Improving Social Interactions in Virtual Learning Environments: Guidance on Spatial Factors for Online Teachers[*]

María José Hernández-Serrano, Margarita González-Sánchez

University of Salamanca, Salamanca, Spain

This paper reports on a project in which students' interactions with learning environments are investigated from the perspective of the spatial factors. Our research examines a significant dimension generated under the interrelationship between the subject and the virtual space, by establishing that spatial dimensions may determine the level of inclusiveness, motivation and positive learning. Growing development of advanced technologies requires a rethought on the impact of the spatial variables, where teachers have to consider new ways of socialization in education. An in-depth analysis on the way that technologies can support social interactions is needed as well as new ways of understanding social processes in online environments, in order to support students for effective educational development. Our results have evidenced a combination of attitudes, feelings and socio-cognitive processes experienced by the students, and the most important insight is that these evidences turn their practical exchanges with technologies into a more or less positive social experience. As a result, using and transforming virtual spaces turn the Web into a new area of socialization. Thus, implications of this research involve some considerations for higher education, as explained in the last section of this paper, by guiding teachers on the effective design and monitoring of virtual learning environments.

Keywords: higher educational research, ICT (information and communication technologies), sociability, online teachers, sense of presence

Introduction

Each and every one areas of social and cultural life have being impregnated with the significant role of ICT (information and communication technologies), especially by the Internet. Due to the technological development, educational contexts worldwide are assimilating ICT, by fostering relevant changes in instruction and learning processes.

One of the main innovations is related with the expansion of spaces into cyberspaces of knowledge (Mioduser, Nachmias, Tubin, & Forkosh-Baruch, 2003). It is assumed that in a near future, more and more students will be using technologies for learning. This context demands the configuration of a new pedagogical

paradigm based on the practices that take place in the so-called virtual training spaces or virtual lifelong learning spaces. Accordingly, appropriateness of the relationship between technology and pedagogical processes is found—from our point of view and based on some of the investigations carried out as the one presented in this paper—on justifying how technologies change the way that subjects are related with in a technological context, since the spatial dimension has been altered.

Social and educational experiences in online environments can be explained in terms of space, where individuals acting, sharing and creating their identities and their sense of social connection. Hence, underneath the Net-space exits another space that riddles with several meanings for the subjects (Harasim, 1993; Badie, 1995). In the interrelationship between the subject and the virtual space, there is a spatial component manifested throughout perceptual, emotional and socio-cognitive aspects of the individuals' evidence when they interact with these virtual environments.

According to the above mentioned, in this paper, we present the main outcomes of a recent research work dealing with the perception of the spatial factor, which focus on showing how the virtual space is not a mere metaphor, since interaction with spaces determines the existence of practices and spatial experiences, similar to those carried out in the traditional places of learning, what implies an existence of cognitive and emotional meanings for individuals.

Our first purpose will be to provide understanding about the sense and function of the space, showing the relevance of some variables involved in the relationship subject: virtual space, through exposing the most important findings of our research. The second purpose will be, by discussing our results, to describe some useful considerations for guiding teachers on the effective design and monitoring of virtual learning environments, able to provide the improvement of students' social interactions.

Theoretical Framework: Understanding Virtuality From the Space Dimension

Virtualization of the educational process has gone hand by hand to the technological possibilities. The ICT have opened new ways for presenting information and facilitating synchronous and asynchronous interactions among individuals of different groups. At this time, individuals have a common place for exchanging information and interests, currently reinforced by the collaborative or social Web identified as Web 2.0 (Hernández & González, 2008).

Technological advances have developed an entirely new communication environment, further to the physical one, where the information is located in a non-tangible area (the virtual space or cyberspace), so it is possible to transmit information instantaneously and globally. Cyberspaces are breaking the unity of time, space and activity, being as invaluable contexts for information, construction, development, learning and discovery.

Nevertheless, the analysis of the social interactions between subjects and advanced virtual spaces requires an in-depth understanding, further to emphasize informational and communicational possibilities.

