Applying Second Life to Supplement Classroom Teaching for a Computer Graphics Curriculum

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Abstract More and more colleges and universities around the world are using Second Life (SL) as an emerging vibrant medium for their educational programs. This investigation with analysis is focused on the use of SL to supplement an undergraduate computer graphics course from a private college in China. Data from a survey were analyzed and five unique characteristics of SL as a new educational media were identified. Results for computer graphics suggest that SL can enrich traditional classroom teaching and can further engage students for deeper learning.

Keywords: Virtual worlds, Second Life, computer graphics education, avatar.

1. Introduction

Second Life (SL) is a web-based virtual world developed by Linden Lab launched in 2003. SL supports multimedia communication, virtual collaboration, and highly scalable 3-D content creation. Today, SL is perhaps the most popular virtual world platform and has great potential for teaching and learning in higher education [1-3] [9]. In 2010, over one million registered users logged in SL during a 30-day period of time. Today, colleges and universities across the world are utilizing SL in various curricula to supplement teaching and learning [10-11]. This qualitative study has two major purposes. The authors intend to explore how Second Life can be incorporated into classroom teaching to enrich computer graphics education.

This investigation will showcase how an SL project was designed, developed, and implemented in a computer graphics. Second, the authors are interested in identifying unique characteristics of Second Life as a new learning medium technology[12-13]. A survey was conducted right after the implementation of the SL simulation. Five major characteristics of SL as a new educational medium from preliminary data analysis will be discussed in detail in the finding section of this paper [14-16].

2. Literature Review

Early in 2005, Dede predicted that emerging multi-user environments (such as SL) in which users’ avatars interact with each other would supplement the standard desktop interface [7]. He further concluded that higher education institutions could prosper by using this emerging technology to deliver instruction. Tom Atkinson wrote a series of paper on SL as a new virtual learning environment. From the perspective of learning theories, SL predominately uses constructivist theory and social learning theories; constructivist content and social interactions may result in more robust learning environments that create opportunities for engaging learners.

Second Life has the capability to simulate a traditional classroom. SL permits academic institutions to create their own virtual campuses and tailor content to address specific needs and interests of the learners they serve. Media support in SL includes streaming audio and video for sound effects, music, movies, and voice with proximal settings so those who are farther away sound softer.

In addition, SL’s virtual environment is immersive in nature, which means it generates a 3-D image that appears to surround the user. In 2005, Jones, Morales, & Knezek studied how immersive virtual worlds might affect students’ attitudes towards virtual learning [8]. According to their study, virtual worlds have the potential to “bring the experience of distance education closer to face-to-face education”. SL’s platform is user friendly and rich in visual media and it offers powerful interactive capabilities that even a novice can use to simulate complex activities with engaging game-play qualities for learners. Furthermore, SL is more than just a game. Unlike most games, SL imposes a flexible learning environment and supports a “sense of place” and open-ended options that allow users to create objects for economic gain and to interact in almost unlimited ways.

In 2007, Boulos, Hetherington, & Wheeler provided an overview of the potential use of SL in healthcare education[4]. Their study indicated that SL provides a virtual environment where students are allowed to practice learned skills and make mistakes without serious consequences. They also pointed out that the immersive nature of SL makes simulations more real for learning. As
a result, SL can be a very effective tool for online simulation in healthcare education. In 2009, Beard, Wilson, Morra, & Keelan also pointed out that SL offers unique design features for training health professionals[5]. Furthermore, they concluded that behaviors from virtual worlds can translate to the real world. Bransford and Gawel further pointed out that virtual worlds offer educators a wonderful solution as they make it possible to create interactive learning experiences that would be hard to duplicate in real life[6]. This is significant for computer graphics education as its curricula are training students’ technical skills in the hospital setting and there is a need for simulations to augment learning. For example, in 2006, UC Davis built a mental health clinic in SL where visitors can experience auditory hallucinations from schizophrenic patients.

3. Method

The subjects are from an undergraduate computer graphics course, with a total of 50 students enrolled in the Spring 2012 from a private college in Yangtze University of China. The survey contained six multiple-choice questions on a scale along with one open-ended comments box to obtain qualitative information from the students. A total of 46 surveys were collected after the simulation demonstration. Data were analyzed using content analysis, which consisted of taking all survey inputs, classifying key words and phrases by using the method of coding. The results of the content analysis revealed five major characteristics which will be discussed in detail in the findings and discussions part of this paper.

