Open Source Virtual Worlds for E-Learning

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INTRODUCTION

In this contemporary era with the rapid penetration of Web 2.0 services and transactions in e-Education, it is urgent for students and instructors to utilize new media sources and online learning environments in order to reinforce their technological literacy. Concurrently, some of the most important needs which have occasionally concerned many scholars or educators are as follows:

1. The students' participation without geographical or time constraints in a common place (Sher, 2009);
2. The maintenance cost of each learning environment (Littlejohn, 2005);
3. The students' engagement in the educational process (Gebre, Saroyan, & Bracewell, 2012);
4. The students' abilities to communicate with others anywhere in the world (Eppler, 2007); and
5. The minimization of training course costs in online settings, something that can be accomplished today by the utilization of Massive Open Online Courses (MOOCs) (Ruth, 2012).

On the other hand, the radical use of the Web 2.0 services (see social networking sites, blogs, wikis, and recently virtual worlds) for educational purposes is growing at an exponential rate. Despite the widespread acceptance of two-dimensional (2D) systems, until nowadays it seems that did not apply on users' co-presence with interactive applications, i.e. couldn't be produced as additional data processing for the implementation of "constructive" information analysis. The effectiveness of these systems varies because of the way that these systems were designed, and the pattern of usage from the stakeholders is not always freely or well-established.

Several studies (Dabbagh & Kitsantas, 2004; Tayebinik & Putch, 2012) have pointed out some disadvantages from the utilization of 2D learning environments, such as: (a) the insufficiently support for various collaborative e-learning processes, (b) the inadequately interactive conditions that cannot help distributed students to participate in learning procedures in a common place, (c) the poor cooperation between students that is provided, and last but not least (d) the poor students' satisfaction that can be also provoked. The lack of students' coexistence in a common place may lead to dropout rates and in these circumstances can create users' feelings of disconnection, resignation, isolation or lack of concentration which can affect negatively to their sense of awareness and co-presence (Keengwe & Schnellert, 2012).

Researchers and scholars are rightfully concerned with some of the most persistent educational problems facing with ICT-based transactions or Web 2.0 services today. While with the 2D computer-oriented interfaces of Web 2.0 can frequently be discerned some problems, on the other hand the three-dimensional (3D) Virtual Reality (Virtual Reality, VR) technologies can solve some problems that e-learning faces in nowadays. An improved understanding *that "there is some in a 3D place or space"* with a variety of visual applications, according to the sense of a psychological "illusion" in a 3D cyberspace is being provided simultaneously to all users. Alongside the social and cultural identity that is getting lost with Learning Management Systems (LMS) or MOOCs can be recovered precisely with the 3D VR technology and the visually-rich environment can allow students to gain innovative constructive experiences (Pellas & Kazanidis, 2012).

The technological infrastructure of computer hardware and Internet speed has allowed the dissemination of 3D multi-user virtual worlds (VWs) as alternative e-learning platforms. VWs evolve users as cyber-

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entities (avatars) in socially networked environments and interactive 3D multi-user "spaces" or "places" for implementing learning procedures between distributed (or not) users (instructors and students). In the same way VWs can also facilitate the social interaction among users with verbal (text-chat, private instant messages, group instant messages, voice-chat) or non-verbal communication forms (avatar appearance, movement, important messages, sound effects), integration of multimedia applications on the Internet and exchange objects with material produced exclusively by cyber-entities in a collaborative environment. Subsequently, before using VWs instructors should be considered on how effective can become for educational purposes or on how apply them with traditional teaching strategies in virtual classrooms or even on how users can recognize the opportunities for implementing a variety of collaborative activities within a safety environment (Pellas & Kazanidis, 2012). From these perspectives, 3D multi-user VWs can become reliable candidate platforms for the acquisition of knowledge, particularly for online courses (Mansour, Bennett, & Rude-Parkins, 2009; Pellas, 2013).

The pedagogical utilization of 3D multi-user VWs may easily be converted into habitable multi-user virtual "spaces" or "places" through Collaborative [Educational] Virtual Environments (C[E]VEs). In the last seven years great scientific interests are exponentially growing to explore or exploit their potential for the support of the teaching process (Duncan, Miller, & Jiang, 2012). In the practical-teaching level, Zhang et al. (2010) research have shown that communication and social interactions that occurred in VWs can contribute to the anticipated learning outcomes. In fact, it was revealed the students' need to communicate and develop social interactions as the key ingredient to better produce the anticipated learning outcomes in a multi-user VW. Nonetheless other emerging issues such as the configuration, deployment and management of a community required considerable time and effort of coordination and organization (Burgess, Slate, Rojas-LeBouef, & LaPraire, 2010).

While the above academic literature body disclosed the instructional affordances and benefits from the utilization of (social) multi-user VWs like Second Life, further studies are needed to provide an alternative dimension, those of "open source." Open source VWs was corresponding initially to lecture events, student engagement in constructive activities and in the implementation of innovative social-cognitive pedagogical frameworks, as many researchers and scholars has already proved (Dafli, Vegoudakis, Pappas, & Bamidis, 2009; Sequeira & Mordado, 2013; Weito, Hui, & Mingyuan, 2011). Juxtaposing to the above, remarkably little research was not done only for the investigation of the service level or interoperability issues on these 3D environments with open-ended architecture, but also for the functionality and efficiency results that can replicate to educational practices. Despite the widespread interest that is a limited in several case studies (Berns, et al. 2013; Lesko & Hollingworth, 2013; Pellas & Kazanidis, 2012) with a small sample to explore innovative and alternative teaching methods or models, it is crucial to be amplified the technological services, the technocratic infrastructure, capabilities and benefits that open source VWs may supply for the e-Education.

The main purpose of the current study is to present a comprehensive overview of 3D open source virtual environments and their technological capabilities in order to be acknowledged from instructors, scholars and instructional technologists a standalone mode of an open source VW. In this perspectives the scope of the current study is twofold: i) to provide the anticipated validations and functionalities of open source VWs for learning, aiding to understand the "open-ended architecture" of VWs' technological infrastructure, and ii) to highlight the polymorphic dimensions of structural requirements that may elucidate a different role of an open code 3D technological-advanced environment in the learning process in which students can be engaged in meaningful and effortful e-learning processes.

BACKGROUND

An open source VW emerged as a novel open-world platform where instructors have the rights to configure and establish freely and without distractions their activities into intimate situations within multi-user virtual contexts. A practical consequence according to the above background can be depicted during the design of multi-user virtual "places" or "spaces" for e-learning processes. Advantages for students' learning experiences are manifold and are the following:

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