Firstly, we are faced with the idea that the Internet has no spatial dimension, because the interactions are generated outside of a space. At least by the way, we are able to conceive space, which brought back from the traditional places. On the contrary, it is fundamental to argue that technologies are perceived and experienced by the subjects in a clear spatial sense (Muntañola, 2004). A simple reflection on the semantic speech, used to talk about our actions in these spaces (to enter, to leave, to move, to pass, to visit...), helps us to realize that language refers to spatial dimension, making space no longer connect with a physical place. Therefore, the mental model of what space means is relative, even though it is perceived. In virtual environments, movements

are recreated making individuals feel as if they would be located and belonged to a place, as well as noticing about how this place is progressing when other individuals are interacting within.

In addition, other authors, such as Echeverria (2003), with his conceptualization of "the three environments" and Hine (2000), with her reflections on "virtual ethnography", have established some legitimacy on the idea of spatiality to the network, based on the socio-cultural mediation of the space. In this sense, it is possible to understood that there is not only a semantic and rhetoric way of talking about virtual spaces, but also a experiential way to conceive ourselves (the author and the other) interacting in this spaces.

Furthermore, the way we think space could vary in terms of the level of how is perceived, conceived and lived (McPherson & Baptista, 2004). In this matter, Wise (1999) presented three ways of thinking about space, spatial practice, representations of space and representational space:

(1) Spatial practice: It embraces production and reproduction, the particular locations and spatial sets characteristic of each social formation, which in this case is a learning community. Spatial practice ensures continuity and some degree of cohesion;

(2) Representations of space: These ones are abstract and conceptualised constructs, referring to a virtual environment supported by Web technology;

(3) Representational space (or, better and more literally, spaces of representation): It is the space as directly lived through its associated images and symbols and, hence, the space of inhabitants and users.

As a result, if the spaces facilitated social practices, are associated with a representation and allow individuals to represent ourselves, we may put forward that socio-spatial variables may determine the development of sociability process in virtuality, being thus necessary to examine the technological mediation in the interpretation of the space.

Examining Spatial Variables in Virtual Training Environments

With the aim of becoming visible for the variables involving in the interrelationship between the subject and the virtual learning space, we will explore in this section the main findings of a research carried out with postgraduate students.

Aims

According to Pellegrino (2003), spaces are significant because they involve meanings: social, cultural, physical, personal, emotional, etc., and all these meanings are the result of, as McKie (2000, p. 118) have reported, "Not only of what the technology provokes for the individuals because its structure, its possibilities, its limitations or its features, but also what the technology evokes". That is, the memory of what traditional known environments represent compared with the virtual ones.

Based on this approach, the study aims to discover how these "provocations" and "evocations" are perceived by the students in different virtual learning environments.

Participants

Twenty-two university students from an educational technology Master Degree were asked to participate in the study, and all of them were included in the two months' experiment. Fourteen were women and eight were men. Most of them ($n = 19$) were between 20 and 30 years of age. Only three subjects were older than 30 years.

Method

Initially, as technologies are quite diverse, four different virtual spaces were selected in the analysis

including: chat, forum, a multi-user environment for interaction and communication (Habbo Hotel) and an e-learning platform (Moodle built). Interest was focused on making comparisons among spaces that offer different levels of social interaction.

Secondly, some activities were designed in order to encourage students' participation and interactions within the four spaces, allowing them interact spontaneously once activities ended. Activities were two chats and three weekly forums where participants discussed on the topic of "technologies perception". Also, they were trained to design their own virtual space in the multi-user environment as well as invite other students to visit it and share activities. Also, they interacted during the whole month in an e-learning platform, according to the activities designed by the trainers (wikis, diaries, workshops and assessment activities).

After these activities, students were asked to complete a questionnaire. This instrument, chosen for data collection, was passed out to the students one week after the experiment concluded, facilitating their engagement in other spontaneous activities brought aside from the requested activities.

