Second Life as a Medium for Lecturing in College Courses

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Abstract
Second Life is an online virtual world that is gaining popularity in academic institutions as an alternative means for collaborative and distance education. However, the number of formal research efforts that assess the impacts of an educational experience in Second Life is limited. In this paper, we present the results of a pilot study that used a quasi-experimental pretest-posttest comparison groups design to compare the experience of a Second Life lecture to a real world lecture. We found that those who attended the real world lecture performed significantly better on a posttest quiz than those who attended the same lecture in Second Life. Comments on a survey given to the Second Life students indicate that while some enjoyed the experience, students encountered many difficulties, such as problems viewing the lecture material, and a lack of constraints on avatar behavior in the educational setting.

1. Introduction
For many, the idea of using the Internet as a learning environment has great appeal. The ability to attend class from the comfort of your own home can be both convenient and economical. Currently, many academic institutions around the world offer online courses to supplement their curriculums. Some, like the University of the Phoenix, offer entire degree programs online (http://www.phoenix.edu/). By 2006, as many as 3.5 million students were participating in online education [1]. While the number of online courses is vast, potential drawbacks with such courses include students feeling a lack of social presence and awareness, problems with the technology, insufficient attention from the instructor, and delays in communication [2, 10, 19].

Recently, a number of institutions have begun to experiment with virtual worlds as a way to enhance online education [4]. Research has shown that factors such as social presence and a sense of belonging can improve someone’s willingness to participate in virtual communities [7, 8], and an enhanced sense of presence can help students to perform learning tasks successfully [15]. Massively multiplayer online role-playing games (MMORPGs) like Everquest and World of Warcraft (WoW) allow users to interact with other players around the globe as they complete tasks together. For many, the appeal of these games is that they offer users a high sense of belonging and community. By 2007, WoW had over nine million subscribers, and now more than 200 universities are experimenting with MMORPGs as a medium for learning [12] to capitalize on this fascination with collaborative telepresence.

The virtual world Second Life [18] has become one of the most popular tools to facilitate collaborative online education [4, 17, 20]. Similar to the PC game The Sims (http://thesims.ea.com/), players control an avatar version of themselves to communicate and socially interact with others around the world. Second Life allows users to modify their avatar’s appearance, build structures, and even purchase land. Some have constructed their own virtual learning environments in Second Life for faculty and students to interact and develop a “sense of community” [2]. Our university

Figure 1: An academic building in Second Life. (www.secondlife.com)
has created a Second Life representation as well (one of our classroom buildings is shown in Figure 1). Virtual worlds like Second Life have the potential to “encourage social groups to form” and support “a culture of collaborative learning” [3] in ways that are not present in traditional online courses.

While it seems that the use of Second Life for academic purposes is on the verge of explosion, the actual understanding of the impacts of Second Life for teaching and learning is limited. Some research issues related to the use of virtual worlds for education include how to develop virtual classrooms that best promote learning; how the role of a lecturer changes in a virtual classroom; and how learning in a virtual world compares to real world learning [6]. The goal of this paper is to begin to address the last question. Specifically, we are interested in how Second Life compares to a real world classroom environment as a medium for conducting lectures in an undergraduate college course. While there are those who suggest that virtual worlds will not replace traditional forms of learning, and that virtual worlds offer much more than just the potential to fill virtual classrooms with virtual students [3], we feel it is important to understand how Second Life lectures compare to traditional real world lectures to begin to appreciate the ways to best leverage this technology for conveying subject matter to students.

The remainder of this paper is arranged as follows. Section two discusses related works with an emphasis on educational practices using Second Life. Section three describes our experiment to compare a Second Life lecture to the corresponding real world experience. Section four discusses the results of this experiment, and section five presents our conclusions.

2. Related Works

Universities like Harvard, Pepperdine, Ball State, and the University of Tennessee have all held Second Life classes in disciplines such as Law, Education, English, and Medicine [9]. Others have used Second Life to enhance experiential learning projects [13]. Teaching in Second Life has advantages for instructors such as being able to “illustrate points visually as well as verbally with minimum effort [5],” and encourage otherwise introverted students to participate in classroom discussions when they might not in the real world [2, 17].

