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The Extended Classroom: meeting students' needs using a virtual environment

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Abstract

In this article we outline some of the potentialities and barriers of 3D immersive virtual environments when used in a learning context. Classrooms can be extended – from physical to virtual space in order to fulfill students' needs and to facilitate a more collaborative learning style. Setting up a tutorial in a virtual environment has some complexity but the gains are well worth the effort. Immersive learning allows us to learn in 1st person, allow us to have control over what we want to learn, how and when. The use of virtual environments allows students to participate in richer interactions at times that are more convenient to their work/study patterns, with no physical restrictions.
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1. Introduction

Virtual environments can be used for tutoring in any field of education, whether science, arts, humanities, history. We direct the reader to a few of the many examples of this in §2. In this article we will analyze the use of immersive 3D virtual environments in creating an extended classroom – from physical to virtual space. In order to evaluate the potential benefits and barriers of setting a virtual classroom in a 3D immersive environment, a study was conducted as a working example (case study) of how a teacher can monitor their students learning through the use of virtual environments. With the evolution of Web and Games Industry many 3D environments – or 3D worlds - are available in the market (World of Warcraft, Blue Mars, IMVU, MOOVE, ActiveWorlds, Second Life®…). Of all the virtual worlds and gaming environments that are available, we chose Second Life® (SL®) because it offers the best approximation to the real world and offers enormous flexibility to its users. Other environments are less open and don't offer the same degree of freedom to create. However, this flexibility comes at a cost, since the learning curve is much steeper.

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Second Life® has several characteristic that make it an ideal environment for online, collaborative tutorial lessons. In Higher education, collaborative and cooperative work is a crucial for well-balanced scholarly activities. In order to build up student competences and give them skills to have success in a networked society (Castells, 2005), new ways of interaction and assessment have to be developed. Networking tools, virtual worlds and massively multiplayer games can be used in scholarly activities and coursework (New Media Consortium, 2007). Those collaborative virtual environments give users the opportunity to communicate, collaborate, interact, explore, role-play, and experience many situations in a safe and controlled way. The limits for the setting of experiences is only limited by the participants' imagination, therefore the use in education is almost limitless. Any situation from real world can be simulated or modeled in a virtual world. The best virtual space for learning activities, according with our and other educators' experience2, is Second Life®. SL® is a simulation of the real world. It has a meteorological and gravitational system, it has specific money currency. Everything is built by the users (or avatars), in real-time, stimulating collaboration and interaction involving several avatars; learning by doing. SL® is immersive; it allows learning in 1st person, each user has his own 3D representation. Learners can walk though contents and information not just view it from a distance; learning by living. SL®, although not a game, offers the attractions of multi-player games; learning by playing.

2. SL® as a learning platform

Some of the examples of learning contexts set in the immersive 3D environment SL® can be found at the Resource Database for Second Life Educators (http://simteach.com/sled/db/). Many of the biggest Universities and Institutions all over the world have an in-world presence.

2.1. Features

SL® is not primarily developed as a learning platform, although it can be adapted and used to support learning. SL offers many features that can be used in learning contexts.

One particularly interesting feature of version 2.0 of the viewer is the possibility of adding shared media to an object. This means anyone can add web-based media content to the surface of any object and place it in-world or attach it to an avatar. For instance, it is possible to be inside SL®, running, adding and modifying contents in an external web site and the audience in-world can watch in real-time. These tasks can be made collaboratively.

Another interesting feature, especially for those who use Moodle as a LMS (Learning Management System) is the possibility of connecting and integrating it into SL® - through Sloodle (Simulation Linked Object Oriented Dynamic Learning Environment). Sloodle provides a variety of tools for supporting learning contexts in immersive virtual environments. By connecting Moodle and SL it is possible, for instance, to have a same chat session running in real-time at both platforms – students can chose in which one to be or connect at both. Plus it saves the chat logs in Moodle database. Another feature is related with registration of users, both accounts can be linked. It is possible to set quizzes, polls and 3D modeling tasks. It also has a presenter with the possibility of showing slides and/or Webpages. For those who like to have a more close control over participants it is also possible to set (via a Sloodle toolbar) a function to collect a list of avatars or Moodle users connected at a certain time/date.

