

Teaching Role-Playing Instruction in Second Life: An Exploratory Study

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Abstract

Web-based and Internet technologies are constantly being developed, evolving new ways of working, teaching, and learning for a broader range of professional and social groups. In a landscape of technology innovations, teacher professional development should try to capitalize on modern internet-based tools and services, better known as Web 2.0 and virtual worlds, in an effort to meet the increasing lifelong learning needs of pre- and in-service teachers. In this paper we suggest using the Second Life MUVE for teaching role-playing instruction to practitioners. After designing and implementing a 3D virtual learning environment in Second Life according to cognitive apprenticeship methods, we taught role-playing instruction to fifteen primary and secondary school teacher educators, using as a case scenario a rhapsody from Homer's Odyssey. We applied qualitative research methods to investigate the effect of role-playing on affective, behavioral and cognitive engagement of our participants. Our exploratory study indicated that learning role-playing instruction in a virtual learning environment has positive impact on learning engagement.

Keywords: Teacher development, design science, cognitive apprenticeship, role-playing, virtual classroom, virtual learning environment, virtual world, Second Life

Introduction

School organizations need to provide teachers with ample opportunities for skill development and individual training, knowledge, and practice sharing through collaborative work, team planning, critical thinking, and reflection. Teachers should improve their instructional competencies and feel confident that they can effectively achieve specific learning goals and make the right decisions in any given learning environment (Darling-Hammond & McLaughlin, 1995). Therefore, there should be access to experimentation with new instructional models and to appropriately executed feedback systems, which enable users to make mistakes, learn from the consequences and try again.

Tremendous progress in information and communication technology (ICT) in the last decade has a great effect on teaching and learning practices. Work of the 21st century teachers is becoming

highly challenging and complex: they should be capable of creating digital learning resources and designing online activities in cooperation with other educators (Retalis, Papasalouros, Avgeriou, & Siassiakos, 2004). Teachers should also reflect on experimentations and innovations as "reflective practitioners", i.e., gain knowledge and skills to a greater extent than do theorists and researchers of the same domain (Russell,

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2005; Schön, 1983). According to the *National Educational Technology Standards for Teachers* (International Society for Technology in Education [ISTE], 2008), educators need to enrich their instructional methodology, to foster student creativity and design and assess authentic and contextualized learning in face-to-face or virtual environments. And the most effective way of meeting successfully the increasing technology and learning needs is by providing a high quality teacher professional development.

In the wake of the above mentioned developments innovative forms of organizations with new structures, culture, and design attributes come into existence, such as the virtual organization (VO). According to Travica (1997), the virtual organizational form is “characterized by a temporary or permanent collection of geographically dispersed individuals, groups or organization departments not belonging to the same organization – or entire organizations, that are dependent on electronic communication for carrying out their production process”. VOs are network-based organizations, which facilitate the collaboration of geographically dispersed multiple specialists on specific objectives, the combination of different methods across boundaries, and the sharing of resources and skills. There are different kinds of VOs. One that is important for this study is the virtual classroom (Hiltz, 1994). VOs can have team aspects. A strong feeling of mutual dependency between partners in the virtual teams, due to the heterogeneity and the different level of specialism, and the temporary nature are considered to be among the VO’s characteristics (Jägers, Jansen, & Steenbakkers, 1998).

Virtual worlds may enhance learner engagement by providing opportunities for content creation, decision making, problem solving, and reflection (Dickey, 2005). Multi-user virtual environments (MUVEs) enable the contextualization of learning in authentic conditions and they can engage the users in activities that take place in communities of practice. Thus, Situated Cognition is perceived as the most suitable learning theory for designing and implementing learning activities in these environments (Halverson, Shaffer, Squire, & Steinkuehler, 2006). Among the instructional techniques which are ideal for understanding and practicing in virtual environments is role-playing.

Based on situated learning theory and, specifically, on the model of Cognitive Apprenticeship, we have developed in the virtual world of Second Life a proper learning environment for teacher educators to teach their colleagues the role-playing instruction. As a case scenario we used three scenes of rhapsody ϵ (book 5) of Homer’s *Odyssey* (Calypso’s island). The aim of this study is to clarify the factors that have positive or negative influence on student engagement in virtual learning environments.

Literature Review

The teacher professional development (TPD) is described as a prolonged process, which begins with the professional orientation and lasts until retirement. It contains formal or informal learning activities (Hargreaves & Fullan, 1992), and self-learning and self-assessment as well (Klenowski & Askew, 2005). It is thought that TPD improves instructional and collaborative skills and it helps teachers deepen the consciousness of their critical role (Villegas-Reimers, 2003). It focuses mainly upon aims such as design, implementation and distribution of knowledge, values, and practices that address learner needs (Schlager & Fusco, 2003).

Teacher Professional Development has to be integrated in daily school life and practice. Nevertheless, teachers lack the time needed to observe the instructional practices of their colleagues as well as the opportunities for sharing individual perspectives and ideas. Additionally, the concurrent models of TPD are based mostly on behaviorist theories of knowledge transfer, disconnected from classroom activities and incoherent, far from being effective (Paraskeva, Mysirlaki, & Talanti, 2008). The practitioners seldom apply knowledge and skills learned from these programs to

their daily practice in class (Joyce & Showers, 2002), and they rarely succeed (C. C. Johnson, 2006). Consequently, very few practitioners believe that their instruction will become more effective owing to professional development programs, and, accordingly, they are reluctant to attend (Haworth, 2003). However, according to Astin (1985, p. 36): “the effectiveness of any educational policy or practice is directly related to the capacity of that policy or practice to increase student involvement.”

Beside the traditional approaches to teacher professional development, open and distance learning is perceived as an alternative for teacher training. E-Learning simulations allow teachers to practice, share knowledge and views, and identify shortcomings in a safe environment. Cases of web-based professional development are the Virtual High School (<http://www.govhs.org/website.nsf>), the Teachers Network (<http://www.teachnet.org>), the National Grid for Learning Cymru (<http://www.ngfl-cymru.org.uk>), the TeacherNet (<http://www.teachernet.gov.uk/>), the European Schoolnet (<http://www.eun.org/web/guest/home>), or the Education Program of the World Bank Institute with the World Links initiative (www.worldbank.org/worldlinks/).