Ye et al. [20] conducted a formal study to evaluate two educational software engineering (SE) group games that could be played in Second Life. Students in an SE course played the games in Second Life with their classmates and completed surveys that asked about their experience. Overall, 93% of the students surveyed found the first game either “definitely helpful” or “somewhat helpful” for learning the demonstrated concepts. Similarly, 92.3% of the students found the second game helpful. What was not clear from the study was the difference (if any) of playing the game in Second Life as opposed to the real world.

Ritzema and Harris [16] surveyed two groups to determine if Second Life was suitable as a medium for teaching computer science concepts to students. The first group consisted of non-majors that completed an online training session in Second Life. The second group consisted of third-year computer science students who used Second Life to participate in a laboratory activity. In the first group, 100% of users were able to complete their task, and 93% found their overall experience to be enjoyable. In the second group, 83% of participants recommended that Second Life be utilized in the future for computer science courses.

As we conducted our literature review, we were surprised at the lack of formal evaluation studies that assessed the impacts of educational experiences in Second Life, and in particular, comparing these experiences to the real world. We hope that this research will encourage other formal studies that evaluate teaching and learning practices in Second Life. The next section describes the experiment we conducted to compare a Second Life lecture to a real world lecture.

3. Experimental Design

To compare learning in a Second Life classroom to that of a traditional real world classroom, we conducted a pilot study that used a quasi-experimental pretest-posttest comparison groups design. Quasi-experiments use groups that have been already formed, rather than randomly assigning subjects to groups. Such studies are common in educational research when the groups consist of classes that are already in place [14]. The pretest-posttest structure of the experiment allows the researcher to measure the actual impact of the treatment by accounting for any previous knowledge or experience subjects may have with the material. The remainder of this section describes the details of our experiment.

3.1. Subjects

Two groups of students participated in our experiment. The first group, the control group, consisted of students from the first author’s Computer
Graphics course. The second group, the Second Life (SL) group, consisted of students from the first author’s Human-Computer Interface (HCI) Design course. One advantage to having HCI students participate in this study was that their knowledge of usability and interaction design gave them insight in how to critique their learning experience in Second Life. The control group contained 13 students, and the SL group contained 15 students.

Both groups attended a lecture on the same topic. However, the control group attended the lecture during one of the regular class periods in the computer graphics course. The SL group attended the lecture in one of our campus’s Second Life classrooms during a time period reserved for the normal class meeting.

3.2. Materials

To quantify the amount of material subjects were able to learn in both lecture environments, subjects took the same quiz before and after receiving a lecture on the quiz material. In order to ensure that no individual in either group had an unfair advantage on the quiz, we chose a topic about which we felt most of the students would have little prior knowledge: college wrestling. A quiz was constructed with 20 questions about NCAA College wrestling. The quiz questions are shown below:

**College Wrestling Quiz**

1) Where was the NCAA Division I Wrestling Championship held this year?
   1.1) Who won the team tournament?
   1.2) What was the highest place by a wrestler from California?
   1.2.1) Where was this wrestler from?
2) What university has won the most NCAA Division I championships?
   2.1) How many championships has this University won?
   2.2) Who is the coach of this University?
   2.3) How many world freestyle wrestling championships did this coach win?
3) What University has won the most Division I NCAA championships in the last 35 years?
   3.1) Who is the coach of this University?
   3.2) How many individual NCAA championships did this coach win?
4) Name one of the two Universities that have won the most NCAA Division II championships?
5) What college has won the most NCAA Division III championships?
6) A takedown is worth how many points?
7) An escape is worth how many points?
8) A reversal is worth how many points?
9) When one wrestler exposes the back of the opponent to the mat, that wrestler can earn 2 or 3 points (depending on how long the back is exposed). What is this called?
10) When one wrestler holds the top position for at least one minute longer than the opponent at the end of the match, this wrestler earns 1 point. What is this called?
11) How many periods are in a wrestling match?
   11.1) What is the total length of the match?