3.1. Scenario Description

To begin with, a faculty member from the Computer graphics of computer graphics course was identified, and was very interested and motivated in using SL in her class. Next, an appropriate scenario was selected, a complication of pregnancy resulting in hypertension and abnormal protein in the urine. Traditionally this content can be challenging for students and it was often difficult for technical faculty to provide technical experience for students with this type of patient. Simulations, mannequin-based or Internet-based, can offer technical application opportunities to supplement and enrich classroom teaching. Due to the drawbacks of the mannequin-based simulator, Second Life was chosen as the main medium to deliver the simulation. Students are often able to understand, apply, and retain knowledge more effectively when there are technical application opportunities for them[17]. Written objectives of the scenario and a written outline of pertinent technical information on the virtual patient in Second Life were given to the students.

3.2. Design and Development

The first step was to create a premium account in SL so that land could be purchased or auctioned. A group was then created in the account and the land was restricted to only allow designated avatars to access. This helped avoid unnecessary intrusion or grieving by unexpected visitors. Since it is very time consuming to build the house from scratch, a prefab house was more practical: the land owner shopped around in SL where there were many prefab houses on the market for sale. The house with four rooms was purchased and one room in the house was designated to be the microteaching room.

Some of the microteaching equipment could be built from scratch such as a weight scale, microteaching sink, presentation board (to display microteaching history and condition), etc. However, for more complicated equipment, it was more practical to shop around in SL and purchase what was needed.

A avatar was then designed and was chosen to be the patient. Again, to save time, a pregnancy skin was purchased and it was worn by the female avatar to simulate her appearance.

Faculty members were then trained to use SL. This training phase was divided into two parts: orienting SL and rehearsing the scenario. It was fairly easy for faculty to get started in SL as its interface was very user friendly. The rehearsing part came right after the orientation. The rehearsals helped to further refine the room setting and role play script.

3.3. Implementation

This SL simulator was brought to the classroom after some rehearsals between the instructional technologists and the faculty members. One nurse avatar and the pregnant patient avatar logged in SL and went to the OB clinic room to simulate the scenario. The whole scene was projected on the screen for the entire class. The computer graphics instructor controlled the pace of the whole simulation as she frequently asked questions and evaluated feedback from the students[18-19]. The main communication between the nurse avatar and the patient avatar was conducted in audio dialogue format. The conversation focused on the patient’s microteaching history and current symptoms. Also through the conversation and the tone of voice, a high level of anxiety was simulated. The avatar weighed on the scale. The parameter was read off the screen.

By changing the touch script attached to the, hypertensive vital signs were simulated. To help reduce the patient’s anxiety and blood pressure, the dark room environment with dimmed lights was simulated by adjusting SL’s environmental setting to midnight. Next, due to the patient’s hypertensive symptom, the common left lateral position was simulated by turning the avatar to the left side on the bed. Then, the computer graphics instructor gave instructions on medicine dosage calculation on the presentation board in the room.

After the IV infusion and bed rest, the machine was clicked again to tell the class the patient’s anxiety level
and blood pressure were well controlled. The scenario ended. A survey was administered right after the simulation.

A total of 36 surveys were collected through the course management system. After a detailed review of the survey data, students’ overall perceptions of using SL as an instructional strategy were positive.

- Second Life format improved their understanding of the theory content associated.
- Second Life scenario assisted them to engage in the problem solving.
- Second Life format improved their ability to apply the theory related in the technical setting. Only 2 (6%) students disagreed on the above statements and 1 (3%) student was undecided.

27 (77%) students reported that the Second Life format provided a satisfactory mechanism for reviewing a dosage calculation, while 5 (14%) disagreed on this and 3 (9%) students were undecided. 29 (81%) students enjoyed using the Second Life format to assist with their learning, while 3 (8%) students disagreed on this and 4 (11%) students were undecided. After a detailed content analysis of the open-ended question, major coding categories were identified, and the following five unique characteristics of SL as a new educational media emerged.

