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The use of virtual environments as an extended classroom - a case study with adult learners in tertiary education

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Abstract

This study was conducted in immersive 3D virtual environment Second Life®, with the support of web 2.0 tools as a complement to physical classroom - extended classroom. It was assumed that socialization is a key factor for collaborative learning and knowledge construction. The study aims to identify the variables that may influence knowledge sharing in learning contexts using virtual environments; with the aim of contributing to the improvement of learning situations using the online tools. This research is exploratory in nature and falls within the field of phenomenological studies. The study was implemented in a tertiary education institution involving regular and adult learners.

We conclude that in virtual environments learners tend to feel more confident, open, participatory, creative, understanding and seem to participate in training sessions because they are indeed interested in learning. On the other hand, the possibility of providing online tutorial session allows reaching a larger number of learners. These online sessions can be established in a time and place (virtual) free of constraints and can be tailored, allowing a more effective participation from learners.

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Keywords: virtual environments; extended classroom; adult learners; Second Life; tertiary education; b-learning

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1. Introduction

With a network society, and with particular relevance to the means offered by the World Wide Web (web), we can witness another form of learning based upon research and learning throughout life (LifeLong Learning - LLL). LLL is the pursuit of knowledge permanent and continuous, performed on a voluntary basis and self-motivated, for reasons both personal and professional, improving social inclusion, active citizenship and personal development as well as the competitiveness and employability. Learning is not confined to the classroom; it takes place in the diversity and variety of situations experienced throughout life in a sustained and continuous manner. The web is more than a simple information search and social contact feature, it is also a learning tool that allows other ways to build and share knowledge. Therefore, teachers have the need to change teaching strategies in order to address the learning needs of students in the digital age, developing and enhancing their skills. These changes are related with the use of information and communication technologies (ICT) in learning contexts, particularly through the use of online tools and environments - highlighting the multi-user virtual environments (MUVE); and the change to a game-based learning pedagogy. According to the NMC Horizon Report Higher Education Edition [30] these areas are identified as emerging, as well as the Social Web and Collective Intelligence, regarding the educational potential and a great impact on tertiary education. Nowadays learning environments go beyond the physical classroom; students have the opportunity to be in constant learning, using, for instance, the technologies, as if in an extended classroom, where all participants can collaborate in real time, whether through voice, video, image or text [1]. In an extended classroom aspects such as the possibility of collaboration, communication, sharing and socializing are essential. The ability to socialize is assumed as the most important, being considered as a key factor for collaborative learning and knowledge building. We consider, in a broad way, that collaborative learning is when two or more people learn or attempt to learn something together [2].

2. Theoretical background

A virtual learning environment(VLE) have specific characteristics such as the fact that they are information and socialization places, and where students are not only active but also actors, are not restricted to distance education and integrate multiple tools, complement the physical space of the classroom and are represented explicitly [3]. A VLE is then "*a set of teaching and learning tools designed to enhance a student's learning experience by including computers and the Internet in the learning process*" [4]. Much of our daily activity occurs in the virtual environment, using online tools, it can be said that almost every citizen has a virtual profile on any social network; these may have a more or less informal dimension. Can be found social networks of professional, academic, social or entertaining, being used by almost everyone, regardless of gender, age or social status. In the educational sector social networks, web tools, collaborative virtual environments and immersive virtual worlds, have been gradually introduced. At first tertiary education institutions have started to use learning management systems (LMS) and learning content management (LCM) allowing teachers to share documents to support their classes. In LMS students can only share information if the teacher set this option, which does not always happen. In most cases, students use the platform to access documents made available by the teacher or to deliver work – similar to an information repository. More recently, social networking, web tools and collaborative virtual environments have been integrated into the learning environment, bringing changes so great that, in the near future, we will not imagine ourselves teaching without them [5]. There are three aspects that define the social online educational environments: (i) the ability to collaborate with others both synchronously and asynchronously; (ii) the ability to create a personal profile built just around the specialties and interests and educational curriculum, making it easier to find other people, resources, events and discussions around the same interests; (iii) the ability to more easily find, organize, manage, and share information and content.

