Utilizing and evaluating the virtual world of Second Life for collaborative learning activities: A primary case study

Nikolaos Pellas[1], Ioannis Kazanidis[2]
npellas@aegean.gr, Kazanidis@teikav.edu.gr
[1] Department of Product & Systems Design Engineering, University of the Aegean, Greece
[2] Kavala Institute of Technology, Greece

Abstract

In the last decade, there is a common conviction for modern learning practices to use virtual worlds (VWs) for enhancing the "technological literacy." Likewise, the corollary of interactivity and social formalization of modeling, allows the design of learning activities, in conjunction with contemporary pedagogical approaches. Accordingly to these provisions, our paper focuses on the implementation of a collaborative lesson, taking advantage of the virtual world "Second Life" (SL). Thence, a case study was stipulated at the Kavala Institute of Technology, presenting the findings of an effort that 25 undergraduate students involved to investigate the value of this effort, in a computer lab. This premise frequently recapitulates, firstly our effort to articulate the initial perceptions of students-based assessments, and secondarily to demonstrate multisensory-multimodal perspectives that are being emerged from the exploitation of virtual worlds in Education.

Key words: collaboration, cyber entities, Second Life

Introduction

The emergence of innovative educational technologies has caused serious changes in the present educational system. The technological infrastructure that supported at the original 2D LMS (Learning Management Systems) and subsequent the development of their descendants, i.e. the 3D systems are beyond VLEs (Virtual Learning Environments), also includes virtual worlds; seems to offer several advantages as a learning process regards. The joint appearances of users (instructors and students) in a place, where they interact simultaneously, have been significantly influenced the nature of teaching and learning procedure. A popular support on this issue is the expansion of supported computer systems, following a collaborative pedagogical approach, which utilizes the social interaction and the production of a co-constructive knowledge with ICT (Information & Communications Technology), called as CSCL (Computer-Supported Collaborative Learning).

Similarly noteworthy, the explosive growth of the "blogosphere" and Web 2.0, seems to enunciate users' needs and thus, virtual worlds are proposed to support learning activities, develop skills strategies (Merrick & Maher, 2007), learners perform in the particular activity as a part of a larger community, which shares common goals and ways to attain them. The social aspects of online virtual worlds attracts more and more cyber entities (avatars), and does not offer a longer isolation in front of a computer screen, but it has many characteristics of "persistence" (i.e. a virtual world that continues to exist, even after a user exits from the world and that user-made changes to its state are-to some extent-permanent).

C. Karagiannidis, P. Politis & I. Karasavvidis (eds.), Proceedings of the 8th Pan-Hellenic Conference with International Participation «ICT in Education»
University of Thessaly, Volos, Greece, 28-30 September 2012

Nowadays, Second Life (http://secondlife.com/) is regularly one of the most popular virtual worlds, composed with a multi-complex "cyber-sphere" of interactive variables that are combined and interconnected. This environment is a whole mixture of roles, activities, relationships, interactions, circumstances and influences that are currently combined to give each person adequate conditions for development or learning process. Particularly significant is the dynamic dimension of three-dimensional virtual reality (3D VR), which can really provide a highly intuitive or even consubstantial contact between man and computer, as it incorporates the features of the interaction of real and virtual world.

The polymorphic dimensions of Second Life structural requirements are presenting a visually interactive and multi-sensory "world," which is exclusively for users and influence actions in a positive way, with one of the following processes: (i) *standalone* or (ii) *networked*. The *standalone*, as a single process can handle up the entire simply configured simulation "world" of the system (including the communication protocol). On the other hand, *networked process* has various aspects of the simulation, which are separated and asserted among multiple geographical areas (grids), which can exist on different "virtual" machines. Indeed, the potential scale is being enlarged, as the number of users grows with exponential rate, according to: (a) the overall atmosphere of the class (emotion, motivation, presentation and link to the original objectives of the course), (b) the possibility of reaching alternative ways for one or more disciplines, aiming to optimize student's performance, (c) the use and treatment of primary learning context-action and investigate their own without inhibitions and "must", but with proper guidance and feedback, and (d) the interaction between "digital natives" (students) at the same time, within virtual environment.