The weakest point of most teacher development programs seems to be in technological skills (Browne & Ritchie, 1991). The practitioners are being taught computer use out of class context and, thus, inventing and applying modern instructional methods is left to fate or to their good faith, as they are not provided with concrete paradigms related to their discipline (Abdelraheem, 2005; Doering, Hughes, & Huffman, 2003; Staudt, 2001).

However, ICTs can effectively support student-centered models of teaching and through collaborative activities foster the development of high order thinking skills (Scrimshaw, 2004; Wilson & Harris, 2004). Therefore, it is imperative that technology is integrated into teacher professional development curricula (Dexter & Riedel, 2003). To this end, educational organizations demonstrate considerable interest in exploring teaching and learning possibilities of virtual environments and worlds (Cheal, 2007; Dieterle & Clarke, 2008; Hetherington, Bonar-Law, Fleet, & Parkinson, 2008; Kluge & Riley, 2008), and corporations and agencies invest heavily in employee and client training (Brown & Green, 2009; Nebolsky, Yee, Petrushin, & Gershman, 2003).

Virtual Worlds – Second Life

According to Schroeder (2008), virtual worlds are persistent, avatar-based environments, in which the users sense their presence and they can interact with other users being present, too. The difference between virtual worlds and virtual reality is that virtual worlds are *persistent* internet-based social places, i.e., they keep existing and evolving regardless of whether an individual is logged into them or not. Also, the quality of social interaction distinguishes virtual worlds from massively multiplayer online role playing games (MMORPGs), as they do not have missions, levels of difficulty, and specific goals for the players to accomplish.

Even though virtual world existence is independent of an individual's physical presence, users still need to be present in some way because virtual worlds are ecosystems that foster interaction between users with each other and the environment. Through an *avatar*, i.e., a digital representative of self, the “co-inhabitants” make others' acquaintance and friends, join groups, and engage in various social activities. Research indicates that the virtual worlds, and in particular Second Life, have pedagogical advantages over traditional teaching and learning means concerning specific learning styles and disciplinary subjects (Bradshaw, 2006; Roussou, Oliver, & Slater, 2006; Slator et al., 2005; The Schome Community, 2007). Also, the sense of community can be created and enhanced to a greater degree in 3D virtual environment courses than in face-to-face courses (Steinkuehler & Williams, 2006).

Many business corporations (i.e. Michelin, IBM, Xerox) aim to market their brands, research current or future needs of target audiences, and hold business meetings or training classes in Second

Life. Business and other organizations seek to reduce operational costs, to establish a global presence, to be accessible to anyone from anywhere at any time, and to recruit international staff, overcoming physical or other boundaries. Alongside these and other government institutions (i.e., NOAA, US Navy, US Army) (Zhou, Jin, Vogel, Guo, & Chen, 2010), more than a hundred universities and other educational institutions have a Second Life presence and are active in organizing lectures, discussions, cultural, or intellectual events and exhibitions (Baker, Wentz, & Woods, 2009). In many virtual campuses the students are encouraged to meet together, attend educational programs, and create content.

Teachers, who are interested in exploring educational uses of Second Life, in order to integrate virtual world activities into their class, are supported by educational communities activated *in-world* (i.e. on the Second Life platform). Second Life-renowned teacher training communities are ISTE (International Society for Technology in Education, <http://www.iste.org/>) and NMC (New Media Consortium, <http://www.nmc.org/>). Both communities offer advice, organize seminars, discussions and events, and vigorously promote innovation in teacher professional development programs (Atkinson, 2009; L. Johnson, 2009). Furthermore, teachers can derive valuable resources and experience from Second Life mailing lists, such as the SLED (Second Life Educator's list <https://lists.secondlife.com/cgi-bin/mailman/listinfo/educators>).

Engagement and Cognitive Apprenticeship model

Effective learning is more likely when learners are engaged in knowledge exchanging activities (Kahan, 2004; Wenger, 1998). The concept of learning engagement is multidimensional and dynamically interrelated with factors referred to feelings, cognitive processes and behavior (Connell, 1990; Connell & Wellborn, 1991; Finn, 1989, 1993). Engagement in learning is connected with regular attendance, continuous effort, interest, high grades, and success; hence it is considered to be an important indicator of meaningful and effective learning (Connell & Wellborn, 1991). Engagement is particularly related with three factors: emotion (i.e., enthusiasm, curiosity, interest, anxiety, anger, denial), cognition (i.e., strategic thinking, experimentation, seeking information, research, mental agility), and behaviour (i.e., level of sustained concentration and effort, time spent on task, persistence, contribution, compliance with rules) (Fredricks, Blumenfeld, & Paris, 2004; Klem & Connell, 2004).

There is a growing consensus about the importance of student engagement for school achievement and success (Frank, 2005; Kuh, Kinzie, Buckley, Bridges, & Hayek, 2006). Engaged learners have better grades, more confidence and satisfaction, they adjust better to the school environment and they improve themselves (Pascarella & Terenzini, 2005; Zhao & Kuh, 2004).

In instructional models and strategies based on Vygotsky's theories and situated cognition, the social interaction is of paramount importance. Learning is perceived as a dynamic social process, which ensues from engagement in activities situated in cultural contexts (Järvelä, 1995). At a central position in situated learning theory stands cognitive apprenticeship. According to this approach, learning activities are embedded in a social and cultural context (Collins, Brown, & Newman, 1989). Learners actively participate in a broad range of joint activities in communities of practitioners, as they do in traditional craft apprenticeships (McLellan, 1994). They intentionally engage in authentic problem solving and processes, which refer to real life situations.

As an instructional model, cognitive apprenticeship aims at teaching students the practices that experts use to deal with realistic, complex, daily tasks. Compared with traditional instructional methods cognitive apprenticeship has proved very effective in social construction of knowledge through active participation, interaction, and reflection, in transferring learning from classroom to authentic contexts, where the problems are ill-defined and motivation is intrinsic, and, also, in encouraging the students to engage and assume ownership of their learning.