In a study [6] about collaborative groups in distance learning, we can find that the quality of the learning environment also implies the involvement of students in interactive activities with their peers, in order to contribute to better outcomes and for developing reasoning tools through knowledge sharing. Another author [7] refers that learning does not only depend on the individual's ability to acquire, store and retrieve knowledge. Also depends on a network of learning that occur through different interactions with different knowledge sources, including the Internet and LMS; through participation in communities of practice and learning and on social networks, and through the

completion of group tasks through collaborative and cooperative work. Another reason given by students as essential to their participation in online activities are the possibility of information exchange and social interaction that these provide [8]. Thus, according to the authors, social interaction may be the key element to determine the success or failure of an online community. Therefore we consider that the main benefits of collaborative learning are: (i) the development of critical thinking skills; (ii) the co-creation of knowledge and meaning; (iii) reflection; (iv) and transformative learning [9].

However, the social component often referred to as being important for the development of new skills and learning, is not a key factor in LMS, which focuses more on the distribution and content management. On the other hand, web 2.0 tools and virtual worlds bring many benefits to students in terms of learning, which may be summarized down into [10;11]:

- participative learning through encouraging participation in the creation and editing of content;
- collaborative learning, provided by the collaborative construction of knowledge where the information shared by each individual can be recombined to create new forms, concepts, ideas, mash-ups and services;
- autonomous learning in order to share, communicate and find information on learning communities;
- ability to communicate and interact, creating richer opportunities through socialization and integration into learning communities;
- lifelong learning, by the development of digital skills and joining the wisdom of the crowds.

The extended classroom defined for this study was designed with these principles in order to foster online collaboration on a massive scale among regular and adult learners. Thus, the entire group of learners had the opportunity to make their contribution, highlighting the whole and helping the growth of the community in regard to information and content, contributing to the arising of a collective intelligence.

3. Motivation and purpose of the study

In this study, and taking into account the students' profile of tertiary education, we resort to the concept of extended classroom, in order to provide other opportunities for learning further than the so called traditional classroom. The definition of this extended classroom relates to the need to meet the educational paradigms assumptions set out in the Bologna Declaration (2005), in which the role of teacher goes beyond the physical space of the classroom and begins to assume functions of facilitator, guiding and supporting; and where all spaces are learning spaces, not only the classroom, but also the library, the laboratories, the Internet making relevant the access to information and the ability to select, organize and synthesize it. A methodology centered in an extended classroom can foster in learners not only the development of specific skills, but also have horizontal capabilities and skills such as learning to think, critical thinking, learning to learn, the ability to analyze situations and solve problems, communication skills, leadership, innovation, integration team, adapting to change (Bologna Declaration, 2005). In the context of the study described here the classroom was extended essentially to cyberspace, once it was in a range of more direct participants due to its flexibility in terms of time and space.

What motivated the development of this study is related to the challenge that the researcher, as a teacher, was confronted: how could provide the same kind of support, extra physical classroom, to regular and adult learners. The teacher intended to promote creative and motivating collaboration, communication, sharing and interaction among learners in an online tutorial setting. Therefore, we proposed to investigate and answer the question: to what extent the use of virtual environments can enhance learning contexts in blended learning format regards cooperation, building and knowledge sharing among regular and adult learners in tertiary education. To find answer to the research question outlined, we defined the following objective of the study: understand to what extent the Web 2.0 tools and immersive virtual worlds can promote collaboration, building and knowledge sharing among those learners. In order to get the answer, we have chosen to decompose this goal into three main objectives: (i) identify the variables that may influence collaboration, building and knowledge sharing in the context of learning by using Web 2.0 tools and immersive virtual worlds; (ii) analyze how regular and adult learners engage in the use of Web 2.0 tools and immersive virtual worlds; (iii) identify, among the online tools used, which and why are best suited to each group of learners.

This study aims to contribute to the improvement of blended learning (b-learning) contexts. We understand b-learning as a learning environment that combines both online and face-to-face approach [12], in which the time spent in physical classroom are smaller, "*reduced seat time*" [13]. Blended learning thus combines the effectiveness and socialization opportunities provided by the classroom with the possibility of learning facilitated by technology and online environments, i.e., "*blended learning should be approached not merely as a temporal construct, but rather as a fundamental redesign of the instructional model*" [13]. A blended learning approach has the following features:

- learner-centered - more active and interactive as a learner, whether in a classroom setting or online environment;
- greater interaction between learner-teacher, learner-learner, learner-content and learner-external sources of information;
- integration of formative and summative assessment systems.

