auditory senses. However, when the means used to communicate inhibit these senses, the lack of social interaction becomes conscious and interferes with communication. This is to say that, when people communicate through networked computers, communication is commonly based on text and users are located geographically apart. When network computers are used to deliver education, it may be fundamental to enhance social interaction in order to achieve successful online education.

Online education (OE) is a modality of distance learning in which students are responsible for establishing a time and place to study. They may never be physically together but they are virtually together to study, discuss, chat and/or work.

III. DISTANCE LEARNING

Distance Learning is based on the dissemination of education through different means of reaching students who are located geographically apart from each other. It can use printed material, video, tapes, CD and with the advances of technology it can use broadcast delivery through computer network. Web-based distance learning, or just Online Education (OE) is structured under the benefits and restrictions of the Internet. It is a process of Computer Mediated Communication (CMC) designed to exchange information, where interaction is a distinguishing characteristic [2]. This so called Online Education Environment is web-based software dedicated to education. In this digital space students interact through different means, from a synchronous forum to asynchronous e-mail.

Some of the benefits are flexibility of time and place. Each
participant is responsible for his/her own diary. This flexibility allows participants from all over the world to meet in cyberspace allowing rich interactions to take place. Flexibility of time is an important characteristic to all full time workers who still have to study. Twenty-four hour courses enable participants to study during the night or at weekends.

Much research relates positive findings when comparing online education to face-to-face classroom teaching. Burge (1994) quoted by Miltiadou at al [3] studied two online graduate courses and found out that students enjoyed having time to think about a topic before writing about it.

Conversely, there are many restrictions on OE that should be considered before they are structured and designed. One main point is the lack of opportunities to interact with peers or tutor, blurring the sense of community. Participants meet each other through digital media, not face-to-face meetings, with no personal contact, no visual or sound cues and no sense of smell or touch. Their interactions are through text, and are based on email, a forum or chat. According to Palloff and Pratt (2001) quoted by Niven at al [4] ‘it’s always important to remember that in the online environment we present ourselves in text. Because it is a flat medium, we need to make an extra effort to humanize the environment’. The ‘humanization’ of the environment becomes even more important when knowledge is the main purpose because knowledge is constructed upon interactions.

The most successful experiences of OE presented by Muirhead [3] used constructivism theory based on the construction of knowledge from experiences shared with others. According to Vygotsky, learning is a social act [5]. This social act takes place when students talk to each other, when they share their experiences, success and errors. ‘We tend to under-emphasise the fact that two kinds of knowledge creation take place in any shared learning experience, the “individual” and the “social”. Knowledge is created at the social –….– and the individual also creates his own understanding by interacting with the group’s shared construction’ [4]. Learning is not just a matter of being active but being interactive. Through interaction social presence becomes possible that, in turn, leads to the construction of a community. A community of learning, or a community of practice is the ideal place to learn, ‘ …it becomes crucial to those that recognize knowledge as a key asset’ [6].

‘In examinations of interactions, the concept of “presence” or a sense of being in a place and belonging to a group also has received attention’ [7]. Social presence is the sense of being on a course, the possibility to interact. Therefore, social presence is a main factor in students’ satisfaction on an OE course. When a member of a group becomes more interactive his social presence is better defined and he becomes an insider member or a full participant of a community [8].

Quoting Jo Kim (2000) in [4] ‘at the most basic level, a community is a place where everybody knows your name, it’s also a place where, for better or worse, people learn things about you – your personal history, special talents, social reputation, and peculiar quirks – and incorporate that knowledge into their interactions with you’. Hence, to achieve a high level of satisfaction in an OE course, a community of practice must be constructed. ‘Forming a sense of community, where people feel they will be treated sympathetically by their fellows, seems to be a necessary first step for collaborative learning’ [9].

A theoretical framework will be proposed to enhance social interaction that introduces design agents into the environment. The success of a course delivered in an online education format may depend on the sense of community that participants construct which is based on the sense of presence each one is aware of, which in turn is directly dependent on the social interaction they are able to establish in the environment. Success can be defined in terms of high grades, deep involvement with the content, and satisfaction.

IV. EXPERIMENT

The first experiment aims to collect qualitative and quantitative data from students’ interactions. Qualitative data will be collected from content analysis of messages exchanged through email, forum and chat. Students’ grades will be used as an indicator of performance. A questionnaire will be answered by participants (students and tutor) about their perception of interactions during the course. Quantitative data will be collected and saved by the system, using two dimensions: time and quantity. The analysis of these results and the literature review will be used to suggest the theoretical framework. The theoretical framework will be used to design a graphic interface that supports the suggested embedded elements and the new environment will be tested in the next experiment.