The cognitive apprenticeship model includes six methods (Collins et al., 1989): modeling, coaching, scaffolding, articulation, reflection, and exploration. The first three methods (modeling, coaching, and scaffolding) emphasize the development of cognitive and metacognitive skills and strategies through observation and scaffolding. The following two methods (articulation and reflection) are primary aimed at mastery of problem solving skills through dialogue and conversation. The last method (exploration) is oriented towards fostering learner autonomy by identifying and solving his problems.

Besides the instructional design, the methods of the cognitive apprenticeship model can be applied to the design of web-based teaching and learning environments. Dickey (2007a, 2007b) in her literature review refers to many cases of integration of the cognitive apprenticeship methods into e-learning systems, as do Parscal & Henemann (2008). Research indicates that the cognitive apprenticeship model can effectively support the preparation of new teachers for online learning (Parscal, 2006) and for online teaching of instructional design (Chen & Javeri, 2005). The principles of cognitive apprenticeship combined with the qualities of the MMORPGs are able to create powerful learning environment, appropriate for teacher professional development (Paraskeva et al., 2008).

Role-playing

Virtual environments are a safe place for developing immersive role-playing scenarios (Ryan, 2008). Several projects have taken place in Second Life in order to provide training of some sort to learners, e.g. tourism management education, international affairs studies, bioterrorism preparedness and response training courses, industrial and organizational psychology, medical training (Kay & FitzGerald, 2009).

The concept of role-playing is usually related to massively multi-user online games and simulations. Within the educational domain role-playing is the experience of facing a situation that can be viewed from at least two different points. The instructor facilitates the learning process providing the framework and the conditions under which the students decide on their acting, usually after an inquiry into their role character has preceded (Teed, 2009).

Role-playing can be used for teaching literature, history, or science or for complex social problem demonstration (Kozma, Belle, & Williams, 2000). As an instructional method it is more effective when it is played by peers than individually, even if it is played in electronic environments (Stone & Koskinen, 2002).

Using role-playing techniques students participate actively in learning activities, as they express their feelings, ideas, and arguments, trying to convince others of their viewpoint, and, thus, they create and develop self-efficacy beliefs. Also, through the negotiation and interaction with their peers, they learn to compromise, accept different perspectives, and gain tolerance to cultural diversity. Furthermore, role-playing can be used as a method for teaching insight and empathy competence (Blatner, 2005). Role enactment fosters autonomy, responsibility, and solidarity (Bonnet, 2000).

According to Teed (2009), the role-playing instruction requires good preparation and management. It is important that the teachers are aware of the following steps: goal setting, context and role defining, role-playing introducing strategies, character researching and preparing, role performing, feedback providing, and concluding evaluation.

Methodology

The goal of this study, which took place in the middle of May 2009, was to investigate the effect of training in role-playing, an instructional technique available in the 3D virtual learning envi-

ronment of the virtual world Second Life, on teacher's learning engagement. According to Harvey (2005): "Very little research has focused on psychological and other variables which may influence teachers' decisions to engage or not in CPL (Continued Professional Learning). Little is known from empirical research about the motivations teachers may or may not have to engage in CPL, especially CPL as offered through postgraduate courses." Also, virtual worlds as learning environments for adult education have strengths and weaknesses which have yet to be studied and illustrated (Hayes, 2006).

The research question of this study was: *What factors do affect most the level of learning engagement of teachers taught role-playing in the virtual world of Second Life?*

Our research was based on qualitative methods. Structured *interviews* were conducted for data collection. In a structured interview the questions are always answered by interviewees in the same order within the same context, allowing reliable comparisons between subgroups of the sample (Kvale & Brinkmann, 2008). As the interviewees were geographically dispersed, we used two methods for conducting the interviews: (1) phone interviews, which lasted about 40 minutes each, were conducted with eight participants, and (2) interviews in the learning environment of Second Life, which lasted about 1.5 hours each and were conducted with four participants, on their request. It is worth mentioning that in one case interviewing in Second Life was the only option, because, when the interviewee was informed that his answers on the phone would have to be recorded, he felt so stressed that he could not answer any question.

The study participants were 15 Primary and Secondary public or private school teachers falling in two groups: (1) a group of seven teachers who attended the E-Learning postgraduate program in Department of Digital Systems in University of Piraeus, and (2) a group of eight teachers serving in public secondary schools in the prefecture of Argolis. Of these, 12 teachers were interviewed, six from each group.

For the purposes of the study, we have created educational resources on collaborative learning and role-playing instructional technique, which include slides with text and images and videos with presentations, dialogues, and role performance from the rhapsody ϵ of *The Odyssey*, Homer's epic poem. This material was uploaded or linked with 3D objects in the virtual learning environment in Second Life.

Designing the Virtual Learning Environment

In order to teach role-playing as an instructional technique in Second Life we had to design and implement a three-dimensional virtual learning environment.

First of all, we focused on *user characteristics and needs* (Nardi, 1996). For exchanging information and interacting with the environment we used the Greek language since all participants were Greek natives. However, some information about the identity and purpose of the place is in English, in order to orient English speakers or as a precursor of a future opening to English-speaking learners.

We assumed these requirements to reflect participant needs:

- easy and fast orientation into learning environment
- flowing and manageable movement into the place
- observation capability of other avatars being in the same place at the same time
- saving time and effort given the hardship of handling movement and controlling camera (view that the client viewer is showing)
- smooth synchronization and coordination in learning activities

- sense of security and unimpeded by would-be intruders participation in the educational process

The virtual learning environment design for teaching role-playing was based on a set of decisions to meet specific needs, made after consideration of alternatives. The decisions taken during the design phase are discussed below.

1) Decision about owning virtual land in Second Life

In order to create and maintain a learning virtual environment in Second Life someone has to own a *parcel* (plot of land owned by a single user or group). Instead of buying we chose to rent land from a “*landlord*” (i.e., owner of private islands). The following reasons were sufficient to justify our choice: (a) the land owner has already “*terraformed*” (i.e., shaped) his property and thus, he relieves the renter of this burden; and (b) there is reassurance from estate owner regarding the protection of the place physiognomy from neighbors’ activities and, also, with regard to “*lag*” control (i.e., slow reaction time when using Second Life due to the simultaneous presence of many avatars in the same area).