The "technocratic nature" of SL completes on user's computer screen a three-dimensional (3D) virtual reality (VR) networked system for supporting communication and collaboration, with geographically distributed users, over 18 years old. Despite the fact that first creative conception of SL was not being planned for any particular scientific research program, as it opposed from almost all 3D VR "systems," but clearly for entertainment. Among the factors of impressing, it doesn't prevent some universities to use it as "educational tool" for organizing, managing and transferring their "knowledge field" (de Freitas et al., 2010; Inman et al., 2010; Pellas, in press). Thereof, we can easily understand that the production of the dynamic dimensions can make the 3D VR and especially virtual worlds not considered as simple simulations, but as "idioms," parts of the whole educational environment, which enables us to change the whole educational "status quo." Pretty remarkable is that every educational institution can use SL as a "*canvas*" to create secured grids and enhance experimental learning activities. This distinctive characteristic indicates that users are discovering new areas of interest and become practically "*seekers of knowledge*" and not mere recipients of directives and regulations. Furthermore, theoretical underpinnings from prior studies (Hanze & Berger, 2007; Pelet et al., 2011; Slavin et al., 2003) have shown that learning can be evolved in a more satisfactory manner than usual, when the bidirectional communication (interaction), between instructor and students are frequented and directed in students' problems or interests.

Based on these findings, our research effort exploits SL usability, in a real computer laboratory, where students placed at one in all computers, and installed the "client viewer." Approximately, theorizing the nature of our problematic view, it was focused in an effort on whether the frontal teaching and the mentor-instructor, in accordance with each person that is representing as an iconic figure (avatar), can effectively learn cooperatively with peers, even in a computer lab. In this respect VWs come to transform or liberate education from

the way of "instructivist" approach, in a socially collaborative structure, where students are working as communities and briefly play and learn together.

This distinction very clearly indicates the trail that we need to follow for the utilization of the virtual world "Second Life." The main scope of the present study is to utilize and evaluate a collaborative learning process through a case study, which was implemented in the computer lab at Kavala Institute of Technology, with a view of investigating the value of a collective activity.

Research Methodology

The current study was implemented in the middle of April 2012, in order to research first initial trainees' users' expressions from a collaborative activity. Our target-sample was twenty five (25) undergraduate students (7 women and 18 men) from the Kavala Institute of Technology that participated in the case study. They were never experienced with SL, since they had attended to a class, in which we had described the beneficial formalization of SL's educational uses (Pellas, in press). Their participation was voluntary and as a result they have been registered in pairs for the collaborative activity that is depicted below (Figure 1).

Figure 1: Getting the lesson started

Our research was based on an experimental design and on the criteria of the quantitative method, with Likert scale answers (1=disagree to 5=strongly agree). Quantitative (scale) variables were the answers from the main questionnaire and the qualitative (nominal) were the demographics ("Gender," "Leverage on ICT" and "Months of using Web 2.0 applications"). Also, for better processing and reliability of our descriptive results, we used the statistical program SPSS (ver. 20) for setting up the aggregate data connection, configuration, and creation of templates.

In a searching effort to find innovative learning environments, our research questions of this study, are: (i) May Second Life endorse the requirements of the contemporary learning process? & (ii) Can the primary appreciates of students influencing the significantly decision on SL's reuse as an "educational tool"?

Procedure

As it is well-known, Second Life was not thrived for educational purposes, but entertainment and social networking. Although the integration in the field of Web 2.0 and the collective form of interaction via communities, which distinguishes it, gave us the

opportunity to create a collaborative learning process. According to these extraordinary experiences, the contextual framework of the learning process follows the development of an IBL (inquiry-based learning) progression that is proposed by De Jong (2006). Firstly, we averred the orientation of the original idea and main hypotheses, needs of each group analysis, experimentation with creating artifacts, and last but not least we followed the evaluation efforts. Inasmuch as, we have contemplated the design of the user interface, by navigating in many grids that were available for action, as heretofore users try to occupy the graphic designing and the development of visual objects.

The main data was gathered from two sessions, lasted 45 minutes, where students and their instructor have participated. In 1st session students created avatars and learned the basic skills for exploring a virtual space (e.g. teleport, communicate via chat text or voice). Perhaps the most beneficial effort of the 2nd was to separate them into five (5) heterogeneous groups of five (5) students, learning to create exchangeable virtual objects. All of them were physically located in two different computer labs and collaborated exclusively through SL. After the project, students answered a personal questionnaire on demographics, previous experience with ICT and general issues for Second Life, tendency to become involved in collaborative activities and present knowledge, related to their exploration and experiment.