3.4. Designing courses in Second Life

Whilst theories of learning have never been static, the distinction between and across the approaches, cognitive, developmental and critical pedagogy continues to be eroded. There is increasing focus in the 21st century on what and how students learn, and on ways of creating learning environments to ensure that they learn effectively, although much of this remains contested ground. New models and theories of learning have emerged over the last decade, which inform the development of learning in Second Life. For example, the work of Trigwell et al. (1999) on teachers’ conceptions of learning offers useful insights into the impact such conceptions have on student learning. Yet, the work of Meyer and Land (2006), Haggis (2004), and Meyer and Eley (2006) have been critical of studies into conceptions of teaching and approaches to learning. Thus with the shift into Web 2.0 technologies, and the increasing focus on learning and interaction through social networking, it may be advisable to develop academic regulations that fit more effectively with these approaches to learning than the objectives model of education. For example, a learning outcomes model of education has a focus in terms of what the students must do and what content they must cover, what is measurable and recordable. This model is teacher-centered. Perhaps it would be increasingly appropriate to adopt a more flexible approach when designing courses for Second Life, which reflects the principles and practices of social networking. An example would be the intentional model of course design, which focuses on a notion of responsible learning embracing the idea that learning, rather than teaching, is central to higher education. It is a student-centered approach, so it is the “intentions” of the teacher that are described, what the teacher “expects”. The focus then is on multiple models of action, knowledge, reasoning and reflection, along with opportunities for the student to challenge, evaluate and interrogate them. Thus in this model effective teaching is designed to change society in substantive ways. The idea then would be to utilize the notion of learning intentions rather than objectives for Web 2.0 curricula. Theoretically this is based on both Stenhouse (1975) and Pratt et al. (1998) combining Stenhouse’s notion of “induction” and Pratt’s notion of Social Reform [20-21]. This would provide a different course design rhetoric which is more resonant with many of the practices we actually use already and allow for the possibility of “regulating for flexibility”. Thus, the curriculum becomes based upon the idea that knowledge is contested and speculative, and thus although content is specified there is not necessarily disciplinary structure. This learning intentions model focuses on equivalence of experience, since in any system of higher education it is not ultimately possible to ensure equity. The focus is on quality learning, whilst acknowledging that quality is not unproblematic.

4. Getting Started With Second Life

4.1. Communication: three ways

(1) Local Chat
Avatars within a ten-meter range of each other can communicate via the Local Chat text box. Type content into this box and press “Say” to speak to other avatars. You can also choose the option “Shout”, which has a louder range if you want avatars further away to hear you. To view a history of all chat, click the ‘local chat’ button.

(2) Instant Message
The second way of communicating in Second Life is via private Instant Message. Click the “Communicate” button at the bottom of the screen; choose the “Contacts” tab and then select whichever avatar you wish to talk to from the list of “Friends” or, if you wish to communicate to a number of people, “Groups”. Clicking the IM/Call button on the right brings up a window in which you can chat privately to another avatar.

(3) Voice Chat
The third method of communication is via voice chat. If a person has a microphone and speakers/headphones, their voice will be projected into Second Life so that those who have voice chat enabled will be able to hear them and can respond accordingly, either by text or voice as well. To enable voice chat, go to Edit>Preferences>Voice Chat and tick the box. A button at the bottom right of your screen will then appear labeled “Talk”. By holding down this button, other users in Second Life will be able to hear your voice, provided your microphone is plugged in. Like
4.2. Issues of facilitation or course design

Early work on exploration of the role of different staff was carried out, which identified five types of course design teams for distance learning, which are summarized below:

Type 1: A university lecturer who is solely responsible for developing and running an online course. They may have had some experience of online learning but may not have worked as part of a team or know the literature on online education.

Type 2: A university lecturer who co-authors with educational technologists.

Type 3: A learning technologist or a group of learning technologists who are responsible for developing a course.

Type 4: University lecturers, learning technologists, graphic designers, editors and media specialists who work together as a course team and develop a course, for which they are jointly responsible.

Type 5: An expert online teacher and experienced faculty member who is aware of the educational and technical issues of online learning, and uses the support of a learning technologist for preparation of course materials.

These are the delineations of the types that are often seen in the design of immersive virtual world programs. What tends to happen most often is that the education drive for developing immersive virtual worlds comes from the Type 1 facilitators, who then seek support from one another and maybe also a learning technologist. The module or course is thus pedagogically driven but the materials are not always well designed in terms of learning technology. This then introduces issues as to what counts not just as good design but also as good facilitation.