The lecture material was delivered using PowerPoint slides developed by the authors. One such slide is shown in Figure 2.

**Figure 2:** The lecture in both environments made use of PowerPoint slides such as the one shown above.

Following the lecture, subjects in the SL group also completed a survey (developed by the second author) that asked about their experience attending a lecture in Second Life. The survey questions are shown below:

**Second Life Class Survey**

1. Are you male or female? Circle one
   Male  Female
2. Do you regularly use a visual online program like Second Life to communicate with others? Circle one
   Yes  No
3. If yes, how many hours a week do you spend in them? Mark an X where appropriate:
   0-3  4-8  9-13  > 14
4. Do you think that you learned the material sufficiently through Second Life? Circle one
   Yes  No
5. Do you think that your knowledge of the material would be the same, less, or greater if you had learned the material in real life? Circle one
   Less  Same  Greater
6. Circle a response to the following statement that corresponds most to your opinion
“In the future, I would attend another lecture in a virtual world if it was offered.”
Strongly Agree Neutral Disagree Strongly Agree

7. Overall, did you find learning material in Second Life enjoyable? If so, what were some of your favorite parts of the experience?

8. Did you encounter any problems, difficulties, or general frustrations with using Second Life as a lecture environment? If so list a couple of them below:

9. If you could improve the experience of learning material in Second Life, what would you change or add?

3.3. The Second Life Lecture

In order to prepare for the Second Life lecture, students in the SL group spent one class period creating avatars and completing the Second Life tutorials. As mentioned previously, our university has a Second Life island with models of several campus buildings. One of these buildings contains a terraced lecture style classroom to which avatars can come for a presentation (see Figure 3). After completing the Second Life tutorials, students were shown how to teleport to the university’s island and how to locate the classroom. This room was reserved for the Second Life class meeting, which took place during the next regularly scheduled HCI class period. The classroom contained a podium towards the front of the room behind which the lecture’s avatar could stand and look out towards the class (see Figure 4). The PowerPoint slides were presented on the large board behind the lecturer (see right side of figure 3).

Prior to the lecture on college wrestling, the SL group was given the pretest quiz through PowerPoint. Students were asked to sign the quiz and state that they did not look up any answers on the Internet. The lecturer (the first author) then presented the college wrestling material, communicating with the students through Second Life’s chat interface. The lecturer explained each slide and gave students an opportunity to ask questions before moving on to the next slide. At the conclusion of the Second Life lecture, the students and teacher met in their real life classroom to take the posttest quiz, participate in a short discussion to talk about their experience, and to fill out the surveys.

3.4. The Real World Lecture

The real world lecture for the control group followed a predictable format. The lecture began with the pretest quiz, followed by the PowerPoint slides being projected onto a screen at the front of the classroom. Students were allowed to ask questions during the lecture. The period ended with the posttest quiz.

4. Results

The results of the pretest and posttest quizzes for both the control groups and Second Life Group are shown in Table 1. To analyze the results of the quizzes, a 2-way Analysis of Variance (ANOVA) was conducted, with group as a between subjects factor and quiz number (pretest or posttest) as the within subjects factor. The ANOVA indicated a main effect of quiz number $F(1, 26) = 152.351$, $p < .001$, indicating that subjects improved between the pretest and the posttest. There was also a significant interaction between
quiz number and group $F(1, 26) = 8.302, p = .008$, indicating that the improvement by both groups was not the same. Thus, there was not a significant difference between the groups on the pretest, but there was a significant difference between the groups on the posttest, with the control group scoring higher.

Table 1: Pretest and posttest quiz results for the Second Life and control groups.