2.2. Potentialities

Many examples of buildings and cities (some of them already missing in the real world) were built and now can be visited in SL®. The Sistine Chapel has been modelled in great detail; the aim of this recreation was to explore use of virtual reality in the context of learning about art and architecture, allowing students experience the context, scale and social aspects of the original monument (Taylor, 2007). Another example is the reconstruction of ancient Rome or the city of Lisbon pre-earthquake 1755[3]. The potential is not limited to art, history or anthropology. An example in the field of physical science is related with the simplicity of how we can model molecules and observe

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[2] https://lists.secondlife.com/cgi-bin/mailman/listinfo/educators
[3] http://lisbon-pre-1755-earthquake.org/

their interactions when exposed to physical variables such as temperature. Also in the field of medicine, some experiments in training students are being conducted covering biology and doctor/patient role-play. SL® is also a great tool for language learning, with the possibility of direct contact with native speakers of a certain language, allowing the development of language skills at a writing and speech level. And because there are full and reliable constructions of real world scenarios, the direct contact with the culture of a country or community is a reality that is reachable by every classroom with an Internet connection. Generally speaking we can say that the use of 3D immersive virtual worlds in education have an important part to play since they allow multiple learning styles and they can be used in any subject of the curriculum. It allows students to acquire and develop formal competences and also to develop social and collaborative skills.

3. Setting up a tutorial in SL®

Setting up a course in this particular environment has a very high initial cost. SL® is a very rich environment with a significant amount of complexity. It demands the acquisition of considerable basic skills in order to make effective and value use of the environment. In order to evaluate how comfortable a teacher feels with SL® a simple quiz can be taken[4]. It helps to understand what competences the teacher already achieved.

Since SL® is immersive and tridimensional each user is represented in-world by an avatar. The avatar assumes many human characteristics, including the ability of showing basic emotions, and users interact in the environment in a 1st person approach. Avatars have to learn how to move - walk, run, fly; interact with objects, with the environment it-self and with other avatars; communicate – by text, voice and gestures; customize the avatar, by changing their appearance – skin, shape, hair, clothes. There are several Websites with useful guides and tutorials to help users with the 1st steps in SL®. Additionally, when an avatar 1st logged in in-world he goes into an Orientation Island – where, by following an interactive tutorial, each avatar gets in touch with all the basic skills and competences needed to engage with SL®.

After a user has become familiarized with the environment it becomes easy to discover some of the huge number of activities on offer. According with a study released in 2008 (Hayes, 2009a) most part of SL® users exploit the immersive environment for activities of teaching and/or learning. "For education, Second Life is one of the most efficient tools in the learning process. "Education becomes democratized; everyone can contribute and learn equally, remote learning is far more compelling, fun and immersive" (Hayes, 2009b). SL® can be used as an online complement to physical classroom or to set a course at a distance. The environment can be used for meetings and discussions to take place; for lectures and conferences. To build joint 3D objects and scenarios, that facilitates modeling, simulation and emulation.

In order to understand how appealing a virtual environment can be for learning contexts, especially as a tutorial setting, an experiment was implemented.

3.1. Case study

In this study we worked with two groups of students - a regular undergraduate day class and a part-time night class (23 years +) - following the same syllabus in an identical curriculum. The teacher meets each class, in a common physical space (traditional classroom), once a week. The teacher also has some hours of contact out of the classroom (support hours). These support hours suit the regular students very well but don't meet the part-time students' needs. The night class has full-time jobs and studies in the evenings and at weekends. The challenge was to provide a way for students collaborate on coursework, in a tutorial context, making use of the support hours in a creative way. The main goal was to encourage collaboration 'out of hours' by providing means for students and teacher to interact.

For the study, each group of students was given the same research topic; namely to a) research the ideas of Prensky (2001) on 'digital natives' versus 'digital immigrants', and to determine in which group they belong; b) research Stephenson's quote "I store my knowledge in my friends" (Stephenson, 1998) and relate it with today's networked society. The performance of each group on this task is being used to evaluate the effectiveness of SL® in

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[4] http://www.quibblo.com/quiz/7--PShe/Are-you-ready-to-teach-in-Second-Life

promoting collaboration, communication and interaction skills. This was an observational study.

Prior to work commencing, the students were asked to select a virtual environment that could host tutorial meetings. After a class discussion about the advantages and disadvantages of some 2D and 3D virtual environments, Second Life® was chosen. The predominant reasons for choosing SL® were its interactivity, its immersion and the fact that the environment is user defined; also the class wanted to learn about this one in particular. The ability to completely define your in-world presence and interact with others in a simulation of reality has immense appeal. Clearly an environment which connects with students' interests is more likely to have a positive effect. With this online shared classroom, night and day students were able to meet enabling further cross collaboration and the opportunity of both classes enrichment – since normally day and night students do not have the chance to mix. With this online setting we could extend classroom beyond its physical space. Additionally, each student also added – in an informal way - their own personal learning environment. They often use the information they gather in their connections in Web 2.0 (Diigo, Facebook, HI5, Digg, LinkedIn, Plaxo, Twitter, several blogs) to enrich the contents and discussions set in the classroom. This helps develop a class community, which we feel is vital for sharing and collaboration – helping to build a collective intelligence (Lévy, 1997).