4.3. Simulating Real Life Experience

SL provides a unique and flexible environment for students to simulate real life experience, practice skills, and reinforce concept understanding. Student A commented:

“I think that we should use this (SL) more often in class because it gives a real life visual perspective of different concepts.”

In the scenario described above, SL successfully simulated a real hospital or clinic situation in which students had to do critical thinking in order to make the most appropriate computer graphics interventions. Student B echoed in a similar way:

“I really enjoyed this, it really gives you an idea what to do before you get into the hospital.”

4.4. Engaging Learning Environment

The immersive nature of SL makes the learning environment more vivid, interactive, and highly engaging. The 3-D virtual environment makes learning and exploration more realistic. At the same time, SL’s powerful multimedia capability makes learning more compelling. For example, at a click of a button, students could hear the baby’s fetal heart tone, and also enable them to count the number of beats for 30 seconds together. Here is student C’s comment about the simulated environment:

“Very helpful, I could actually pay attention. More simulation like this would be helpful.”

SL’s immersive learning environment is different from simply viewing media, emailing, text-based chatting, or even attending traditional classrooms. Through synchronous or asynchronous interaction and role-playing of social context, SL emerges as a powerful tool for engaging learners. Student D made the following remarks:

“I think that SL is very helpful. It sort of puts you in the technical experience so you can apply the information you’ve learned. Very good learning tool.”

4.5. Supplementing Regular Classroom Teaching

SL is not meant to replace traditional teaching and learning but it can serve as a great supplement to regular teaching activity. It reduces class-meeting time while retaining the basic structure of the traditional course. Here is what student E said in the survey:

“SL was a great learning experience and I hope that we have more opportunities to utilize the simulation.”

4.6. Mitigating Challenging Content

SL provides virtual simulations that real-life teaching can’t provide. Through SL simulations, students will better understand challenging concepts. This feature makes SL stand out from other new media. For example, the scenario designed in this study was to provide computer graphics care for a patient diagnosed. The major reason why this scenario was selected was that the computer graphics students typically do not have the opportunity to care for this type of complicated patient while in the hospital technical setting. So this simulation in SL actually fulfilled the need. Below is how Student F described his thoughts in this regard:

“Great program. SL was really helpful in better understanding the situation, and how it would play out in real life. Let’s do more of it!”

4.7. Improving Content Retention

SL offers an engaging learning environment where students may potentially experience deeper learning and demonstrate positive behavioral changes in SL rather than from simply viewing media or communicating through
email, text-based chat rooms, or even attending traditional classrooms. Student G affirmed it:

“Since some of us learn better in the technical setting than from just reading books and listening to lectures, I feel this (SL) was a great addition to the curriculum which helped me to learn and retain much more than I normally would.”

5. Virtual World With Second Life For Live Event

5.1. How Can SL Meetings Possibly Be Better Than Real Life

The image below was captured during an SL panel session when IBM and Linden Labs discussed their joint effort to create portability and interoperability standards among the different virtual worlds. The session was conducted entirely in text chat (other sessions have been done in voice, voice with slides, or video). Regardless of whether the panelists/presenters use voice, video, or text, audience members are free to contribute thoughts and questions in the text window at any time during the session. Panelists see these comments in real time and can choose to respond or ignore them; they can effectively incorporate these thoughts and questions into an integrated whole with the rest of their content. The characteristics of SL support kind of interaction because, in SL, it is non-intrusive; but the real-world equivalent (shouting a question from the audience) would not be tolerated during an in-person event.

In addition, note the tabs along the bottom of the text window. Each tab opens onto a different conversation. Although you can’t make out the blurred text, there is the main tab housing the public discussion in this space; then comes a tab wherein I was IM’ing questions to Ziggy Figaro, the panel moderator (another accepted form of interaction); in another I was asking technical advice of the island's operations manager and hostess, Rissa Maidstone; in another, having a personal discussion with a colleague; and finally, the last tab is for a group to which I belong, members of which were in attendance. The same factors that make SL a great meetings forum also make SL a great place to foster community. But do not make the mistake of viewing SL as a “3D Web”; while the Web is all about human interaction with automated systems (think eBay, Amazon, Google), Virtual worlds are all about human interaction with other humans. They represent the emergence of a brand new communications paradigm. But what's new and important about virtual worlds is their synchronous communications directly among live human beings.