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quiz1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Second Life</td>
<td>1.6667</td>
<td>2.41030</td>
</tr>
<tr>
<td>Control</td>
<td>1.0000</td>
<td>1.35401</td>
</tr>
<tr>
<td>Quiz2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Second Life</td>
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<td>4.04381</td>
</tr>
<tr>
<td>Control</td>
<td>12.6923</td>
<td>3.64314</td>
</tr>
</tbody>
</table>

4.1. Focus Group

After the SL group’s posttest quiz, a brief discussion was held with the students to talk about their experience. The main problem brought up during the discussion was the lack of constraints for student avatars. Some students said that other student avatars standing up obstructed their view, and one avatar even danced around the room, distracting students from the lecture. Another common complaint was the chat box and the constant barrage of questions and comments, many unrelated to the lecture topic. A queue system and a “cool-down” period after making a comment were suggested.

4.2. Survey Responses

The SL group’s survey responses were as follows:

Question 1. Are you male or female?
   Males: 13; Females: 2

Question 2. Do you regularly use a visual online program like Second Life to communicate with others?
   Yes: 5; No: 10

Question 3. If yes, how many hours a week do you spend in them?
   0-3: 11; 4-8: 3; 9-13: 0; >14: 1

Question 4. Do you think that you learned the material sufficiently through Second Life?
   Yes: 3; No: 12

Question 5. Do you think that your knowledge of the material would be the same, less, or greater if you had learned the material in real life?
   Less: 3; Same: 5; Greater: 7

Question 6. “In the future, I would attend another lecture in a virtual world if it was offered.”
   Strongly Agree: 4; Agree: 4; Neutral: 3;
   Disagree: 0; Strongly Disagree: 4

Question 7: Overall, did you find learning material in Second Life enjoyable? If so, what were some of your favorite parts of the experience?

Those who enjoyed the Second Life lecture experience listed reasons such as:

“Having the ability of not leaving home.”

“Its fun playing around but it is difficult to absorb the material”

“Yes, the idea was enjoyable but not with the immature people.”

“I like it, but it was really easy to get distracted. Also, zooming in on the slides didn’t work correctly – the slides were still difficult to read.”

Those who did not enjoy the experience listed reasons such as:

“Not really ‘enjoyable’ but it wasn’t really any different from real life except with all the distractions. One thing that I did like is the fact that you don’t have to wait for someone to stop talking before you can say something.”

“Second Life does not have enough constraints in the world to be conducive to an educational environment.”

“I don’t believe that you can ‘learn’ things in an environment like 2nd Life – the only enjoyable thing for people is goofing off.”

“No, The teacher text comes in as same as students, makes it hard to focus on material. Maybe if ‘Officers’ text was in red or stood out more, it would be easier to follow”

Question 8: Did you encounter any problems, difficulties, or general frustrations with using Second Life as a lecture environment? If so list a couple of them below:

All students indicated that they had least some difficulty using Second Life. Representative responses included:

“Avatar names obstructed view. Slides loaded slowly. Hard to concentrate on slides when looking at chat.”
“1. Non relevant chatting; 2. Lack of understanding of discussion; 3. Some people didn’t take it seriously”

“Just could not stop flying and dancing around. Takes too long to load the pictures.”

“Inexperience with the program. It was a little difficult to control my person. People stood in my view, also the names of the people. The loading was a bit slow, but not too bad.”

“No order of, or queue, for comments. No constraints for learning (sit down at all times during lecture, questions at appropriate queues, etc.). Graphics & CPU intensive (Lag).”

“Yes, no one takes it seriously so nothing gets done. Genuine questions have the potential to be missed and stupid questions people would never ask in class are easily asked.”

“Basically classroom disruption was the major issue. If there was a way for the professor to moderate the students.”

**Question 9:** If you could improve the experience of learning material in Second Life, what would you change or add?

“Mute the chat of other members”

“Increase loading speed”

“Nothing”

“If it was possible, voice chat.”

“More constraints for an educational setting.”

“Moderation ability. Get rid of Player name boxes that obstructed views. Different color text option for teacher.”