A. Course

The course of Cognitive Ergonomics is offered to 2nd year Graphic Design undergraduates at UNOESC (Universidade do Oeste de Santa Catarina). This course was chosen to be offered in a DL format because it is fundamentally theoretical, facilitating the lectures’ implementation in digital media in terms of time and content. Due to the great difficulty in finding a teacher who lives within easy commuting distance of the University, a DLE was implemented. Therefore, it was possible to establish the online distance course even though pupils and teachers were in different locations. Also, students were already used to dealing with computers in their daily life.

The course schedule is divided into fifteen weeks in which ten are held by distance teaching, whereas five require attendance at lessons. The assessment is conducted by a tutor and students are also evaluated on their participation and written assignments.

B. Participants

Twenty-two students volunteered for this course, half male and half female. Their ages range between eighteen and twenty-five. One tutor is responsible for promoting interactions in chat sessions, the forum and encouraging participation, discussions and assigning grades.

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C. Procedure

The course is mandatory but participation in this experiment is on a voluntary basis. All data exchanges between participants (students and tutor) will be analysed and therefore they must agree to their participation.

A questionnaire will be answered by all participants at the beginning of the course about their personal experience with computers and demographic data. At the end, another questionnaire will be formulated about their personal feelings about the course and their perceptions of their interactions.

D. Questionnaire

Ten demographic items compose the first questionnaire. The last one is still being formulated and probably will be based on five categories [10]:

- Student’s interactions
- Collaboration
- Student’s satisfaction
- Isolation
- Use of the interface

All data exchanged between participants will be saved. The system will also save the time and date users log in and out of the system.

E. Data analysis

The technique, which will be most useful to treat the data collected from the experiment, has not yet been decided upon. The experiment will involve the analysis of both quantitative and qualitative data.

Using the data collected some possible queries the system will be able to answer are:

When a user logs onto the system
How long a user spends in the:
- Forum
- Chat
- E-mail
- Specific Pages
- Extra pages – extra text to be read

Frequency of access to:
- Forum
- Chat
- E-mail
- Pages

How many tasks a user sends to participants
How many messages a user posts to:
- Forum
- Chat
- E-mail

How many messages a user receives from:
- Chat
- E-mail

How many messages a user replies to in:
- E-mail

How many messages a user forwards in:
- E-mail

To whom a user sends messages in:
- Chat
- E-mail

V. THE ENVIRONMENT

The environment for the Cognitive Ergonomic course was designed with a focus on a pedagogic strategy to reach students who were experiencing distance learning for the first time. Therefore, its home page (see Fig. 1) was conceived to inform students about the current topic, what are the latest queries posted on the forum and any other news the tutor would like to tell them.

![Ergonomia Cognitiva](image)

Fig. 1 - Home page

The current topic appears in the home page directing the students’ attention to its content. Each lecture is divided into several pages connected by Forward and Back buttons to avoid scrolling the page. To make reading interesting, humour and direct speech are used, while videos, animations and self-assessment tasks are used to reinforce and give a different perspective on the same content. Sometimes the student needs to read his/her email before completing a task. This strategy makes the student stop reading for a while aiming to give the impression that the tutor is closer.

The participants communicate with each other through email, the forum or chat. Only discussions using chat are scheduled. The students are encouraged to post as many messages as they want in the forum, email and to use chat to talk to their course mates at any time. To promote interaction between students some assignments are done in groups of two or three. They are supposed to use chatting devices to discuss the work. There is a room for each group. To stimulate personalization of chat, the students can choose a different name and colour.

VI. DISCUSSION

Social interaction seems to be one of the most important features of online education environment. Social interaction can be enhanced by increasing the social presence bandwidth of the medium. The theoretical framework that will be proposed will be based on social presence as defined by Short.
Social presence is about the medium capacity of transmit information about facial expression, gestures, direction of gaze, ton of voice, and much more. But it also depends on the mental set created by the person who receives this information. Social presence is produced as a stream of closely integrated feedback, subjects of continuous correction as result of interpersonal interaction.

There is a lot of work to do. It is necessary to construct and validate a correlation between the quantity of interactions and the degree of social presence sensed by the students. This could be a way of providing input for the design agents. Whilst the question about what would be their output remains unanswered, this study works with the hypothesis that the output of the design agents will result on a reactive interface.

VII. REFERENCES


VIII. BIOGRAPHIES

Luciane Maria Fadel obteve o grau de bacharel em comunicação visual em 1986 na Universidade Federal do Paraná, o grau de engenheiro de computação em 1993 na Pontificia Universidade Católica do Paraná, Brasil e o grau de mestre em ciência da computação na Universidade Federal de Santa Catarina em 2002. É professora do curso de Design na UNOESC em Videira. Atualmente é aluna de doutorado em Typography and Graphic Communication na University of Reading, UK.

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