

# Maintaining Context in a Changing (Virtual) World

## *Educators' Perspectives for OpenSim and Second Life*

Athanasios Christopoulos and Marc Conrad

*Department of Computer Science & Technology, University of Bedfordshire, Park Square, Luton, UK*  
{Athanasios.Christopoulos; Marc.Conrad}@beds.ac.uk

**Keywords:** Virtual World, Second Life, OpenSim, Context, Virtual Learning, Blended Learning.

**Abstract:** Educational activities previously performed in Second Life are now more and more moving to other alternatives. This study concentrates on the features of Second Life and its open-source alternative, OpenSim that affect the results of the in-world educational activities. The need for educators to take these features into account is another focus of this study which also aims to highlight the similarities and differences between the contexts of Second Life and OpenSim worlds, whether internally or externally hosted, as well as their potentials and weaknesses. The findings suggest that each one of these alternatives gathers different positive and negative features and their suitability greatly depends on the academics' educational needs.

## 1 INTRODUCTION

Due to the availability of the OpenSim (OS) architecture it is nowadays comparatively easy to install and run a Virtual World (VW) that in appearance very much resembles a 'Second Life' (SL) environment. Such worlds can belong either to individuals or companies, organisations and institutions. They can be self-maintained or rented from a dedicated provider. However, the educational activities in OS and SL operate in a very different context implicating upon the immersive experience.

It has been indicated that immersion is an essential factor for achieving satisfactory learning results within the context of a VW (Bredl, 2012; Childs, 2010). The networks of various interactions that occur within the VWs are noted as the most important among the various factors that lead to immersion (Kanamgotov et al., 2012; Christopoulos & Conrad, 2012).

At this point, some important questions arise when a VW is to be used for educational purposes: what is the role of its context to the students' way towards immersion? How can its context contribute to the implementation of successful educational projects? And finally, when an educator has to choose among SL, an OS world hosted by a dedicated provider (OSDP) and an institutionally hosted OS world (OSIH), which one is the best option as far as their contexts are concerned?

This paper is focused on answering these questions and providing clear guidance to educators who are faced with the decision to use SL or OS worlds –hosted either institutionally or externally– for the realization of successful educational projects.

The student perspective concerning VWs has been widely investigated, (for example Vrellis et al., 2010; Kostarikas et al., 2011; Levesque & Lelievre, 2011); we focus here on the educator's point of view.

## 2 RELATED WORK

In this paper, the term "context of a VW" refers to everything that exists or takes place within the VW, including the virtual land, the avatars, the users' artefacts, and the interactions between them.

SL and OS have many similarities concerning their basic characteristics (Cram, 2010), on the one hand, but they have many differences, on the other, which should be carefully taken into account when these VWs are to be used for educational purposes (Conrad, 2011; Conrad, 2013).

### 2.1 Avatars

Avatars are the users' virtual selves or, rather, the users' 3D self-representations in a VW through

which they are able to be in it, and interact with it and with each other (Savin-Baden, 2010).

A common view of several scholars (Kostarikas et al., 2011; Bredl et al., 2012; de Freitas et al., 2012) is that avatars are a feature of VWs which enhances the effectiveness of the educational activities. On top of that, Bredl et al. (2012), de Freitas et al. (2009), Levesque & Lelievre (2011), and Kay Michel et al. (2011) underline that the use of avatars contributes to the development of the users' immersion, which, in turn, leads to better outcomes from the educational activities.

## 2.2 The Worlds' Content

There seems to be agreement in literature to consider the content of both SL and OS equally useful and appropriate for educational purposes. More precisely, Miller et al. (2010) emphasize the importance of students' easy access to learning materials and the potentials for experiencing interactive educational activities offered equally in both worlds. Similarly, Aydogan et al. (2010) indicate the significance of the 3D visualizations of the educational material created within virtual classrooms, which may contribute to a better understanding of the lesson by the students.

Callaghan et al. (2009) also agree with the statements above and add that the environments of both VWs and the tools provided for creation enhance the students' collaborative abilities, who work together aiming to create the world's context and carry out their projects. Konstantinidis et al. (2010) partially agree with Callaghan et al. (2009). They suggest that the 3D representations that may be created in OS have a positive effect on the collaboration among students, creating a sense of belonging in the VW and thus promoting immersion into the developed world. In other words, it is their common claim that collaboration among students is enhanced within the context of VWs, but each of them presents a different aspect as the reason of that enhancement.