Our SLurl (Second Life uniform resource locator, i.e., the teleport link to our virtual environment in Second Life) for the role-playing teaching environment is:

<http://slurl.com/secondlife/Caladesi%20Island/207/84/23>, and for the role-playing performing environment is: <http://slurl.com/secondlife/Caladesi%20Island/236/157/22>.

2) Decision about the parcel size

The virtual learning environment has to be of dual use: a) allow role-playing teaching, (see Figure 1. Role-playing teaching environment), b) allow role-playing performing of assigned roles. Scenario comes from rhapsody ε of Homer’s Odyssey (see Figure 2. Role-playing performing environment).

Therefore, the amount of land acquired should be able to hold enough “*prims*” (a primitive, or prim, is a single part object, which virtual physical objects are made of) to allow essentially the construction of two learning environments. For the reason that these two environments serve plainly different purposes and functions it was considered appropriate to keep their autonomy being adjacent to each other and separate from each other with the use of a hedge. Thus, learners can be effectively immersed in the mythological world described by Homer and user avatars can walk, fly, or teleport from one place to the other.



Figure 1. Role-playing teaching environment

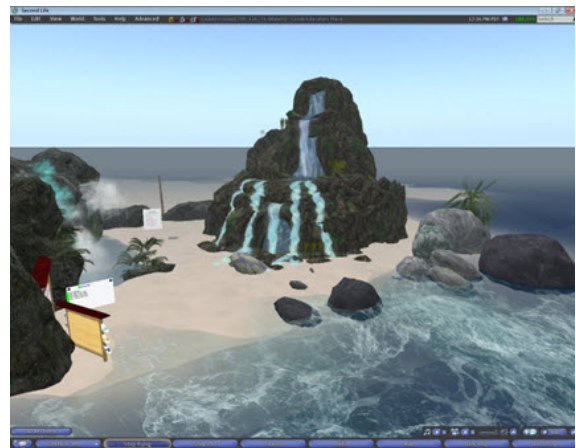


Figure 2. Role-playing performing environment

3) Decision about the prevalent design metaphor

The context is very crucial for learning in a virtual environment (Clark & Maher, 2001). The prevalent design metaphor in role-playing performance environment was given at the very beginning: sea-shore with rocks, cave, running rills of water in channels, greenery. For the role-playing learning environment it was decided that ancient Greek structures and buildings, like ruins of *Tholos* (circular building) and *Stoa* (a portico commonly for public usage), along with outdoor costal space (log fire, log seats, wood tables, and signs) would be the prevalent design metaphor.

4) Decision about safety and place security

The security is a critical issue for the development of online learning communities (Preece, 2001). The reasons which necessitate security measures are: a) keeping away harassment from uninvited visitors during the learning process, b) discouraging “*griefers*” (i.e., users who violate the terms of service and harass other “*residents*”, i.e., users in Second Life), c) protecting research intellectual property rights until the study draws to a close. After discussing with the estate manager it was agreed that we should not bar others from entering our place changing land regulations, in order not to disrupt avatar free traveling from one place to another and not to ruin Second Life coherence. Thus, two security systems have been purchased, each for every environment, which allow us to control access rights.

5) Decision about creating a group

The creation of virtual learning groups is beneficial for the management of learning resources and the team interaction (S. D. Johnson, Suriya, Yoon, Berrett, & La Fleur, 2002). Our decision to create the “Greek Educators group” was based on the fact that users as group owners can invite anyone to their group or expel him out of it, they can, also, assign roles and offer specific privileges like “*rezzing*” (i.e., making an object appear from inventory on the land or to create a brand new item) and keeping 3D objects on land or run scripts. In addition it is possible to send at once notices to all group members or to create proposals for voting.



Figure 3. Arrival and welcoming area



Figure 4. Basic training and skill acquiring area

6) Decision about place arrangement and functions

The place in both learning environments should be arranged properly in order to perform different functions. Thus, the role-playing learning environment consists of:

a) Arrival and welcoming area: entrance point for visitors who are being *teleported* after searching Second Life for places. At their arrival visitors receive automatically a welcome message and

a *landmark* (shortcut to a place in Second Life which is stored in inventory), so that they can easily visit this place again in the future (see Figure 3. Arrival and welcoming area);

b) Basic training and skill acquiring area: research participants acquaint themselves with the place and its functions and they feel that their learning is situated and contextualized (see Figure 4. Basic training and skill acquiring area);

c) Gathering and discussion area;

d) Whole group slide show presentation area (see Figure 5. Whole group slide show presentation area);

e) Subgroup collaboration and interaction areas: slide show presentation area for subgroups and wooden tables and logs for subgroup collaboration in activities (see Figure 6. Slide show presentation area for subgroups and Figure 7. Wooden tables and logs for subgroup collaboration in activities);

f) Whole group interactive information and exercise area (see Figure 8. Whole group interactive information and exercise area in teaching environment).

The role-playing performance environment consists of two basic areas: cave interior for performing two pairs of roles (Hermes – Calypso and Calypso – Odysseus) (Figure 9 Cave interior for performing two pairs of roles), and sea-shore for performing one pair of roles (Calypso – Odysseus) (Figure 10 Sea-shore for performing one pair of roles).