Meanwhile, correspondents are used their personal SL accounts and avatars to log in and teleported to the Info Sic Island (48, 234, 36). There, they met their instructor who guided them to the activity setting workflow. At the first step forward, the instructor was posed the problem and then students had to solve it collaboratively, remaining nearby available to provide assistance. In this attempt, the vast majority of users (students and instructor) communicated via voice, text chat and IM (Important Message) in a shaped classroom. The instructor made a brief introduction to the topic under study and then all students separated into teams to work collaboratively for a specific objective. Another characteristic that is crucial to be mentioned is that students were not really familiarized with the corroboration of Linden Scripting Language (LSL), and the available artifacts (materials or virtual objects and tools for scripting and texturing), but with the guidance of instructor they tried to learn. In this position, they walked outside the classroom, where the activity setting was located. The basic expectation was to find information about the construction of an educational island and then each team tried to configure a texture and presented their thoughts to others. Our featuring inspiration is to build a grid that can be used for Institute's lessons. After finishing the activity, students answered 24 (twenty-four) close-ended questions, for the primary impression report, and 3 (three) open-ended about problems, structural-adhesive future trends and opportunities that SL can offer for the Institute.

Results

Our first intention is to describe the demographic results from users' e-profiles. Mainly, 72% of student population was male, while 28% was female, with an average age of 24 years old (n=25, M_{age}=24, 3, SD=4,32). Indeed, we also see that 64% advocates are in the "middle" level of using ICT. Most adult users have previously been used other Web 2.0 applications (like Facebook, Twitter, Wikis etc.) from over 12-36 months (15%). Initially, even before presenting the results, we investigate the possible association between "Gender" and "Months of using Web 2.0 applications." The findings have shown a statistically significant association between two categorical variables by using the x^2 test control (Pearson Chi-Square) [$x^2 = 12.257$, $df = 3$, $p = 0.002 < 0.05$] (see Table 1).

Table 1: Chi-Square Test

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	12.257[a]	3	.000
Likelihood Ratio	20.378	3	.000
Linear-by-Linear	6.612	1	.012
Association N of Valid Cases	25		

a. 0 cells (. 0%) have expected count less than 5. The minimum expected count is 4.32.

Worth mentioning is that as we observe from the third category (i.e. "Months of using Web 2.0 applications" for 6-12 months), was chosen by 63% of male versus 22% of female participants, who previously used for 1-6 months, something that is more than twice rating. Also, according to the second message of the first table [a. 0 cells (0%)], informs us about whether to satisfy the condition of the validity of the x^2 test, and we want more than 25% of the cells have values less than 5. Thus, for this reason we trust the process of Pearson Chi-Square. From the coefficient correlation "γ" (Gamma) of our vouchers of qualitative variables ("gender" and "months of using Web 2.0 applications"), has a positive independence (γ=0.617), with a fairly "strong" correlation and the level of statistical significance is greater than 0.05 (Approx. Sig=0.712).

Below, we describe our findings, and for the reliability analysis of each questionnaire section we used the Chronbach alpha ("a"). In all tables, we have also compared the Mean indicators (Mean) and Standard Deviation scores (SD) for all quantity variables, with $p<0.05$, as a statistically significant correlation factor of the analysis. Consequently, Table 2 shows the previous "technological literacy" of students. It depicts the fact that ICT can play a significant role in their communication (a=0.731), according to their previous experience in distance learning (see questions 1 and 3).

Table 2: Previous experience with ICT

Question	N	Min	Max	Mean	SD
1. Have you previously attended to any distance learning course?	25	1	3	2.27	1.43
2. Do you think that with today's knowledge of "technological literacy," can encounter any challenge that is presented?	25	1	5	2.83	1.47
3. Have you ever worked with people who were distributed in other places of the world, but their presence was in the same virtual room with your own?	25	1	5	2.98	1.27

From Table 3, we can pronounce that many correspondents were very satisfied with the GUI (Graphical User Interface) of SL (a=0.745), and we are sure that the control panel of SL was not difficult to be configured (see questions 3 and 5).