## 2.3 Interactions

Even though SL and OS offer great opportunities for interactions among their users and between the users and the worlds' content (Levesque & Lelievre, 2011; Zhao et al., 2010), very few studies have been carried out in relation to the interactions between the users and the context of the VWs. However, both the interactions among the users of VWs and the interactions between the users and the context of the

worlds significantly affect the educational processes performed in them (Vrellis et al., 2010).

The given opportunities for manipulating virtual objects and interacting with the virtual environment and other users make the educational projects that take place in-world pleasant (Perera et al., 2010a; Vrellis et al., 2010), interesting (Perera et al., 2010a; Kostarikas et al., 2011; Vrellis et al., 2010) and effective (Vrellis et al., 2010). According to Miller et al. (2010) these specific characteristics contribute to the strengthening of the collaborative and exploratory learning activities and ensure student participation in them. Moreover, the manipulation of virtual objects in the context of a VW is less disruptive and more preferred by students than the use of other e-learning tools, whilst the environment enhances the interactions among the members of a student group, thereby enabling the effective implementation of collaborative learning activities (Vrellis et al., 2010).

The only drawback in using these VWs for educational purposes concerns the inability of using the non-verbal communication channels (Childs, 2010; Vrellis et al., 2010). On top of that, the use of text chat may be very time consuming, disruptive, and inefficient, a fact that complicates the in-world educational activities and, combined with the absence of non-verbal communication, further complicates communication within the students' group (Child, 2010). Hence, Vrellis et al. (2010) do not fail to express their conviction that the educational processes within VWs will never be able to replace the traditional teaching methods but will always serve as a complement and as a useful tool in providing additional educational opportunities.

## 2.4 Security & Privacy Issues

An important factor in ensuring universities' safe operation within the VWs concerns the protection of their virtual land against intruders. Savin-Baden (2010) states that the best way for universities to deal with this issue in SL is to buy isolated islands. Perera et al. (2010b) insist that both in SL and in OS, the academic institutions are able to allow entry to avatars which are "marked" as their students, and prohibit entry to unwelcome users. On the other hand, Hu (2010) stresses superiority of the OSIH, as far as their security level is concerned. In these servers, the institutions can fully control which avatars may be registered in them. Meanwhile, these avatars can be transferred to other servers in order to explore them and come into contact with others using hypergridding (Korolov, 2010).

### 3 RESEARCH METHODOLOGY

The Grounded Theory approach, as described by Strauss & Corbin (1998), was thought to be the most suitable qualitative analysis approaching method; the interview questions were formed in accordance with the indications of Strauss & Corbin (1998), whilst the findings of the literature review also shaped their content, in particular we asked:

1. What does a typical session of yours look like in SL's/OS's virtual environment?
2. Why do you use SL/OS in your teaching? In your opinion what are the advantages of this teaching method?
3. Respectively, are there any disadvantages?
4. Comparing the university classroom with the virtual classroom, which one may have better results?
5. Which one of these two virtual environments do you consider more appropriate for educational use?

During a four-month period (January to May 2012) a total of 34 academics (20 of them have used only SL, 2 only OS and 12 both of them) from various educational fields were interviewed via Skype, SL, or in person. The educators were asked to express their opinions regarding the contexts of SL and OS, their advantages and disadvantages and also their effects on the educational activities based on a priori formed questions. Given the content of the questions, not all of them were addressed to all participants. Besides, the educators' empirical perspectives were what these interviews were seeking for. Thus, questions 1, 2, 3 and 4 were addressed to the educators who had used SL and/or OS (the latter one either internally or externally hosted). Finally, the participants who had used both SL and OS were asked to answer the fifth question and compare these two VWs.

Following the qualitative analysis of the responses according to Strauss and Corbin's (1998) methodology we present our findings in the next section.

### 4 FINDINGS

Both the advantages and the disadvantages of the context of SL and OS were considered important to be examined. Simultaneously, a summary of the educational activities that may take place within these VWs will be presented with the aim of informing educators and providing guidance on how to use them.

#### 4.1 Critical Evaluation of the Contexts

The positive elements of the contexts of SL and OS were emphasised whilst corresponding emphasis was also placed on their drawbacks seen from an educational viewpoint. Although certain positive and negative features are unique to each one of these contexts, several others are common to both of them. Besides, the similarity of the OS context to the SL context, combined with the fact that it is open-source software, was highlighted as a very fundamental feature of OS.

Several educators stressed that the use of VWs, in general, is an innovation in education. As a consequence, the in-world learning activities attract students' interest, engage them in the educational processes and therefore produce better learning results (see Christopoulos & Conrad, 2012 for more details). Furthermore, the contexts of both VWs were marked as user-friendly, playful, dynamic, and plausible.