The ad-hoc questionnaire was designed based on the results of a preliminary phase of the project, where the concept of presence used in another instruments was examined among others (Witmer & Singer, 1998; Slater, 1999; Baños, Botella, García-Palacios, Villa, Perpiñá, & Alcañiz, 2000; Gerhard, Moore, & Hobbs, 2001; Nowak & Boca, 2003). Besides, a set of meanings generated around the spatial dimension was described, derived from earlier researches (Garcia del Duo & Martin, 2002; Garcia del Duo & Muñoz, 2004). These two theoretical sources helped us to define several regularities around the relationship subject-space, which could be summed up into five coordinates: territoriality, emotion, relationality, meaningfulness and communicability. Thus, variables included in the analysis were selected from these five dimensions, revised and adapted to virtual spaces. Specifically, the questionnaire was focused on nine variables, based on social and interactive issues:

(1) Perception of one's presence in space;

(2) Role of passive spectator or active participant;

(3) Degree of immersion or sense of reality lost;

(4) Emotional involvement, in a positive sense;

(5) Sense of social closeness;

(6) Creating an atmosphere of cooperation;

(7) Interdependence between one's actions and the other's subjects action participating in the same space (other's co-presence);

(8) Memories and/or likeness with physical spaces activities;

(9) Positive disposition to stay or come back to this space.

From these variables were formulated 50 statements included in the questionnaire. Statements were discussed and validated by a group of five university experts. Also, a pilot interview was carried out with ten graduate students, discussing the meanings of the different statements, and other previously not consider. Finally, only 30 statements were chosen to deal primary with perceptions and experiences.

The instrument was structured in short statements, answering by a Liker type scale from one to five ("Strongly disagree" to "Strongly agree" with the statement), with the same statements for each space, so that comparing the different perceptions.

Finally, data analysis was running by statistical program SPSS (Statistical Package for the Social Sciences v.14); the procedure was the repeated measures ANOVA (Analysis of Variance) via the General Linear Model, which tested several means of different spaces (factors) for each subject (within-subjects effects), using the

sphericity assumed. Thus, we can compare and seek for evidence of changes in the perception of social dimension in the four different spaces.

Results

First, relating to the feeling of "being" in space, represented and capable of movement, namely perception of personal presence, significant results ($p = 0.000$) showed that spaces where the sense of presence was greater were in the chat and the social environment—due to the higher levels of communication—and also in the e-learning platform, which offered more possibilities and activities.

Regarding the role of spectator-participant, significant differences were also found ($x^2 = 33.45$, $p = 0.003$) among the four spaces. Where individuals had more perception of observing things was in the chat and where most felt that they were acting was in the social environment.

However, no differences among spaces were found about the degree of immersion, in terms of loss of sense of reality. All participants based their perception on being manipulated something on a screen, instead of being with others within a virtual space. The average indicated that individuals did not lose, at any time, their sense of reality during technological interactions. Response variability was small ($V_{max} = 1.33$, $V_{min} = 0.88$; where one means never immersed, and five always).