5.2. What Should A Business Media Company Do

That human-to-human connection is what B2B marketers crave business media is, in the end, all about connecting buyers and sellers. Virtual worlds eliminate all the real-world pain-in-the-neck barriers to face-to-face meetings, and replace those barriers with an easy-to-scale learning curve in the use of a technology tool. Second Life complete, so the answer to the question in bold will vary by market segment, as follows: the more technically savvy your audience, the more quickly you must move to develop in Second Life a community for your brand's audience form around. Otherwise, as history has shown through the rise of the Internet, someone else will provide a community for them.

Many companies were blindsided by the sudden rise of the Internet. Don't let it happen to you. Also, when I say “the more technically save your audience” I don’t refer only to audiences for technical subject but rather an audience for any subject.

5.3, Facilitating learning in Second Life

One of the central principles of facilitating immersive virtual worlds is that until we understand our own pedagogical stance (i.e. what we believe and stand for in learning and teaching) it is difficult to operate effectively as an immersive virtual worlds facilitator. Thus until we understand our own views about teaching and our ideas about collaboration in online spaces and are able to consider the issues of student responsibility, it is difficult to locate ourselves in these complex spaces. Therefore a useful starting point is to ask yourself about how you see your position as a facilitator in immersive virtual worlds:

- How much guidance do I expect to give to the students?
- How do I expect groups to work?
- What do I believe are the students’ roles?
- How do I see the relationship between immersive virtual worlds and the rest of the curriculum?
- What is the nature of the problem scenarios used in problem-based learning and assumptions implicit within the construction of these scenarios?
- What do I see as the relationship between immersive virtual worlds and the assessment methods?
- How have I will I create space that enables students to reflect upon individual and collective goals?
- Some things to consider at the outset include:
  (a) Ensure you know the scenario you are facilitating and also the learning objectives/intentions you would expect students to address in the session.
  (b) Before you facilitate in-world, it is a good idea to try out the scenarios so you understand how they work.
  (c) Know the target audience (in this case the students) who are going to be taking part in the
session, so that you understand the level of knowledge they will apply to the scenario.

5.4. Getting started as a facilitator

Although it is possible to plan the program well in advance and arrange for staff members to undertake an e-moderation program, there are some principles of facilitating immersive virtual worlds that differ from other models of e-moderation, in which Second Life facilitators should:

1) **Guide but not interrupt.** There is a tendency, particularly at the start of a session where students are presented with a new problem or activity, to interrupt or even pre-intervene by asking leading questions before the team have had a chance to discuss the problem. For example, if there is silence some staff will begin the scenario for the students by asking a question. It is better to wait, or to ask a gentle question such as “what are the team thinking about this?”

2) **Represent etiquette.** Although much has been written on online etiquette (netiquette) there are differences in immersive virtual worlds, particular in relation to respecting silence, promoting student autonomy, and not interrupting when flaming occurs. This is largely because if facilitators interrupt or take control, the locus of control shifts to the member of staff and the team do not deal with the problem or conflict themselves. There is a delicate balance here, but it is important for staff to model this and also to help students develop ground rules for their own team.

3) **Acknowledge and use prior experience.** Many tutors feel that becoming a facilitator seems to be such a different role when they first begin that often they forget to draw on their prior experience. For example, one approach might be to reflect on the experience of being supervised in a research project. Often the supervisor guides the students in the early stages of the project, but towards the end the students may overtake their knowledge base. Another option might be to imagine the facilitator role as being that of a nondirective counselor who uses reflection and questioning rather than direction.

4) **Recognize that being a facilitator means also being a learner.** This might mean learning to develop the capabilities of a facilitator and learning new knowledge with and through the students. The process of becoming a facilitator also demands developing and understanding the way in which facilitator and team influence one another in the learning process.

5) **Ensure that the team’s concerns are heard.** Active listening skills are a prerequisite to good communication and are one of the most effective tools for helping online teams manage conflict. There is often an assumption that “hearing” what is occurring online is very difficult, but learning to read the subtext of discussion forums and chat sessions is a skill facilitators need to develop. Although this is complex to begin with, the ability to read team interactions in online spaces does develop over time.