As participants stated, all these SL and OS features are especially beneficial to the preparation and successful implementation of various educational activities that will be both attractive and effective for most of the students. Students' freedom to take advantage of these features, interact with the context of the worlds, participate actively in the development of the virtual content with their creations, and explore others' creations contributes towards the same goal. In both cases, the amount of the experience they receive from their participation in various activities increases.

The accessibility of SL, which results in the coexistence of a wide online community which contributes to the in-world creation of a global context valuable for numerous educational activities, was noted as a significant advantage of it. These features combined with the anonymity that is typical of SL enhance the immersiveness of this VW, as indicated by some participants. Educators who use SL can be benefited from its global context and reduce the time and effort required for building and scripting, simply by using the existing in-world infrastructures or visiting its marketplace.

OS worlds have narrow online communities due to the fact that they are hosted on many independent servers. This implies that the content of OS –either IH or DP– is very limited, compared to that of SL, sometimes even completely non-existent. Therefore the educators who use OS reported that the creation of the necessary content for their educational activities is a time and effort consuming process and requires the possession of building and scripting

skills as well. Nevertheless, OS users can visit other OS worlds using the hypergrid architecture in order to explore other places and communicate with others.

On top of that, the OSIHs are independent, closed and protected from intruders, and their access control lies exclusively in the educators' hands. In contrast, universities in SL are confronted with several security and privacy issues which result from its accessibility.

It is also worth mentioning that the educators who use OS emphasised that they have absolute control of their world and a high degree of independence, especially in the case of OSIHs. They attributed these features of OS first to its open-source nature, which allows them to develop worlds perfectly suited to their educational needs, second to the ability it offers them to keep backups of their world, something which preserves the content of their worlds invariant and available for reuse, and finally to the fact that OS worlds have no global online community. The last feature allows educators to be fully aware of the users who access their world, whether this is institutionally hosted, where the university holds the in-world access rights management, or externally hosted, where the university can choose a provider which hosts an acceptable one to the university community.

On the other hand, educators using SL depend directly on Linden Lab: they should seek support from Linden Lab when they encounter issues related to their region and, on top of that, several educators underlined the lack of support by Linden Lab in a rather disapproving tone.

Several educators made particular reference to the use of the plugin tools which are compatible with SL. Some of them referred to the collaborative and the distance learning tools which they use in the context of SL in order to support and enhance their educational activities. These tools are fully or partially compatible with the OS technology as well. However, this was mentioned by none of the interviewees using OS.

Not only do these two VWs have many positive features in common but they also have many drawbacks. The use of any VW for educational purposes presupposes that one or more sessions are devoted to the students' familiarization with the context, the tools, and the navigation system of the VW, a process usually called "orientation".

Orientation was deemed necessary by the educators but, at the same time, time-consuming which is thought to be a significant drawback of any educational practice. Students' orientation and the

use of VWs in general, are hindered by the fact that SL and OS are not intuitive enough to allow new users to "feel" their contexts. Besides, the internal communication is sometimes problematic, due to poor VoIP quality, and face-to-face communication is not an option.

Additionally, several participants appeared dissatisfied with the graphical user interface of both worlds, because it makes them even less intuitive. Moreover, the incompatibility of MS Office and Open Office with the SL and OS environment (documents need to be converted to images) was mentioned in several interviews as a significant concern.

Due to the technical issues identified in both VWs, the quality of the implementation process and the results of the learning activities are degraded. The educators raised concerns about the considerably high technical requirements of both worlds, since the use of sufficient computer systems with high minimum standards is demanded for the proper rendering of the VWs. In cases where these requirements are not met, users face several rendering issues, such as latencies, deficient and problematic display of the in-world content, and the like.

## **4.2 The Effects Applying on the Educational Activities**

The interviewees, taking into consideration the positive and negative features of the context of each VW, concluded that both of them are worth being used for educational purposes.

Carrying out learning activities within SL and OS has multiple positive effects on students' education. First and foremost, educators are given the opportunity to pursue the so-called "edutainment" which fosters higher levels of student engagement with the educational activities. Furthermore, the plausibility, the interactivity, and the dynamic nature of the contexts of these worlds combined with the high level of freedom provided to users allow the realization of projects which are too costly, or too dangerous, or even impossible to be carried out in the physical world. Besides, the flexibility of the contexts of SL and OS permits complete control of the laws of physics. Moreover, several educators consider the opportunity given to their students to build and script and then observe the functionality of their creations as very constructive. This is a very useful feature of SL and OS, especially for students involved with

Information Technology, Virtual Reality, 3D Animation, and similar disciplines.