In terms of positive emotions, there were significant differences between the forum and the chat ($F = 10.56$, $p = 0.004$) and also between the last two spaces, the platform and the social environment ($F = 21.87$, $p = 0.000$). As it is depicted in the Figure 1, by gender, the social environment and the forum were mostly defined by women like a "space where they felt more comfortable" ($F = 3.32$, $p = 0.008$); while no differences were observed in men.
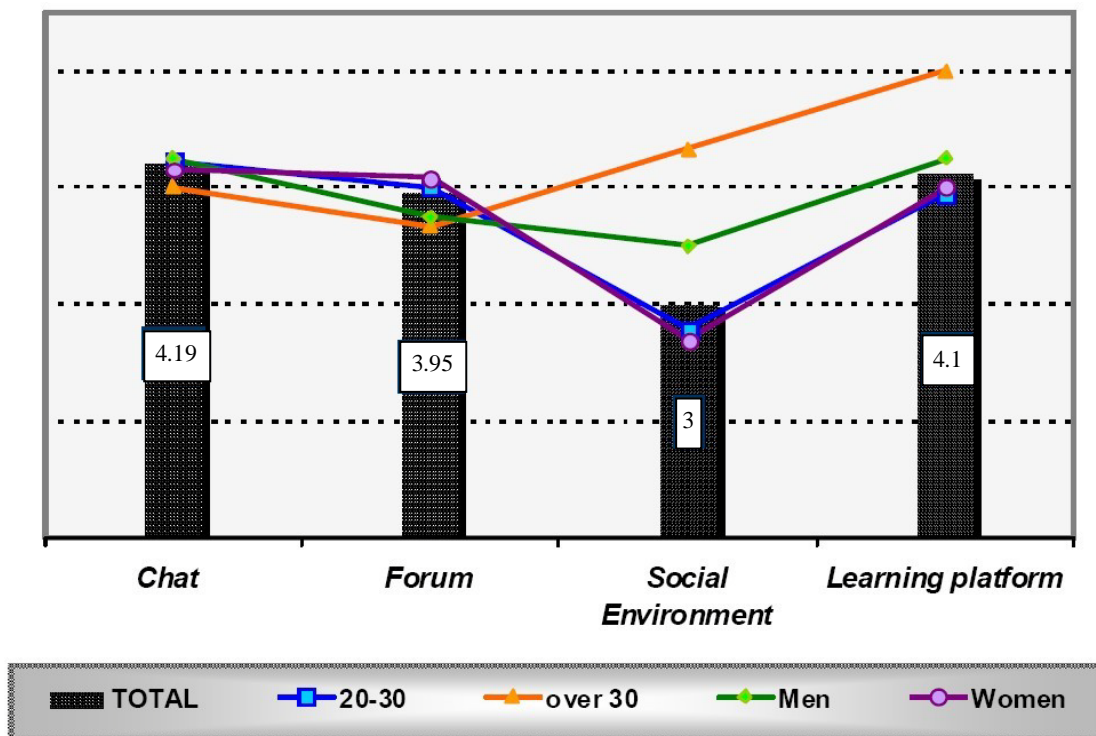

Figure 1. Data from the variable "emotional implication" in the different spaces by gender, age and total.

Age reported differences in emotions as well ($F = 4.29$, $p = 0.001$). The older the subjects are, the more involved in a positive sense are, especially in the last two spaces. It should be noted how, in general, the chat is the space in which they engaged more positively after in the social environment.

About the variables' sense of social closeness, creating an atmosphere of cooperation and interdependence, the chat was the space they felt more closeness and where individuals felt more that one's actions depended on the others ($p = 0.000$).

Regarding the memory or the similarity with the physical space, only significant differences were found between the last two spaces ($F = 8.39$, $p = 0.009$). The activities that most reminded present-ability for them were chatting and teaching-learning (in the Moodle platform).

Finally, referring to the possibility of staying longer in a space, or even returning several times, again, chatting and e-learning platform were the spaces highlighted by individuals ($p = 0.000$).

Discussion

Results demonstrated a general trend that establishes clear differences between the chat and the e-learning platform. Both spaces, evaluated more positively than the other spaces, were those where not only individuals felt more comfortable, but also the most depended on the activity of the others. So, individuals were emotionally involved in the spaces that facilitate social interactions in a synchronic mode. It seems that, for graduate students, they need a quick or immediate feedback; a key consideration that must be taking into account in the development of educative actions that include social processes.

This is especially interesting from the point of view of the way that technologies contribute to build genuine communities (Smith & Kollock, 2003) facilitating relationship and coexistence as well as the way that could contribute to generate learning interchanges. Hence, the approaches about situated learning (Brown, Collins, & Duguid, 1989) or distributed learning (Gee, 1997) gain importance; accordingly, learning is seen as a process of incorporation into a growing community and knowledge is part and product of the context and the social activity.