Figure 5. Whole group slide show presentation area



Figure 6. Slide show presentation area for subgroups



Figure 7. Wooden tables and logs for subgroup collaboration in activities



Figure 8. Whole group interactive information and exercise area in teaching environment



Figure 9 Cave interior for performing two pairs of roles



Figure 10 Sea-shore for performing one pair of roles



Figure 11. Object arrangement to create navigation paths in teaching environment



Figure 12. Object arrangement to create navigation paths in performing environment

7) Decision about facilitating avatar orientation

Avatars need to be oriented in space and follow any time the desired path. According to Frery, Kelner, Moreira, and Teichrieb, (2002): “It is important that the virtual worlds offer spatial navigation strategies, helping the user to explore and to accomplish efficiently his/her objectives, even if he/she does not have previous knowledge about how to move and locate in the environment.” Our decisions to facilitate avatar navigation include:

a) Object arrangement to create navigation paths: a circular arrival and welcoming space surrounded by columns and trees in a semi-circular shape allowing the user to identify the exit from where he can navigate the site. Signs and other objects bearing useful information have been set left and right of the desired direction for the visitor to interact with. As a result a clear corridor has taken shape (see Figure 11. Object arrangement to create navigation paths in teaching environment). After avatars have been teleported in role-playing performance environment, they are moving in a direction dictated by the cave outside and the stone fence while a sign in front of a random number generator, a device for random role assignments, prevents leaving the place (see Figure 12. Object arrangement to create navigation paths in performing environment).

b) Using pathways and indications which help with navigation, on the walking route from circular landing point to the meeting place around the fire logs a stone path has been placed on the sand. Signs in blue, green, and red colors as the same color seats around the log fire make easier for the pairs of participants to move their avatars to the right point across the Stoa. Furthermore, before the signs bearing the steps to role-playing implementation as an instructional technique there is a stone corridor which gives the route that may be followed by avatars during the learning process (see Figure 13. Using pathways and indications which help with navigation).

On the tables designated for pair collaboration there are two wood frames; one has a blank sheet of paper with a pencil and the second is empty. The first one would give an assignment while the other one would receive and save the pair work. Hovering texts also inform learners about wood frame functions (see Figure 14. Indications which help with navigation).

On the role-playing wood signs clickable icons for user interaction are located at fixed positions and correspond to six different activities consistent with the six methods of the model of cognitive apprenticeship (see Figure 15. Cognitive Apprenticeship menu).



Figure 13. Using pathways and indications which help with navigation



Figure 14. Indications which help with navigation



exploration: tasks for knowledge transfer to other contexts



reflection: tasks for answer comparison



articulation: tasks for dissemination of individualized answers



Figure 15. Cognitive Apprenticeship menu



modeling: presenting information by videos



coaching: examples and guidelines for answering questions



scaffolding: activation of helping messages by successive click

Role-playing observers may readily locate where on the sea shore they should sit and watch guided by little brown sitting pose balls with the word “sit” hovering above (see Figure 16. Sitting place for role-playing observers on the sea-shore). Inside the cave there is a specified place for the purpose of role-playing observation. Observers may sit in a niche on comfortable pillows strewn on the ground (see Figure 17. Sitting place for role-playing observers inside the cave). Avatar entrances into and exit from the cave without disorientation are achieved through environment affordances, such as (a) roman mosaics on the cave ground floor flaming torches on either side of entrance/exit opening, (c) small white columns with jars on either side of entrance/exit opening, (d) a lamp stand besides the cave opening (see Figure 18. Entrance into the cave and 19. Exit from the cave).

8) Decision about information presentation mode

Information in virtual learning environment can be offered in many ways which accommodate:

a) Different learning styles; for example:

- plain text (signs providing step-by-step instructions for subgroup members) (see Figure 20. Sign with plain text),
- graphics and text (signs bearing step-by-step implementation of role-playing instruction) (see Figure 21. Interactive sign with graphics and text),
- videos (video displayed on a sign screen inside the virtual environment with information about learning procedures) (see Figure 22. Video display in Second L)

b) Different pace of information processing; for example:

- information display triggered or controlled by the instructor (slide show for learners around the camp fire),

- information display triggered and controlled by the learners (slide show on the screens inside the Stoa)



Figure 16. Sitting place for role-playing observers on the sea-shore



Figure 17. Sitting place for role-playing observers inside the cave

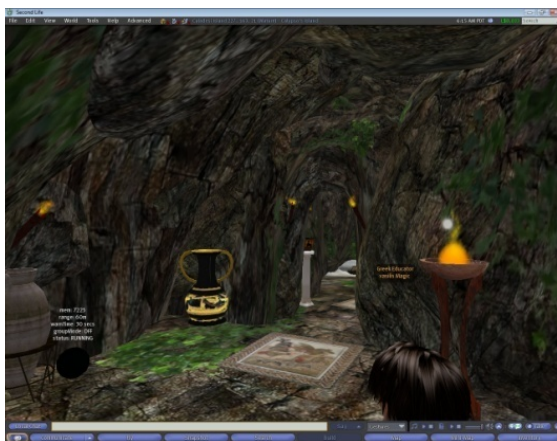


Figure 18. Entrance into the cave



Figure 19. Exit from the cave



Figure 20. Sign with plain text



Figure 21. Interactive sign with graphics and text



Figure 22. Video display in Second Life

c) Different learner needs at a given time, for example:

- information activated by one learner and presented only to him (successive clicks on help icon by a learner activate equal number of messages just on his computer screen),
- information activated by one learner and presented simultaneously to all learners (clicks on articulation and reflection icons bring messages on all learners' computer screens)

d) Asynchronous and synchronous information display inside and outside the learning environment; for example:

- information projected to all learners at the same time (graphics and text on a sign surface),
- information presented after learner activation at various time (external link activation and watching videos from YouTube; thereby processing time decreases significantly).

9) *Decision about the types of tasks and communication*

Learners, when they answer the posed questions, use text-based communication either in public localized conversations that can be heard within 20 m (local chat) or in private conversations (global instant messaging, IM). However, additional means of answers have been used:

- answering a question or commenting on pair answer by using a note card
- assessing the pair role-playing by rating on a board according to a performance rubric
- self-assessing by selecting colors corresponding to various mastering levels of knowledge and skills
- posting impressions and feedback on a notice board at the end of the lesson

Voice chatting, though it is provided, has not been an option mainly because a fraction of participants lacked necessary equipment (microphone, headphones) and, also, due to technical problems when we tried it out.

10) *Decision about creating role-playing avatar*

Learners are invited to assume and perform one from a total of six roles designated from rhapsody ϵ of *Odyssey* in three pairs. All these roles are played by three characters: Hermes, Calypso, and Odysseus (see Figure 23. Hermes' avatar, Figure 24. Calypso's avatar, Figure 25. Odysseus' avatar). We created these three avatars beforehand, so learners, after logging out could log in to the account of the character they had assumed.