Table 3: General issues for Second Life

Question	N	Min	Max	Mean	SD
1. Was your first impression with SL positive?	25	4	5	4.17	1.43
2. Were the technical requirements of SL respond	25	3	5	4.34	1.47

satisfactorily to your PC?					
3. Was the GUI met initial requirements to conduct with educational programs for modeling objects, implement seminars or lecture courses?	25	3	5	3.98	1.27
4. During the design of virtual activities, was your system provided the appropriate feedback to facilitate interaction with your peers?	25	2	4	3.96	1.88
5. Was user's interface difficult for controlling your personal elements?	25	3	5	3.93	1.23

Table 4 (a=0.722) affirms that many correspondents used SL's tools and communication channels appeared to be quite good (see questions 5 and 6).

Table 4: Primary estimation and evaluation

Question	N	Min	Max	Mean	SD
1. Was your cyber entity (avatar) looks like you in real-life?	25	3	5	4.43	1.43
2. Was your avatar able to interact and collaborate more effectively with your team?	25	3	5	4.44	1.47
3. Was there a relatively easy way to direct your avatar with the environmental action?	25	3	5	4.78	1.27
4. Did gestures help you communicate effectively with other members?	25	3	5	3.68	1.88
5. Was SL tools (scripts, textures, note cards, menu selection and direct manipulation) easy to use?	25	3	5	4.13	1.23
6. Do you think nearby voice chat and brainstorming - typed applications, exchanging views and ideas, which are being responded from the system?	25	2	5	4.12	1.22

In order to determine the intervention effect on users' learning presence, Table 5 (a=0.625), penned that almost all participants mobilized and worked collaboratively as a team to succeed their scope (see questions 4 and 5).

Table 5: Users' presence in the virtual community

Question	N	Min	Max	Mean	SD
1. Was the instructor informed correctly about the aims of the course and explains why the lesson takes place in the virtual environment, by using SL tools (note cards, IM)?	25	3	5	4.17	2.23
2. During the presentation of the actively participated course, have you been participating in the dialogue and expressed freely your queries?	25	3	5	4.34	2.37
3. Were distributed activities based on your abilities?	25	3	5	4.98	2.27
4. Did you feel comfortable when as an avatar interacts with other participants in the learning process and so you were mobilized as a community member?	25	3	5	4.96	1.83
5. Has the realness of the 3D "window" environment influenced your feedback, both among teammates and instructor, during the creation of artifacts?	25	3	5	4.93	2.22

It is pretty remarkable that Table 6 (a=0.689), articulates students' views were for SL positive. The implementation of our lesson was succeeded, according to our schedule, helping them to study in an alternative way (see question 5).

Table 6: Students' views for the learning process

Question	N	Min	Max	Mean	SD
1. Did the instructor give you clear instructions on how to participate in the learning activities?	25	3	5	4.17	1.23
2. Did the instructor give a specific timetable for learning activities?	25	3	5	3.74	1.17
3. Was the instructor's presence useful for guiding and understanding for the relating course issues?	25	3	5	3.98	1.97
4. Did the instructor keep participants' unflagging interest in the lesson and participate together in a constructive dialogue?	25	2	5	3.96	1.48
5. Did the instructor maintain the concentration of courses, in a way that helped to innovative learn on new research methods and explore collaborative issues related to your knowledge field?	25	2	5	3.93	1.33

Conclusion and future Work

Given the changing patterns of students' engagement with VWs, hitherto higher educators from Greece, have been already recognize that in many disciplines, interactive activities often lie at the heart of effective, deploying learning experiences through SL. Notwithstanding the fact that these interactions took a plenary of forms, through an exploratory study (Vrellis et al., 2010); the study of collaborative techniques, like Fishbowl and Jigsaw (Terzidou & Tsiatsos, 2011) or the role-playing instruction (Vasileiou & Paraskeva, 2010), we haven't already persuade a study with preliminarily findings in a computer lab. Among the limitations with a small sample size and the limited time horizon, therefore it is unable to generalize our findings outside our work population. But, alongside we still believe to the clarified perpetuation and quintessence apex of this project, in conjunction with a qualitative data from students' interviews.

Summing up the aforementioned results, the beneficial affordances from the revamped decision to take initiatives for describing the implementation of SL, caused presuppositions for: (a) the avoidance of the primary "cognitive overload" that usually happens after the introduction of students in the virtual world, (b) the removal of any initial reactions, which are usually exemplified through the unnecessary and excessive use or navigation in the virtual environment, without the necessary feedback and (c) the achievement of a more direct guidance, both directly, with the presence of instructor (face-to-face), and indirectly (through avatars). In brief, this can be considered effective since many "digital immigrants" of the cyberspace are prone to harmful material (intentionally or not) and eventually would like further support, which could remotely be replaced.