The contexts of blended learning also develop skills in digital literacy, critical in today's society. Digital literacy refers "*to the awarenesses, skills, understandings, and reflective approaches necessary for an individual to operate comfortably in information-rich and IT-enabled environments*" [14]. Digital literacy is then the ability that an individual has to play effectively tasks in digital environments - including the ability to read and interpret media, to reproduce data and images through digital manipulation, and evaluate and apply new knowledge acquired in digital environments [15]. Thus, digital literacy involves: (i) know how to access information and learn how to collect it in online environments; (ii) manage and organize information to be able to use it in the future; (iii) evaluate, integrate, interpret and compare information from multiple sources; (iv) create and generate knowledge by adapting, applying and recreating new information; (v) communicate and relay information to different and varied audiences, through appropriate means.

As mentioned, the integration of blended learning approaches facilitates the development of other skills, especially in terms of digital literacy, beyond the specific competences of any particular subject or course. On the other hand, the fact that the time spent in physical classroom are smaller, allows to reach other audiences that, by its characteristics, related to physical distance or time, with motor disabilities or economic reasons, would be prevented from attending a particular course. The added value of this study is related mainly to the fact that it was conducted with two distinct audiences of tertiary education: regular and adult learners. The latter is often overlooked, and learning contexts are defined not taking into account the specificities and needs of this particular audience, who usually attends training sessions in the evening and are part-time students. A b-learning approach is more flexible concerning time and space.

In general, we can say that the use of 3D immersive virtual worlds in education has an important role to play, since it allows, among other things, that various learning styles can be used in any course or subject. Also make it possible for students to develop formal skills and competences of socialization and collaboration beyond the development of skills in digital literacy. Virtual worlds, as Second Life, allow very rich immersive sensory experiences, authentic contexts and activities for experiential learning, simulation role-play, modeling of complex scenarios, etc.., with opportunities for collaboration and co-creation that cannot be easily experimented in other platforms. In the study described in this paper we used the online mentoring approach with the learners in the virtual world. In online mentoring a model of moderation and knowledge construction that allows you to manage the progression of students attending the course at a distance is required. One of the models more applied is the one proposed by Salmon [16; 17], which involves five stages of moderation based on constructivist theory and in the experience through practice. The same author [18] points out in online mentoring the e-tivities as essential, reflective learning activities undertaken by students individually and in groups, in each of the five stages. The teachers or online tutor should have the ability "*manage all those stages, aware of the learning process and promoting reactions, productions and knowledge construction among the participants*" [19]. The five-step model and the e-tivities of Salmon can be tailored to learners in SL, which can be guided by tutors through the five stages of the model participating in different SL-tivities [20]. Tutors can, in-world, observe and participate in learners' experiences, discuss and find solutions. We chose to adopt the mentioned approach because in online mentoring:

- learners feel more comfortable and confident, annulment of hierarchies;
- the ability to send additional information, activities carried out in-world are more focused and more challenging;

- the building of objects and artifacts that do not exist or are inaccessible in the physical world, opportunities for reflection, discussion and development of new ideas;
- learners have more time to reflect and may contribute to the discussion in a more significant;
- the opportunity of languages learning.

Despite the advantages associated with online mentoring, some disadvantages must also be considered, such as:

- the identity and authority of the teacher can be challenged;
- the need to adapt, and not just replicate, learning contexts according to the characteristics and potential of the virtual world;
- some places (islands), and at certain times of the day, can be very congested with avatars, making it difficult to remain with the group of learners in that location;
- the possibility of varied distractions that can be found in-world and may divert the attention of the learners;
- the time spending that is required to get familiarized with the virtual world;
- and the fact that their complexity could lead to withdrawal of less experienced users and older age groups.

Virtual worlds, such as SL, support flexible learning contexts suitable for distance or blended learning; and enables learning by immersion, promoting creativity and good mood; fosters a dialogic learning, stimulating a sense of belonging and commitment among students. Being an immersive environment and imagery encourages exploration of emotions, which can often lead to reconsideration of the identity in learning, tending to fade relations of power and hierarchy among the different actors, since learners are "*allowed or encouraged to take up a position towards what has been offered*" [21]. Thus, learning in tertiary education using virtual worlds seems to offer the opportunity of a estrangement from the scaffolding type activities (especially at a later stage, once guided activities may be essential at an early stage of exploration), since they are universal without limitations in space or time and with the possibility of importing different learning styles [22; 23], with the ability to adapt and integrate according to the particular needs and characteristics of a learning context.