Figure 23. Hermes' avatar



Figure 24. Calypso's avatar



Figure 25. Odysseus' avatar

This decision was based on the following reasons: a) changing gender if necessary and appearance involves high degree of familiarity which our participants lacked, b) customizing avatar's

appearance is time consuming and may disrupt the learning process, and c) researchers could meticulously edit avatar's attire so that the aesthetical effect may contribute greatly to learner immersion.

Findings

Initially, interview questions sought to estimate in general learner experience from participating in the educational process. They addressed experience characterizations, positive and negative feelings, things that learners thought they have learned, and what value they attribute to it.

Seven of the twelve-member sample (7/12) described their experience in terms of innovation (unprecedented, innovative, original), five interviewees regarded it as "interesting", four as impressive, exciting, or enjoyable and fun. One or two interviewees used these characterizations: 'provocative', "constructive", "didactic", "liberating", "experiential", "collaborative", "interactive", "attractive", and "adventurous."

Half of the interviewees felt that they had learned useful new things or discovered new Internet possibilities. At the same rate participants expressed feelings regarding teamwork, cooperation, participation, and communication ("I felt that I belong to a group", "that I collaborated with the others", "satisfaction from my contact with others", "teamwork"). Four participants mentioned "joy", "pleasure", "fun", "optimism", "confidence", "time went by without realizing" whereas fewer viewed their experience as "opportunity" and felt "fortunate".

Eight interviewees said that their experience evoked only positive feelings. Only two mentioned that they felt fatigue at the end of the lesson caused by mental strain and stretched attention or by irrelevant factors like daily duties.

More than half of participants believed that they had learned "how to apply role-playing to their instruction" (8/12), "how to collaborate", "social skills", "empathy", "to respect diversity and pluralism" (7/12). Half of the interviewees stated that they familiarized themselves with Second Life environment and virtual worlds or that they saw how technology could enhance learning.

All the interviewees agreed that their experience was worthy of mentioning and more than half of them (7/12) claimed that they had already done so. Supporting arguments were: (a) that their colleagues could apply it in the instruction or try a different approach (7/12); (b) that they could eliminate hesitation in teaching with technology (5/12); (c) that they would share their enthusiasm with others; and (d) that learning this way had educational value (4/12).

Affective Engagement

The interview questions relating to affective engagement examined the factors affecting the increase or decrease in learner interest, causes of nervousness or anxiety, methods of overcoming boredom and fatigue, focal points for the learner performance, common or individual objectives, factors enhancing collective or individual consciousness, usefulness of role-playing, and advantage/disadvantages of learning with Second Life as compared to traditional classroom learning.

Almost all the learners (11/12) responded that their interest peaked during the role performance. Phases of collaboration, such as exchanging note cards with comments, attracted most interest (9/12). Half of the interviewees cited these as the factors that diminished interest in learning: a delay in the course progress (e.g., delayed response and feedback from their pair partner), slow typing, babbling during role-playing, and delays caused by logging into role-playing avatar account. Also, three participants mentioned that slide projection was boring and one thought that such were difficulties in program handling.

Almost half of the interviewees (5/12) reported orientation and navigation difficulties as causes of nervousness or anxiety. Three interviewees reported technical problems such as problems with the router, computer crashes, slow wireless connection. Three interviewees felt anxiety just before role-playing performance. Friendly and collaborative climate was cited as the most helpful factors in overcoming anxiety (8/12). Three participants reported that they did not feel any anxiety or nervousness at all. Also, more than half of the participants (7/12) did not get bored and had no wish for changing the virtual environment or to the process.

Most participants (9/12) focused most of their effort on role performing. More than half of them (7/12) tried their best in pair collaborative activities, four (4/12) in whole group discussions and two (2/12) tried harder when they had to think their own scenario of how to apply role-playing to their instruction.

Most interviewees did not feel tired in any of the activities. Three of them (3/12) claimed that they got tired during the slide show view. Almost half of interviewees (5/12) did not look at a clock or feel impatient of the course progress. Four looked at the time after role-playing, at the end of the lesson.

The participants considered as collective objectives the improvement of teaching and learning methods (7/12), the role-playing performance (6/12), the understanding of role-playing instruction, and the interest in virtual worlds (5/12). As a personal goal, nearly a half of the sample (5/12) mentioned the role-playing application to their class, three mentioned the Second Life learning, while four could not think of individual objectives.

As the most effective activities for enhancing team spirit were reported the pair collaborative work (7/12), the role-playing performance (5/12), the discussions (3/12), the gathering around the campfire (2/12). The participants felt that they act solo mainly while studying learning resources (4/12), when they suggested their own role-playing instructional scenario (3/12), or during their role-playing performance (2/12).

What persuaded the learners most that the role-playing is of great value was the fact that they themselves played a role (9/12) or that they became involved and collaborated with each other (4/12). Only two participants expressed reservations or doubts about role-playing being feasible and applicable in a traditional classroom context, mainly due to perceived difficulties in group coordination, the time consuming preparation phase, and a seamless role-playing integration into the existing curriculum.

Second Life is worth being used for teachers' professional development because it can support collaboration (7/12), and it is an enjoyable and authentic environment (6/12). On the other hand, among arguments against using Second Life reported were the familiarity with ICT (5/12), preparation and coordination (2/12), expensive equipment, loss of non-verbal communication, and curriculum change (1/12).

Participants argued that educators would like using Second Life for their distance professional development because it was a pleasurable, enjoyable, and vivid environment (5/12). Learning took place in a more interesting and appealing way that fosters communication and collaboration (4/12). It was not necessary for teachers to move around (2/12), and learners could be autonomous and independent (1/12). However, teachers could be discouraged by requirements of ICT proficiency (7/12), communication and collaboration skills (3/12), and Second Life's steep learning curve (2/12).

In comparison with the classroom face-to-face learning, Second Life offers many advantages, such as comfortable and easy role performing (11/12) and sincere and relaxing conversations (3/12). As a result, the majority of interviewees (9/12) preferred Second Life to real classroom in

role-playing. They would not tolerate a lesson similar but in a real classroom lasting the same length of time (8/12) nor would they show the same endurance (7/12).