As well, data indicate that community participation is affected by social perception of others. As Bandura (2002) agreed, with many others, new electronic technologies provide opportunities for individuals to bring their influence to bear on collective actions. As Kavanaugh, Carroll, Rosson, Reese, and Zin (2005) pointed, Bandura's assertions also warned, however, that ready access to technologies will not necessarily enlist active participation unless individuals believe that they can achieve the desired results by this means. Thus, how the Internet changes the features of social participation will depend on media perceived efficacy, apart from other personal variables as: maturity, communication skills and attitudes for participating, etc.. In this sense, it is necessary to consider that even if our students are digital natives (Prensky, 2001), they are not necessarily ready to participate in online environments. As Nielsen (2006) stated, it evidences a inequality participation in many online communities, as the 90% of participants are lurkers that only observe, while 9% participate sporadically and only 1% are active participants. Comparing with traditional spaces, percentages may be similar; subsequently, when teachers ask for participation in virtual environments, they cannot expect higher levels of contribution, unless they first motivate them for active participation, by offering rapid feedback that engages students to participate again.

The environment where subjects show a more positive disposition, to stay or come back in a future, is the chat, a space that they generally use in their personal lives. This is not unusual, in view of the fact that they

have been considered as the "messenger generation" (Fumero & Roca, 2007). Positive perceptions of well-known spaces make us to consider that moving from personal uses to academic ones may be possible and effective. If subject's social interactions are more and more in online settings, conferring students with new communicating skills, educational context has to take advantage of this kind of expertise and transfer it to academic activities.

Balancing the influence of what spaces evoke or provoke to the subject, we consider that virtual spaces are more evocating than provocating. From data, we observed how the most comfortable spaces are for them those where remind them of social activities, as chatting. Individuals prefer the virtual spaces familiar for them and those where they do not have to invent new patterns of activity. Virtuality, therefore, does not make us much more different, but reminds us our need for adaptation. Subjects' virtual perceptions generated around the sense of space allow us to assert the possibility of meeting human needs, such as knowledge exchange and leisure needs among individuals with similar interests and experiences; also, the sense of being identified and included in, or not. This means that it will be necessary to create spaces where individuals feel that they are (re)presented in, with a diversity of activities facilitating movements, and feeling social closeness for motivating emotions and collaboration. According to this and considering the lower outcomes obtained about immersion in the virtual social environment, it will be necessary that teachers design virtual spaces more adaptable, likely to raise the resemblance with the traditional spaces.

Concerning to other variables as gender differences, our results confirm those found by Baskin, Barker, and Woods (2005) around how female respondents indicate a greater need for human interaction and social communication than males, as women of the sample showed more emotional implication in spaces that requires communication interactions.

Implications and Considerations for Online Teachers

Using and transforming virtual spaces involve converting technologies into new spaces of socialization, living by the use of the Internet. In more tangible terms, we noticed a number of characteristics of these spaces that generate a sense of place and they are based on sociability matters.

Thus, we should change to see the virtual spaces like technological artefacts, to see them as contexts or environments of coexistence, interaction as well as a guide for personality development and construction of identities. Educational professionals will have to address those spatial vectors, since through them, individuals, as this paper shows, are able to feel and to perceive meanings, to be and to do, to relate and to communicate.

The uprising of lifelong learning paradigm (Hernández-Serrano & Jones, 2010) confers a new role for virtual training spaces in which it must be possible to facilitate positive social interactions, in order to achieve the comprehensive development of the learners. These technological innovations have an important effect on addressing the challenge of widening access to non-traditional learning spaces (Croiser, 2008). Educators have to be responsible for the effective design of virtual spaces, by planning and promoting student's social interactions.

Teachers need to reflect on their pedagogical practice as well in understanding and applying new technologies (Bianco, Collis, Cooke, & Margaryan, 2002). Technologies do not originate a socio-territorial single model, but, as it has been happening always, it depends on how it is used and occupied by individuals. So, it would be necessary to design virtual spaces that would offer enough opportunities to every student, which could satisfy their level of adaptation with different degrees of interaction, too.