Apart from the highly regarded advantages of the use of SL and OS in education, the academics did not disregard the drawbacks that possibly arise from the use of the two VWs under study. The participants considered it necessary to remark that the preparation and implementation of in-world educational activities is a fairly complicated process. Additionally, the rich context of VWs, with the various stimuli, the vividness of the representations, and its playful nature, often distracts students' attention during educational sessions, whilst the high level of the in-world experienced freedom quite frequently results in discipline problems.

Finally, it was reported that some students struggle to understand the way their avatars are navigated and the in-world tools are used, even after the orientation session, and it is this difficulty that can also distract them from their activities. These students consider VWs as non-intuitive spaces, thus the in-world educational activities in which they participate do not have the desired results.

### 4.3 The Educational Activities

The participants claimed that they use VWs in the framework of the blended learning approach, that the activities they design and carry out contain the element of content creation, and that these activities are very often simulations. Activities associated with problem-based learning and role-playing are usually conducted within both worlds. The educators emphasised that all the activities related to these modes of learning have much better quality, structure, and results when carried out in the context of a VW whether this is SL or OS. Moreover, in some cases VWs are used to host presentations and lectures.

A significant differentiation between the two VWs is that SL is frequently used for the conduct of exploratory learning activities, such as treasure hunt, whereas similar activities are not performed equally often in OS. This can be attributed to the content of SL which is much wider and richer compared to the OS worlds. Furthermore, SL is used to cover distance learning needs more often than OS worlds which are not as accessible as SL.

Finally, deciding on the physical classroom is most purposeful in cases where the educational objectives extend beyond the simple practice of skills and require students' higher level thinking. Also, when the educational project to be carried out is very brief and fast-paced the use of the physical

classroom is preferable, since the preparation and implementation of activities within VWs requires quite a lot of time in order for them to be successful.

## 5 CONCLUSIONS

The use of VWs, in general, and of SL and OS, in particular, is considered purposeful only when very specific educational needs, which cannot be fulfilled in an equally effective way with other educational tools, are to be met. Using them without a specific aim, just because they are considered a contemporary trend, is not recommended. This view is fully justified given that both SL and OS present not solely a very positive and useful for both educators and students context, but a negative one too. Therefore, it is advisable that educators use these worlds only in cases where the maximum possible exploitation of their positive context with minimal influence from the negative is likely.

It also seems that the ideal use of VWs can be pursued through the use of blended learning approaches, in which students are presented with the course material both virtually and in the university classroom. Thus, the educational processes derive maximum benefits when both the virtual and the physical classroom are employed. Activities related to content creation, problem solving, role-playing, simulations, and collaboration can bring the best possible results when attempted within the VW. On the other hand, activities, such as lectures and presentations, that presuppose face-to-face communication, which is absent from VWs, usually have better results when given in the physical world.

Comparing SL to OS, it seems that the former is more appropriate for the implementation of activities in which the communication of the students with non-student users, or remote student-users and the utilization of the global context of the world are considered as essential requirements. On the other hand, OS worlds are believed to be the best choice for these educators who seek closed, protected, and flexible workspaces. These features can be found in the OSIHs. These worlds are completely closed, protected and the university has full control over their context and the users who can access them. This implies that these worlds can accommodate only the content that the university has approved. Meanwhile, the institutions are able to adjust the world, its specifications, and its tools to their students' learning needs.

Finally, the option of an OSDP is the middle ground between the OIHs and SL. Its context is

usually wider than the one of the OSIHs. It hosts a limited online community that is likely, however, to develop a network of interactions, which is not as wide as the one of SL but it is wider than the one developed in the OSIHs. Moreover, since its online community is limited and the communication with the provider, most of the times, direct and easy, the educators are able to be aware of the characteristics of this community. Anyhow, educators are entitled to choose the most suitable server for their needs depending on the community that each world hosts as well as the appropriateness of the in-world content.