“Ban {immature} people”

**4.3. Discussion**

The greatest limitation of our study was the small sample size; twenty-eight total students, participating in two groups, is a number hardly adequate for making definitive conclusions about the effectiveness of Second Life as a medium for lecturing. There were, however, a number of interesting findings from the study which could serve as guidelines for researchers planning future studies and courses in Second Life.

The focus group discussion and survey responses seem to indicate that the greatest problem with the classroom lecture in Second Life was the distractions caused by a lack of constraints imposed on student avatars. Some students made irrelevant comments and displayed disruptive behavior during the lecture. Other researchers have suggested that individuals may display different behavior in virtual worlds than they would in the real world [6] and that this may lead to classrooms that appear out of control [17]. We certainly found this to be the case in our study. Students (one in particular) who displayed “normal” behavior throughout the term in the HCI course seemed to exhibit much different behavior during the class period in Second Life. While the fact that quiz performance had no actual bearing on student grades in the HCI course may explain some of the disruptive behavior, it certainly seems feasible that students could participate virtually in ways we do now want or expect even when a grade is on the line. Virtual worlds simply give people an opportunity to be someone that they are not in the real world, and this may have ramifications for Second Life classrooms.

Some of the other comments made by students have fixes which at least on the surface may be somewhat straightforward. For instance, finding ways to differentiate instructor text from student text, and designing classroom settings so that student avatars do not obstruct each other’s views seems like issues that may have easy solutions. Other technology related issues such as long load times will likely improve with time. Some students suggested using the voice chat feature, but whether or not this would help lectures is unclear. It may still be difficult for students to differentiate the voice of the instructor from potentially irrelevant chatter. The text based chat does make it possible to reread comments after they have been made, as well.

**5. Conclusions**

In this study, we attempted to evaluate Second Life as a medium for lecturing by evaluating the performance on quizzes that were taken after lectures in both Second Life and the real world. We found that the students who attended the real world lecture did significantly better than those who attended the lecture in Second Life. The surveys that the students completed after the Second Life lecture confirmed these results, with only 20% of the students feeling that they learned the material sufficiently.

Again, the results presented in this paper should be taken in context given the small sample size and limitations of the experimental design. These
limitations include issues such as that the subject matter of the lecture was likely uninteresting to the students. It is unknown whether or not a more interesting topic would have motivated the SL students to pay better attention. It should also be noted that the participants in the study consisted predominantly of those who were novices to Second Life; it was the instructor’s first lecture in Second Life, and two-thirds of the students did not regularly use a visual program like Second Life to communicate with others. The potential impacts of more experienced users on the results of our study are unknown. Similarly, some of the difficulties that students encountered during the lecture experience (such as misbehaving students and the instructor’s text in the chat box being indistinguishable from other students) may be relatively straightforward to fix. The impact of these improvements on the study’s results is also unknown.

Assuming that the major finding of this study is valid (that students recall more from a real world lecture than a Second Life lecture), it is still likely that Second Life could be a highly effective medium for instruction (particularly online instruction). Lord [11] reports that students are much more likely to retain information when they are actually teaching each other in an interactive instructional environment, as opposed to passively listening to a lecture. Our study only considers Second Life for lecturing and only tested student’s short term retention of the information, but clearly SL’s greatest strength is that it supports online collaboration of students (who could be separated geographically by a great distance). A formal study that compares Second Life as a medium to support student collaboration to real would collaboration (and other online collaboration methods) would certainly be worth conducting.

Second Life has the potential to radically change the format of collaborative and distance education. However, the most appropriate ways to utilize this technology for student success are still unknown. We encourage other researchers to formally evaluate educational experiences in Second Life, and to share these evaluations, so that the community of online educators can begin to recognize the best ways to make use of virtual worlds for increasing student achievement and comprehension.

6. Acknowledgments

We would like to thank the students who participated in our study and for the insightful comments they provided. We also thank the anonymous reviewers whose comments helped to improve the paper.

7. References