6) **Listen and lurk positively.** There is often a tendency, after using straightforward online learning, to retain control rather than granting it to the students. The notion of “lurking” often seems to imply that silence and watching are inherently bad, but students often need to watch and listen in immersive virtual worlds, so it is important not to confuse lurking with thinking space.

7) **Provide supportive interventions.** It is often easy to assume that not intervening means maintaining silence, but it is useful if students “know” you are part of the discussion. Rather than just lurking it is helpful to students if the facilitators add some remark that illustrates they are listening and supporting the learning, but in a way that does not interrupt the students’ discussion. Although this is difficult, statements such as “I think this an interesting discussion” or “would all the team agree with this?” are useful general statements for supporting students.

8) **Promote personal reflection.** Rather than weaving and summarizing the discussion as a facilitator, it is possible to encourage the students to reflect and summarize their own discussion and stances at the end of a given time period or problem. This encourages not only group reflection but also the synthesis of the process of what has occurred, as well as the synthesis of the information that has been collected and collated.

9) **Encourage team criticality.** One of the most difficult capabilities for students in immersive virtual worlds is in taking a critical stance. Many of those who have researched immersive virtual worlds report that there is a tendency for students to focus on the process of learning and the information collected, rather than taking a critical stance towards the way they are working and the knowledge produced. Ways of encouraging the development of criticality include suggesting the use of a team wiki, using blogs for assessment and asking students to summarize and critique each other’s contributions. The latter activity is very demanding of students and often difficult to do, but if the teams have been well supported and are cohesive this is often a possibility. One way of beginning this process is to use interesting activities within the team which are competitive, such as treasure hunts, but where the team themselves have to decide which team member wins and say why this is.

10) **Use intuition.** In the context of immersive virtual worlds little attention has been given to the role of intuition in facilitation. Arguments abound as to whether uploading handouts and detailed lecture notes onto WebCT/Blackboard is something that helps or hinders student learning. Yet both staff and students’ stories of their experience of immersive virtual worlds would seem to suggest that intuition is very much part of the process of learning and facilitation. Facilitators often speak of knowing when the team is going well, and also of recognizing times when there were difficulties in the team, although they could neither define nor verbalize how they knew these things.
6. Summary And Recommendations

This qualitative study had two major purposes. First, the author intended to explore how Second Life could benefit computer graphics education. Second, they were interested in identifying unique characteristics of Second Life as a new learning media technology. Fifty-one students in the undergraduate course, “Computer graphics of Childbearing Family,” during Spring 2012 participated in the SL learning experience. A total of 36 surveys were collected and data was analyzed. Students overall perception of using SL as an instructional strategy were positive. Five characteristics of Second Life as a new educational media had emerged: simulating real life experience, engaging learning environment, supplemental to regular classroom teaching, mitigating challenging content, and improving content retention.

However, when integrating Second Life into other healthcare curriculum, here are some recommendations to be considered:

- SL users need a high-end computer with a supported graphics card and a broadband Internet connection. The dial-up connection does not support SL adequately. The authors also found that, generally speaking, a hard-wired Internet connection is substantially faster than a wireless connection.
- The land in SL has a certain number of prims. The bigger the land is, the more prims it would allow. Often times additional land or even an island is considered if more prims are required. Second Life doesn’t allow purchasing more prims if the land is not enlarged.
- Disruptive players presented a serious issue in SL. If the land is publicly accessible, these disruptive players may interfere with classes and negatively impact the student experience. For example, one day when the author was building up the classroom in his land, he encountered an exotic dancer and she danced and exposed herself for about 10 seconds before flying away. Later the authors denied the land for public access and set it as only accessible by their own group. That means other new avatars need their permission in order to access the land and building.
- It can be very time consuming to build simulators from scratch in Second Life. Although shopping around in Second Life may be a temporary solution, often it is still difficult to find what is needed. For example, most of the objects the authors purchased in Second Life are only copyable and not modifiable for further scripting. The major reason is that the designers of these objects are afraid of the buyer making changes and selling the objects for profit. The strategy is to work around it by pasting a thin cube on the item and put the script on that thin cube.

References