4. Methodology

Regarding the methodological perspective, this research is qualitative in nature [24; 25; 26], although using a semi-quantitative analysis by simple descriptive statistics. The method employed in this research study fits in the field of descriptive research [27; 28].

Based in the study goals described in the above section, we chose to use the following techniques and instruments for data collection: documental gathering (posts, chat logs, snapshots), observation and questionnaire. The diversity of information gathered through the different instruments led us to the application of two techniques of data processing. With respect to data collected by questionnaire, particularly for closed questions, the analysis used was interpretive in nature. On the other hand, the open answers of the questionnaire and the information contained in the chat logs were through content analysis. The posts shared on Diigo were also subject to interpretation and content analysis.

For each category, some indicators or evidences were defined (cf. Table 1). This analysis sought to identify variables that could influence the collaboration, building and knowledge sharing in learning environments using virtual worlds and sought also to identify the variables that contribute to the development of interpersonal relationships, and on the other side identify the most appropriate online spaces for learning contexts in an extended classroom format.

Table 1. Content Analysis Categories.

Categories	**Indicators**
perception of students regarding Web 2.0 tools and virtual world	utility
	interest and pleasant
	distance learning
	communication and interaction
	learning
involvement of students in its use	avatar's evolution
	participation
	language
	technical issues
	time
	sharing posts
collaboration, building and knowledge sharing	assistance among peers
	autonomous Avatar's customization
	construction of objects
	autonomous exploration of the virtual world
	comments to posts
strengthening interpersonal relationships	language
	inclusion in friendship lists

For the implementation of the study was outlined a model of an extended classroom, which included the physical classroom complemented with a virtual classroom - including the virtual world Second Life (SL) and the web 2.0 tool Diigo (cf. Figure 1).

In this extended classroom model, learners had at their disposal a physical space, formal, where each group (regular and adult learners) met separately, and a virtual space, informal, where learners could come together and collaborate synchronously or asynchronously. The extended classroom was intended to foster collaboration and cohesion among the students participating in the study. It was not closed, but open to the community of web users and anyone could join and also share information in order to strengthen the mass collaboration and collective intelligence, since everyone could contribute to a whole, developing a sense of community.

For this study we relied on the collaboration of voluntary students from two classes of regular learners and two classes of adult learners (in a total of 68 learners), from a tertiary education institution. This is an intentional sampling, non-probabilistic and selected based on criteria intentional choice and where the size and the elements chosen depend on the objectives of the study [25]. It is an exploratory study in which the results should not be generalized to the population to which they belong, but where valuable information can be gathered [25]. The subject that was taught was related with web design. We find it important to mention, for the characterization of participants, that before attending the extended classroom 30 learners (44%) did not know SL; 36 learners (53%) had heard about it, mostly adult learners, but haven't use it; and only 2 learners knew and were frequent users of the virtual world. Regarding Diigo, and before attending the extended classroom, 6 learners (9%) knew about it but not as users, and 62 learners (91%) did not knew the tool at all.

During the study the students shared information and commented on Diigo group at their own pace and taking into account their research needs. The sessions in the virtual world, however, were organized taking into account the e-moderating five-step model of Salmon [16] and a schedule previously agreed between the participants.

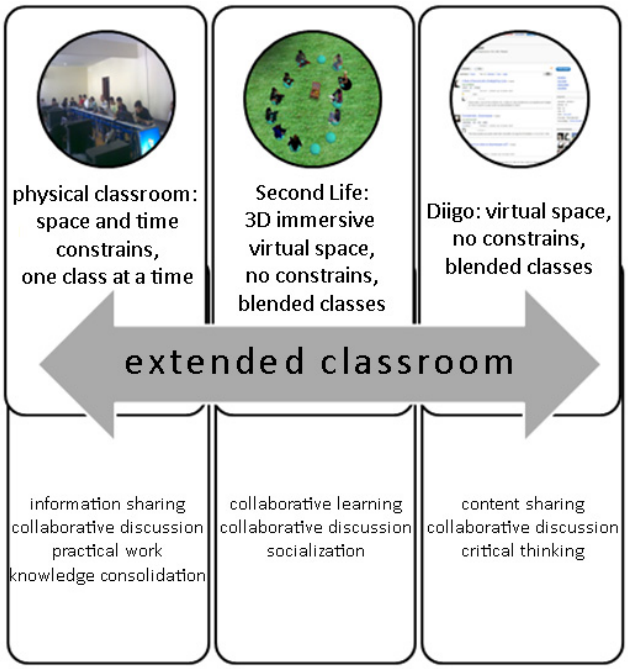

Fig. 1: extended classroom model

The sessions were distributed aiming to develop the following activities:

- 1st Session - Access and motivation: assisted avatar customization, contact with the 3D environment, development of basic skills of navigation and communication;
- 2nd Session - Socialization: exploring places in-world (commercial, educational, entertainment, socialization) and the development of basic skills of building;
- 3rd Session - Information sharing: participation in thematic discussions, knowledge sharing, development of advanced skills of living in-world;
- 4th. Session - Knowledge construction: the autonomous avatar customization; discussion on specific topics of the subject or course or related with the virtual world;
- 5th Session - Development of competences: ability to survive and grow in the virtual world in an autonomous way.

5. Findings

The implementation of learning contexts through 3D immersive worlds, like Second Life®, eliminate the sensation of distance in a distance learning context, due to a presence of an avatar that emulate and simulate the actions and the emotions of their users, providing a physical presence feeling. We confirmed that, in virtual worlds, learners tend to be more confident, open, participatory, creative, understanding, and seem to participate in online training sessions because they are indeed interested in learning [29]. On the other hand, the possibility of providing online tutorial sessions allows the participation of a larger number of learners, since these online sessions may be established at a time and location (virtual) free from restrictions and can be adjusted according to needs and the characteristics of the participants. Also, and based on observations taken from the study implemented, can be noted that the contrasts in behavior observed among learners, with regard to its commitment to the use of online tools, seem to be based on the level of maturity, level of independence as learner and their intrinsic motivation.

In a collaborative virtual environment there are no barriers or physical boundaries, the actions are developed in a natural learning context through the integration of learners in communities and by their socialization and

collaboration. Thus, the implementation of an extended classroom with the use of virtual environments enhances learning contexts in blended learning format for promoting and sharing knowledge.

Taking into account the analysis of the collected data, we can say that the variables that influence the collaboration and knowledge sharing in virtual environment, among the participants are (cf. Figure 2 (a)):

- intrinsic motivation, i.e. their willingness to learn;
- maturity, adult learners were more active during the sessions participating in a more assiduous and continuous;
- the degree of complexity of the tool, which in some cases leads to non-use;
- the technical conditions for access to the tool or the virtual world, when they are not the ideal lead to demotivation and alienation from learners, although we consider that the degree of motivation and maturity combined with perseverance can help to overcome this difficulty.

For the variables that contribute to the development of interpersonal relationships in a virtual environment (cf. Figure 2 (b)), we identified the following ones:

- the degree of maturity - we found fewer restrictions and resistance in younger learners concerning the inclusion of teachers in their online contact list;
- the level of trust – we found that younger learners established ties with teachers faster than adult learners, however, these, and although they took longer to trust and extrapolate the professional relationship for the social relationship with the teacher, the links established were stronger and lasted in time;
- the online coexistence - the time it was passed, particularly in immersive virtual world, contributed to the development and strengthening of interpersonal relationships, increasing the degree of trust among participants.

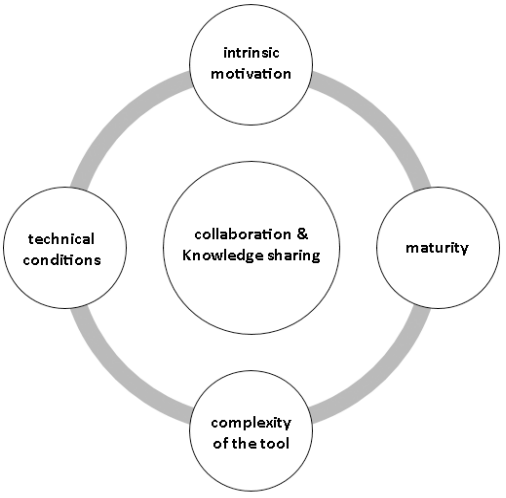

Figure 2 (a): variables that influence the collaboration and knowledge sharing in virtual environment