We also noted that, in virtual spaces, the educational experiences relies upon human interactions, interests, values, expressions of feelings, conflicts, agreements, disagreements and so on. For that reason, when teachers plan a framework for supporting the teaching and learning processes throughout different technologies, it will be essential to map these interactions, in view that learning is not only determined by the processes taking place inside the mind of a subject, but also because of the influence provided by the context that surrounds the subject, the social activities as well as the interactions with other subjects.

In educational settings, what can truly make the difference between a disappointment and a highly productive learning (Salmon, 2000) is the support and socializing actions of the online teacher, so that anyone can feel adapted in the virtual training space. Learners need information along with strong motivation and encouragement to invest the necessary time and effort.

Conceiving and organizing a virtual space from a known space metaphor may help students to construct a sense of recognition and adaptation (Peraya & Dumont, 2003). Spatial metaphors (e.g., boarding news, shared whiteboard, or "cafeteria") facilitate the transference of knowledge, routines and behaviour. Taking advantage of the learners' evocations from traditional spaces and activities make them feel more adapted, thus, promoting successful exchanges. Thus, teachers must take advantage of the resemblances of traditional spaces and activities, or those where they get used to, as chat or recently virtual communities as Facebook or Twitter, encouraging students to create and share content resources instantaneously, even involving within their personal lives.

It is expected that the skills learned in a non-educational context are transferred to learning in educational contexts (Conole, de Laat, Dillon, & Darby, 2006), albeit, as Trinder, Guiller, Margaryan, Littlejohn, and Nicol (2008) pointed out, there are inhibiting factors for transference, mainly based on expectations. Students are used to be the paradigm of the instructor as teacher from whom they expect a great deal of input. However, it is important to clarify the changing roles within a context of collaboration and great expectations on learners' self-direction and mutual commitments. Therefore, it is important for the teacher to explain the different roles of both students and teachers.

In order to promote effective social interactions, online teacher needs to cope with several functions regarding the spatial perceptions that students can experience in virtual environments for promoting sociability. Among the most important functions are:

(1) Promoting perception of presence in the virtual space. In this regard, online teacher has to establish an online identity as teacher and facilitate students to build their own. This is the first step to create an atmosphere of cooperation;

(2) Guiding students from the passive spectator to the active participant. Fundamental for the online teacher is to engage the students and trigger their participation, as well as their maintenance by providing them with appropriate feedback;

(3) Facilitating the immersion of the students by increasing the level of participation and using virtual spaces they know before. Online teacher may turn their frequently technologies, used for personal purposes, into academic tools for learning and socializing with other students;

(4) Creating a sense of social closeness. Loosing of visual clues in communications through virtual environments requires reinforce participation and a guarantee of adaptation by means of a design that resembles them a known spatial metaphor;

(5) Technical skills, literacy. Online teacher has to be able to use special features of the social software

employed for the interactions, along with exploring learners' participation data for monitoring the process (recording and history of activities).

Finally, it is vital to consider that the online teacher can serve as model for the individuals, so participation relies on his/her skills. It is extremely important to support the exchanges by recognizing individuals' contributions and providing them with immediate feedback, which encourages further participation. It is essential to offer sufficient information about the participative process, the different possibilities available and the level of involvement that can lead individuals to a variety of collaborative results. Making this information explicit allows individuals to assess the participative situations and make conscious decisions, which contribute to the enrichment of the interactions.

Conclusions

This paper debates on the relevance of the social interactions in virtual learning environments, where the spatial factors need to be carefully considered by the online teachers. The most important consideration for online teachers is that, in a near future, creating new tools and methods for monitoring and evaluating the social practices of sharing, and their impacts on students' learning will be required. Fundamentally, because of, as stated by Stahl (2006), the metaphor of social learning is continuously changing, and by extension, the metaphor of learning is in virtual environments. Thus, it will be essential for the online teacher to continually identify and update new factors that may affect sociability, as well as analyse the forthcoming virtual tools to exploit new interactions possible for learning.

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