The virtual sessions happened at the Academia Portucalis[5] - a portuguese community devoted to education in a informal and natural context. The choice of this location was left for the students to decide. The other options were: SLESES[6] - official island of Polytechnics of Santarém or SecondUa[7] - official island of University of Aveiro. This location (Academia Portucalis) was chosen for its informality – it is not perceived as an extension to the 'bricks and mortar' university. We are applying a pedagogical philosophy of learning in which the knowledge is built by students in a blended learning environment. We see blended learning as a "learning that combines online and face to face approaches" (Heinze & Procter, 2004).

Underpinning this is the idea that the teacher is no longer the center of the knowledge; the role of the teacher has evolved to being a guide and facilitator. Helping students to search, select, relate, analyze, synthesize and apply information; and therefore build knowledge. In the language of Siemens (2004), the teacher is a 'node' in the students' personal network. The teacher's role is changing from a formal didactic model into informal collaborative one. The teacher's role is to: motivate; promote team work; facilitating cooperative learning; encourage dialogue; moderate the intellectual accuracy; help students become autonomous in their search for knowledge and understanding. The teacher becomes a mentor for students in a more reflective learning context.

This experiment allows us to perceive some of the potentialities and some of the barriers of the use of an immersive virtual environment in a learning context.

First we found that the initial set up cost of starting SL® was high. The students had no prior experience with the environment so the first tutorial session became a focus for fixing 'new user' issues. The SL® environment has a steep learning curve: how to move, how to communicate and interact, how to customize. Predominantly this was navigating the world and helping with avatar appearance. However we felt that this was time well spent as rapid integration into the environment is an important prerequisite to collaboration. Two in-world sessions were devoted to students' acquisition of basic skills (+- 6 hours during successive weekends). We could observe that some students engaged in-world beyond tutorial hours. In future sessions it was easy to see those who had spent more time learning – avatar appearance is one indicator. The virtual collaboration was showing early signs of success with both classes showing high participation in in-world activity. The Figure 1 shows a combined tutor group with 30 attendees - 50% of the two classes. However, we only registered a 33% of attendance (*cf* Figure 2) in latest online meeting - with no participation from day class.

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[5] http://slurl.com/secondlife/Portucalis/218/167/22

[6] http://slurl.com/secondlife/Sleses/42/214/21

[7] http://slurl.com/secondlife/Universidade%20de%20Aveiro/118/124/38

Figure 1. combined tutor group – 1st session

Figure 2. combined tutor group - last session

The discussions held in the virtual classroom were rich and with the active participation of a large number of students – mainly from the night class. Although the teacher launches the topics to discuss the students were able to grab it and develop and build a common understanding. Students showed contentment to have the opportunity of a close contact with both classes and share the life experiences. The average age of day class students is 20 years old; and 38 years old for the night class students. The work developed by night students was, in general, better and showed a higher level of engagement and commitment with the subject goals. We can outline some preliminary ideas, which have been aroused from the observation of both classes performance:

- the night students are more independent as learners;
- the night students have less time and more desire to learn in the most effective way;
- the night students are more motivated since they have stronger reasons to study in their spare time;
- the immersive virtual environment support the work patterns of mature students in particular.

We can summarize saying that the contrast of behaviour between day and night students is a function of maturity; level of independence as learners and intrinsic motivation. The motivation aspect needs further and deeper evaluation (where free will is involved). In that way we may say that the online tutorial established in SL® might suit better the part-time students and this might be a way to help them to keep in touch with the teacher and with other students.

4. Conclusion

As a preliminary conclusion we can say that 3D immersive virtual environments, like SL®, take the distance out of distance learning. Informal and collaborative learning in natural context is the best approach as this is already practiced by students. Virtual environments seem to make students feel more confident, more open, more participative, more creative, and more responsive. In fact, in the immersive virtual environments, students seem to attend training sessions because they want to learn (Bettencourt & Abade, 2008). On the other hand the establishment of online tutorials allows teachers to better reach and fill students' needs. The online tutorials can be set at a time and in a space (virtual) free of restrictions – that can be adapted, allowing a better participation from a larger number of students.

In a 3D immersive virtual environment there are no physical barriers or borders. Information flows, people build and share content, relationships are set up, the net of connections extends and knowledge is built. This acquisition is made in a natural way, by participating in a community, by sharing, interact and collaborate, discussing and launching ideas, contents and information, therefore a "learning activity is (...) a conversation undertaken between the learner and the other members of the community" (Downes, 2009). It is a natural process of interaction and reflection with the guidance and correction of expertise or peers. SL® for being immersive neutralizes the sensation of isolation and distance, since actions are taken in 1st person and can be simulated and emulated. The environment, since is built by the users, can be adapted according with needs of a specific teacher, subject or group of students. Real-time collaboration and cooperation ally to the several connections that can be established from in-world with Moodle or a specific Webpage also gives several possibilities for learning contexts. Everything can be built, modeled, emulated and simulated – all education areas can be covered and any subject can be delivered with the help of a 3D immersive virtual environment like SL®.

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