Almost all interviewees (10/12) declared themselves completely satisfied with their performance in Second Life. Only two interviewees stated that their training was inadequate and they needed more practicing. Eight participants felt confident enough with their ability to apply effectively role-playing to their instruction. All interviewees admitted that they have developed a positive attitude towards role-playing as an instructional method, mainly because of performing the roles. All participants would recommend their colleagues to use role-playing in their classrooms for presenting arguments (5/12), developing social skills or experiential learning (4/12), accomplishing cognitive and affective goals or improving teaching (2/12).

Behavioral Engagement

The interview questions corresponding to behavioral engagement studied learner difficulties in complying with learning process requirements, activities which the participants concentrated their efforts on or which they invested little or no effort in. They, also, studied how the learners responded to issues, where they failed to hold their attention or they demonstrated undivided attention, why communication with their colleagues was or was not effective and why they continued logging into Second Life despite the very long duration of the lesson which lasted long after midnight.

Nearly half of the participants (5/12) felt that they adjusted well to Second Life environment and only two (2/12) reported hardships during note card editing. All the participants (12/12) concentrated their efforts mostly on performing their roles. Half of them (6/12) put a great effort into the various steps of role-playing application, e.g., when they had to suggest their own scenario of role-playing instruction. According to participants, the most difficult activities were the note card editing (3/12), the avatar navigation (2/12), the role performing or typewriting (1/12), whereas three (3/12) claimed that they faced no problem at all.

What attracted more attention was role-playing (8/12), discussions (4/12), collaboration in pairs, video watching, instructions of researcher and study of the material (2/12). On the other hand, participants loosened their attention during the steps of role-playing application to instruction (5/12), the discussion around the campfire (2/12), note card editing or video watching (1/12).

All the participants (12/12) insisted on effectiveness of their social interaction in the learning environment. Their arguments were ideas exchange (5/12), friendliness and familiarity (4/12), authenticity, common effort (2/12), responsiveness, enthusiasm, sympathy, understanding (1/12). Four participants (4/12) reported that they used private messages (IM) to make jokes or have fun.

Despite the fact that the lesson lasted long after midnight participants did not leave mainly because they liked to reach the end of the process (5/12), they liked the process (4/12), it was interesting and they were curious (3/12), they had fun, it looked like playing games, it was cool and innovative, they did not wish to spoil fellowship (2/12) or because they were absorbed.

Cognitive Engagement

The cognitive factor of learner engagement was addressed by questions studying interest for further development and educational utilization of Second Life, cases in which existing experience was applied, mental fatigue and weakness in information processing, seeking urgent help and assistance, cases of affordances utilization, retention of facts and well documented answers. Also, some questions refer to activities which helped most to better understand the role-playing technique, judgments about activities, suggestions for making improvements in learning environment design, and evaluation of Second Life efficiency.

All the interviewees expressed willingness to develop further their knowledge and skills concerning Second Life educational use. They based their readiness on the will to use it in their teaching (9/12) or to use it for distance professional development (2/12), as a collaborative tool, for role-playing, to increase students' motivation and interest (1/12).

Learners used existing experience for performing their role (4/12), for operating the program, for suggesting their own role-playing instruction (3/12), for discussions, for text chatting and for avatar movement (1/12).

More than a half of the participants (8/12) were not tired by the information provided. Three participants stated that they could not assimilate the information about the steps in role-playing implementing in the classroom.

Half of the participants (6/12) never needed any urgent help. Less than the half of the participants (5/12) needed help with the note card editing or with camera control and avatar movement inside the cave (1/12). Most helpful for learners proved to be their colleagues (6/12), the help icon attached on signs or the researcher (3/12), the "teleport" function or the learning environment design (2/12).

Seven learners reported that they had to memorize their part and very few (2/12) tried to memorize information from slide show in Stoa. Four participants reported that they did not need to memorize anything.

Half of the interviewees felt that their answers were justified. Most effective for understanding the role-playing technique was playing the roles (8/12), discussions (4/12), studying the resources (3/12) and watching the videos (1/12). According to the majority of learners (8/12) there was no superfluous activity. Valuable activities were deemed playing the roles (7/12), exchanging ideas and discussing (3/12) and studying the steps in role-playing implementation (2/12).

Half of the participants did not suggest any improvements or changes in the design. However, three participants reported that they could not notice the menu icons attached on the signs, especially when other avatars were in front of them. Sporadically, participants suggested improvements in the design of cave entrance and of the place on the sea shore designated for observers to sit. It was also suggested to reduce the signs with the role-playing steps and the use of reference guides for showing the way. There were positive comments on the ancient Greek character of the place, on the function of teleporting to Calypso's island, and on the random role assignment device.

Discussion and Conclusion

This study has several limitations. The study period (mid-May in 2009) coincided with the beginning of the exam period. Therefore, all teachers in schools were busy with exams preparations and their spare time was limited enough so as not to be available to participate in our study. Consequently, the study sample was small and restricted to teachers who are acquainted with researchers. Also, a random sampling could not be applied, because teachers needed to fulfill certain requirements in order to participate in Second Life learning process: to possess a current state-of-the-art computer system, to have a high-bandwidth Internet connection, to be skilled in computer interaction, and mostly, to be keen to learn Second Life basic skills. Therefore, subject selection was based on personal acquaintance for the majority of the sample (10 participants), except five teachers, who responded readily to an open invitation to all teacher community through our blog (<http://blogs.sch.gr/billbas>) to participate in the research.

Finally, it would be preferable if intervention learning activities were conducted in two or three different sessions. Initial enthusiasm and excitement of the participants caused by virtual environment innovation would be moderated and, also, learners would be more familiar with Second

Life operation. Thereby, they would have more time spent and larger number of functions performed in Second Life. Due to these limitations, this study should be regarded as exploratory.