Our research proved that SL can be effectively integrated as an "educational tool" of Web 2.0, and a part of the learning approach. Furthermore, for the (i) question is based on users' primary evaluation results that presented above, it is understood that SL combines a variety of visual features, supports communication, cooperation in a virtual community and with the guidance of instructor students improved performance levels by a set of previous

methods. It's important to observe that this platform can support an "open–ended" programming language (LSL), expecting to see its contribution in the future by Kavala Institute of Technology.

The future research, according to the (ii) question, must present and keep up the views of our trainees for the future use of SL. In this respect, it appeared that 67% would like to create and install the Institute in a safe grid, committing lecturing and lab courses that serve them. However, some problems that identified were the lagging (57%), security issues (17%) and the monthly payment rent of a virtual land (12%), something that should be taken seriously into account. Finally, it seemed that students led and managed to "fight" any initial concerns and difficulties and so, 65% put as a future target the implementation through interoperability courses between SL and Moodle, while a remarkable proportion (17%) want to have access in other databases on the learning procedure.

The sustainability and approbation of VWs for addressing learning needs and organizational plaits of 21th century need to further approve is the construction of usable supplementary authoring artifacts, as presuppositions of best design practices for students.

References

Dalgarno, B. & Lee, M. (2010). What are the learning affordances of 3-D virtual environments? *British Journal of Educational Technology*, 41(1), 10-32.

de Freitas, S., Rebolledo-Mendez, G., Liarokapis, F., Magoulas, G., & Poulovassilis, A. (2010). Learning as immersive experiences: Using the four-dimensional framework for designing and evaluating immersive learning experiences in a virtual world. *British Journal of Educational Technology,* 41(1), 69-85.

De Jong, T. (2006). Computer simulations-technological advances in inquiry learning. *Science,* 312, 532-533.

Hanze, M. & Berger, R. (2007). Cooperative learning, motivational effects, and student characteristics: An experimental study comparing cooperative learning and direct instruction in 12th grade physics classes. *Learning and Instruction,* 17, 29-41.

Inman, C., Wright V. & Hartman J. (2010). Use of Second Life in K-12 and Higher Education: A Review of Research. *Journal of Interactive Online Learning,* 9(1), 44-63.

Merrick, K. & Maher, M. (2007). Motivated Reinforcement Learning for Adaptive Characters in Open-Ended Simulation Games. *Proceedings of the International Conference on Advances in Computer Entertainment Technology* (pp. 127-134). Salzburg, Austria.

Pelet, J., Lecat, B. & Papadopoulou, P. (2011). Enhancing learning cooperation through digital virtual worlds. International Conference on Education. *Research and Innovation, IPEDR 18* (pp. 24-28). IACSIT, Singapore.

Pellas, N. (in press). Towards a beneficial formalization of cyber entities' interactions during the e-learning process in the virtual world of "Second Life". In P. Renna (Ed.), *Production and Manufacturing System Management: Coordination approaches and multi-site Planning.* Hershey, PA: IGI Global.

Slavin, R., Hurley, E. & Chamberlain, A. (2003). Cooperative learning and achievement: Theory and Research. In Reynolds, W. & Miller, G. *Handbook of Psychology* (pp. 177-198). Hoboken, NJ: John Wiley & Sons.

Terzidou T. & Tsiatsos, Th. (2011). Users' representation for support collaborative learning 3D virtual environments. *In Proceedings of the 6th International Conference in Open & Distance Learning* (pp. 528-540). Loutraki, Greece.

Vasileiou, V & Paraskeva, F., (2010). Teaching Role-Playing Instruction in Second Life: An Exploratory Study. *Journal of Information, Information Technology & Organizations*, 5, 25-50.

Vrellis, I., Papachristos, N., Natsis, A. & Mikropoulos, T. (2010). Measuring presence in a collaborative physics learning activity in Second Life. In T.A. Jimoyiannis (Ed.), *Proceedings of the 7th Pan-Hellenic Conference with International Participation ICT in Education*, Vol. I (pp. 95-102). University of Peloponnese, Korinthos, Greece.