## REFERENCES

- Aydogan, H., Aras, F. and Karaka, E., 2010. An assessment on distance education in a 3D virtual environment: How to produce electricity in a hydroelectric power plant. In *2<sup>nd</sup> International Conference on Education Technology and Computer (ICETC)*. Shanghai, China.
- Bredl, K., Groß, A., Hünninger, J. and Fleischer, J., 2012. The Avatar as a Knowledge Worker? How Immersive 3D Virtual Environments may Foster Knowledge Acquisition. In *The Electronic Journal of Knowledge Management*, vol 10 Issue 1.
- Callaghan, MJ., McCusker, K., Losada, J.L., Harkin JG. and Wilson, S., 2009. Integrating Virtual Worlds & Virtual Learning. Environments for Online Education. In *International IEEE Consumer Electronics Society's Games Innovations Conference 2009 (ICE-GIC 09)*. London.
- Childs, M., 2010. *Learners' Experience of Presence in Virtual Worlds*. Ph.D. Thesis, University of Warwick. Coventry, UK.
- Christopoulos, A. & Conrad, M., 2012. Views of Educators on Immersion in Virtual Worlds from Second Life to OpenSim. In M Gardner, F Garnier & CD Kloos (Eds), *Proceedings of the 2<sup>nd</sup> European Immersive Education Summit: EiED 2012. E-iED*. Paris, France.
- Conrad, M., 2011. Leaving the Lindens: Teaching in Virtual Worlds of Other Providers. In *Proceedings of Researching Learning in Immersive Virtual Environments (ReLIVE'11)*. Milton Keynes, UK.
- Conrad, M., 2013. Teaching Risk with Virtual World. In *5<sup>th</sup> International Conference on Computer Supported Education (CSEDU 2013)*. Aachen, Germany.
- Cram, A., Lumkin, K., & Eade, J., 2010. Using LAMS to structure and support learning activities in virtual worlds. In *5<sup>th</sup> International LAMS Learning Design Conference*. Australia.
- Hu, J., 2010. Educators save money switching to OpenSim. Hypergrid Business, [blog], 3 Apr 2010. Available at: <http://www.hypergridbusiness.com/2010/04/educators-save-money-switching-to-opensim/> [last accessed date: 25th Aug, 2012].
- Kanamgotov, A., Christopoulos, A., Conrad, M., Prakoonwit, S., 2012. Immersion in Virtual Worlds - but not Second Life!. In *Cyberworlds 2012 International Conference*. Darmstad, Germany.
- Kay Michel, M.C., Helmick N.P. and Mayron, L.M., 2011. Cognitive cyber situational awareness using virtual worlds. In *IEEE International Multi-Disciplinary Conference on Cognitive Methods in Situation Awareness and Decision Support (CogSIMA 2011)*. Miami Beach, FL, USA.
- Konstantinidis, A., Tsiatsos T., Demetriadis S. and Pomportsis A., 2010. Collaborative Learning in OpenSim by Utilizing Sloodle. In *Sixth Advanced International Conference on Telecommunications*. Barcelona, Spain.
- Korolov, M., 2010. How to hypergrid. Hypergrid Business, [blog], Thu, Jan 14 2010. Available at: <http://www.hypergridbusiness.com/2010/01/how-to-hypergrid/> [last accessed date: 25th Aug, 2012].
- Kostarikas, I., Varlamis, I., Giannakoulopoulos. A., 2011. Blending Distance Learning Platforms and 3D Virtual Learning Environments. In *6<sup>th</sup> International Conference in Open & Distance Learning*. Loutraki, Greece.
- Levesque, J., & Lelievre, E., 2011. Creation and communication in virtual worlds: Experimentations with OpenSim. In RICHIR Simon & SHIRAI Akihiko (Eds.), *Virtual Reality International Conference (VRIC 2011)*. Laval, France.
- Miller, A., Allison, C., McCaffery, J., Sturgeon, T., Nicoll, J., Getchell, K., Perera, G. I. U. S. and Oliver, I., 2010. Virtual Worlds for Computer Science Education. In *11<sup>th</sup> Annual Conference of the Higher Education Academy Subject Centre for Information and Computer Sciences*. HEA: ICS, UK.
- Perera, I., Allison, C., Ross Nicoll, J., Sturgeon, T. and Miller, A., 2010a. Managed Learning in 3D Multi User Virtual Environments. In *International Journal of Digital Society (IJDS)*, Vol 1, Issue 4.
- Perera, I., Allison, C. and Miller, A., 2010b. Secure Learning in 3 Dimensional Multi User Virtual Environments – Challenges to Overcome. In *11<sup>th</sup> Annual Postgraduate Symposium on the Convergence of Telecommunications Networking and Broadcasting (PGNet 2010)*. Liverpool, UK.
- Savin-Baden, M., 2010. *A Practical Guide to Using Second Life in Higher Education*. Open University Press, Maidenhead.
- Strauss, A., & Corbin, J., 1998. *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory*. Sage Publications: Thousand Oaks, 2<sup>nd</sup> edition.
- Vrellis, I., Papachristos, N.M., Bellou, J., Avouris, N. and Mikropoulos, T.A., 2010. Designing a Collaborative Learning Activity in Second Life An exploratory study in physics. In *10<sup>th</sup> IEEE International Conference on Advanced Learning Technologies*. Sousse, Tunisia.