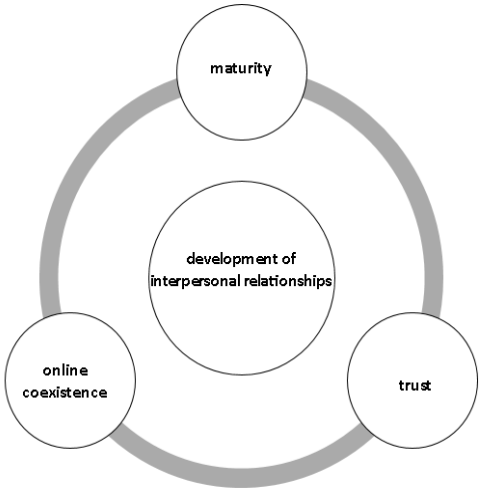

Figure 2 (b): variables that contribute to the development of interpersonal relationships in a virtual environment

Regarding what was observed during the study implementation, namely through the analysis of the number of post shared in Diigo and the level of attendance in SL, we can say that the younger learners seem to adapt better to social web tools and adult learners to the virtual world.

We conclude that maturity and intrinsic motivation influence students' sharing and knowledge construction in a context of an extended classroom. On the other hand the technical conditions of access to virtual spaces is not sufficient reason to give up if there is enthusiasm to overcome difficulties, as the case of one of the adult learners which requested help for solving the problem rather than giving up. With continuity and online coexistence

interpersonal relationships develop faster and are strengthened. We can also say that the medium does not influence the performance of students, and there was no change in behaviour in different spaces, i.e. who actively collaborates in cyberspace is who also actively collaborates in the physical classroom.

6. Final Considerations

The establishment of virtual extended classrooms allows teachers to reach more learners and thus can address their needs more effectively, particularly when dealing with adult learners attending HEIs under nighttime. Classrooms can be set in a time and in a virtual space unfettered and adaptable, enabling a more effective attendance by a greater number of learners.

Collaboration and cooperation in real time, combined with the multiple connections that can be established from the virtual world with LMS like Moodle or with specific web pages, bring many possibilities regarding the implementation of different learning contexts. Everything can be built, modeled, simulated and emulated, all areas of education can be covered and any issue can be addressed with the help of a 3D virtual world like SL. Despite the identified benefits, some challenges should be considered when designing such learning contexts. Learners need to be motivated to interconnect and therefore draw full advantage of online learning situations. Situations of interaction and socialization will not occur simply by being in a virtual space or because the technology allows it. This means that we should not take for granted the ability and motivation of learners to interact and communicate. The boundaries of the learning environment becomes diffuse, therefore a careful planning and a good management are key factors. Virtual Worlds and web 2.0 tools have their own dynamics and environments are transient, where the moderation by a tutor is essential, hence the fact that we felt the need to follow and adapt the five-step model of Salmon [16]. Learners are free to learn according to their own standards, however, a teacher or facilitator should be a constant presence to guide and moderate. Another aspect to consider is the difficulty in designing different models of teaching and learning. On the other hand, are often associated with higher levels of anxiety during situations of online computer-mediated communication, which may limit the degree of social interaction of learners. In order to build relationships and group dynamics, students need to rely on their peers to have a sense of belonging, and feel good with the group, before engaging in collaboration and sharing, there is a need of a sense of belonging to a community.

Design and implement an extended classroom through the use of online tools and virtual worlds requires preparation, time and resources. One cannot take for granted the learners' participation in collaborative learning environments, there is a need to promote and maintain such participation. Learners must be encouraged and reminded about their roles and should be autonomous, but the teacher has to provide incentives. The interaction should be improved through a two-way communication between participants, organizing social interaction, collaboration and shared activities, otherwise, it is unlikely that they occur or are significant. In an extended classroom, the teacher must also foster a sense of community and encourage the development of a social presence. It is very important not to replicate the so called traditional classroom into online environments, makes no sense if the only aspect to change is the place or area; for instance, in a virtual world, it makes little sense to have students simply sitting in rows listening passively to the teacher. Should be employed methodologies that foster communication and interaction and collaborative networking. It is essential that we focus more on students and their needs than in technology itself.

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