Notwithstanding the limitations, the results of our study can be summarized as follows:

- *Teacher training in instructional techniques is possible through a virtual learning environment:* as it turned out, educators with moderate or good ICT skills were able, after a three hour training session in Second Life, to operate in a virtual learning environment and to interact with each other and the information attached on virtual objects. This may allay faculty's worries that the learning curve of the virtual worlds is fairly steep, so that the beginners could be overwhelmed by the amount of time and effort needed for mastering and using them (Cheal, 2007). The difficulties in operating Second Life, which (as expected) the participants encountered, did not discourage or distress them. Strong evidence for that are the increased endurance, stamina, and alertness the participants showed during the long learning process extending late into the night. Learners encountered problems mainly with avatar movement, note card editing, and camera control. Still, advanced ICT skills and knowledge are crucial elements in adapting to virtual teaching and learning. Keyboard skills and fast typing also seem to be a key factor in Second Life integration into the learning community.
- *Learning in a 3D virtual learning environment may have positive effect on learner engagement:* essential learning in virtual environments is based on qualities like readiness to collaborate and to communicate, willingness to be exposed and to effectively participate in learning activities, and a genuine and friendly atmosphere. This complies with the assumption that virtual learning environments and simulations can support student engagement and provide situated learning (Dede, 2009). All participants considered their experience worthy of referring to school colleagues, in order to enrich their teaching methods and integrate technology in their lesson. Furthermore, they argued for implementing role-playing in teaching because it could enhance participation, experiential learning, communication, and collaboration. The innovative, pleasant, comfortable, impressive, challenging, and liberating virtual environment of Second Life could be attractive for the teacher community. Positive emotions aroused in learning in Second Life can reduce boredom or frustration. Also, learner engagement was greatly influenced by pair collaboration. Collaborative atmosphere was critical to learner interest and concentrated effort. Partners were more helpful for learners to handle anxiety or other issues than the researcher.
- *Technical and operational issues in 3D virtual learning environment can negatively affect student engagement, but not decisively:* the participants in our research faced only some temporary, minor technical and operational difficulties. On the other hand, delays in the learning process seemed to affect engagement to a greater extent. It is remarkable that experienced technical difficulties had mild negative effects on learner interest. However, technical concerns, such as lag time, additional demands on hardware and frequent updates, have to be considered carefully before delivering education in SL (Luo & Kemp, 2008).
- *Wider adoption of a positive stance towards innovative instruction requires educators to actively engage in simulations of the new teaching techniques:* the participants were able to comprehend role-playing instruction and to develop a positive attitude, while they themselves performed their assumed role, as the educational scenario dictated. Besides, simulations and role-playing in virtual worlds necessitate active participation and engagement (Kluge & Riley, 2008) and the ability of free self-expression is a primary moti-

vational factor (Shao, 2009). *Role-playing* was a catalytic factor in learning engagement, increasing learner motivation and interest. The fact that they themselves played the assigned roles was the most attractive learning activity and persuasive argument of role-playing learning value. It was considered to be a common cause, fostering collaboration and team spirit, and it enabled learners to use existing experience.

- *In a 3D virtual learning environment educators could create a social presence through an avatar, an online persona, and feel safe enough to socialize, exchange experiences or express overtly their opinions.* The sense of anonymity secured thanks to avatars, digital representations of the self in virtual worlds, has positive effects on creation of a genuine and friendly atmosphere, which can increase learner engagement (Atkinson, Mayer, & Merrill, 2005; Baker et al., 2009). The study participants from the start felt comfortable with the new environment and their partners, even if they had not been acquainted with most of them earlier. They sought to become acquainted with persons they did not know, they were laughing and joking with them, and they enjoyed the learning process. The participants saw the assigned role as a challenge which they were very willing to accept, feeling safe to be exposed via their avatar.

Typical access limitations, such as location, flexible time, shared work space, and participation opportunities (Hiltz, 1994), which are common in professional development programs, could be successfully overcome by our system. The participants did not need to leave the coziness of their home. Also, they were able to decide on time and day of meeting in SL, and they had equal chances to express themselves and comment on peer writings.

Apart from the above inferences, in our effort to design and implement the learning environment we addressed considerable economic issues, concerning mainly land purchase and maintenance fees or 3D object purchase cost. Nevertheless, we believe that investing in projects on investigating the teaching and learning potential of virtual worlds is worthwhile.

Future Research

As more educational institutions and communities manifest their interest in exploring teaching and learning possibilities of virtual worlds, there is clearly a need for further research into the conditions which allow these innovative environments to meet the 21st century learning needs and to support distributed learning (Clarke & Dede, 2005; Dede, 2005). According to McKinley (1993), “of greater fundamental significance is the challenge to develop new forms of organizations whose design attributes feature flexibility, adaptivity, continual learning, self-organization of work and high tolerance of ambiguity.”

Although Second Life is widely used for learning and teaching, surveys need to be carried out on learning outcomes (Sherman & Tillies, 2007). Also, further study is needed on design principles and usability issues that are of interest for design science (Hevner, March, Park, & Ram, 2004; Kasemvilas & Olfman, 2009; Leidl & Rößling, 2007).

There are many crucial questions that need further research, such as:

- How does the organizational context (structure, processes, culture, management) impact on the successful implementation of 3D virtual learning environments for the teacher professional development?
- How can the organizations enhance the teachers’ new role in the direction of their career, in order to meet the individual, group, organizational and community development and needs?
- What are the requirements of virtually organizing the teacher professional development (i.e., additional needs for hardware, software, security, training, time flexibility)?

- What are the advantages or disadvantages of Second Life in comparison with other virtual worlds concerning the teacher professional development?
- To what extent are educators able to build learning applications using the authoring tools that are available in the present virtual worlds?
- What learning activities in virtual worlds are most effective for teacher professional development?
- What is the learning value of “machinima”, videos produced in virtual environments?
- How can interoperability between virtual worlds and current Web 2.0 applications be achieved and what are the learning outcomes of that?
- What are the best practices in virtual learning environment design for teacher professional development?

Certainly, prospective research will further weigh the merits and the shortcomings of virtual worlds before determining whether they have added value to teacher professional development. Already, surveys indicate that playing violent video games can have negative effects on adolescent behavior, as they can increase aggressiveness and social isolation, and they, also, can settle adolescents into ferocity (Mysirlaki, Paraskeva, & Sgouros, 2006). However, virtual worlds are not video games, although they have the game “conceit” (for example, the concept of playing by specific rules) (Bartle, 2004). Their added value in teaching and learning has to be proved. The present study moved towards this goal.

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