SECONDLIFE

A Computer-Mediated Tool for Distance-Learning in Architecture Education?

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Abstract. Despite the importance of distance learning for its ability to reach a wide audience, easiness to access materials, and its lower cost compared to traditional learning, architecture education has not been well served by distance education. This is because it has a higher level of learning objectives, it is taught by coaching methodologies, and involves nonverbal forms of communication. One of the most common learning methods used in the design studio is the Criticism/Critique, which is a graphic and oral type of communication between the tutor and the students. In this investigation, Second Life, a massive multi-user online virtual environment that offers three-dimensional spatial capabilities via Avatars impersonation, is used as a computer-mediated tool for text and graphic-based communication in a distance learning situation. The study describes a demonstration experiment where students had to communicate with their tutor, display and describe their projects at a distance, in a purposely designed criticism space in SecondLife.

The main objective of this paper is to observe and document the effects and the use of SecondLife virtual environment as an online 3D graphical-based tool of computer-mediated communication in distance learning in architecture education. The study also answers some questions: How well did the students use the tools of the medium provide? Was there a sense of personal communication and realism gained through using Avatars in the virtual environment? Did SecondLife provide a successful means of communication for a graphic-based context? And what are the students' opinions about the learning environment? Using multiple methods of data collection, mainly based on an electronic observation of the experiment, questioning the participants before and after the experiment, and the analysis of the chat transcripts, the study presents descriptive results of the experiment, and discusses its main features. Proposals for modifications are made for future replications.

1 Introduction

Online education is growing as a viable supplementary or alternative approach for instruction and learning as long as computers and internet connections are accessible to greater numbers of people (Higgins, 1991). Despite the many advantages of learning at distance, stated in (Althaus, 1996), (McIsaac and Gunawardena, 1996), (Leh, 2001), and (Stover, 2004), some disciplines have been under served by distance education, particularly those that have higher level learning objectives, and those that involve motor skills and non-verbal forms of communication and those that are traditionally been taught by coaching methodology rather than through lectures. Architecture education falls into all of the above categories (Stover, 2004). The design studio is the central focus of architectural education in schools worldwide; the term describes not only a place, but a totally immersive process and a social system (Kalay, 2004).

Communication between the students and their tutor in the design studio is mostly graphic and partly oral; one of the most common learning methods used in the design studio is the Criticism/Critique in which the student will present drawings that represent his/her design work and the tutor will review it, elicit reasons or justifications for the student's decisions, deliver a critical assessment of the project, and help the student to find direction (VasquesDeVelasco and Zhang, 2004). The tutor might point out weaknesses in a design or important factors that the student may have overlooked, provide encouragement and further development of a promising scheme, point out historical precedents by other architects, or suggest alternative approaches to a problem (Stover, 2004). This coaching methodology of teaching in the design studio is the essence of problem-based learning (Kvan, 2001), the students direct their own learning through seeking solutions to the problem under the watchful eye of the tutor, they engage together in a search for solutions through verbal and non-verbal means of communication. It is also important that these criticisms occur a number of times during the project so students get continuous feedback. Kvan (2001) states that these deliberative stages of the problem-based learning of design education which are abstraction and reflection of the students' work, are an integral part of the design studio (Kvan, 2001). Schon, (1983) also explains the importance of communication by illustrating how drawing and talking are parallel ways of designing and how the verbal and non verbal dimensions of communication are closely connected in the design process, this illustrates the term 'reflective conversation' in the process of 'reflection-in -action' where the tutor engages the students in a conversation about their design intentions and decisions, and this is the kind of communication that happens in the desk criticisms (Gabriel and Maher, 1999) and (Kvan, 2001).

One of the most significant impacts of computer technologies and the internet is their role as a medium of communication between the students and their tutor who are geographically separated (Stover, 2004) and (McIsaac and Gunawardena, 1996). Presently most applications and much of research into computer mediated communication (CMC) are focused on text-based communication (Althaus, 1996), however with the increase in sophistication of computer and communication technology, additional modes and media can be combined to facilitate the communication process between the students and their tutor. (Higgins, 1991) and (Kalay, 2004). For communication to take place between the students and the tutor there must be a sender, a receiver, and a message. If this message is intended as instruction, "the medium is the message" then besides student, tutor, and content, we must also consider the environment in which this educational communication occurs, an environment that can benefit the educational system (Berge and Collins, 1995). Communication in learning architecture in a distance, which is a graphic-based context, must be done through a graphic supporting environment.

Applying distance learning is one of the rapidly growing uses of cyberspace, it can affect the way student perceive knowledge Some researchers found that remote connection can be a tool for unlocking discussion and creative thinking (Lynch, 2006). For some students; CMC gives the ability to open up when they are not being observed by others, it allows them to participate more without feeling stressed (Lane, 1994). But Kalay (2004) argues that, till now, distance learning is a little more than an organized way of distributing materials in an efficient, electronic way (Kalay, 2004). The participants in remote learning miss out the rich culture and social phenomenon of the learning experience itself, unless the learning environment creates this richness to the learning activity through the social actions it affords and the cultural settings it provides, thus can be used as a constructive element of the learning process (Kalay, 2004).

Many reviews provide a selection of examples of how 3D virtual environments (VEs) such as massively multiplayer online games (MMOGs) and multi-user domains (MUDs) are currently being used for supporting distance-learning experiences (Wagner et al., 2002), (DeFreitas, 2006), and (Wong, 2006). Architecture designers recognize VEs as tools of form-finding, communication and presenting their ideas (Schnabel and Kvan, 2002). Many students are using some sort of game, or 3D simulation, or non-game virtual environment, outside the classroom, because computers and the internet are accessible to them, they're born in the digital era, so educators might as well look at the possibility of tapping into newer student's familiarity with these kind of 3D worlds as a means of furthering their education (Gross, 2006). Computer game-based learning possesses high

potential because of its freely virtual environment and fancy multimedia effects in a learning scenario (Yu et al., 2005). They exhibit a sense of real place in terms of environmental quality or socio-cultural experience through sophisticated graphics which combine different activities and contexts. Virtual places afford group learning, of the kind enjoyed by students gathered in a virtual classroom, where they know they are in a communal space, they are aware of the social process of learning, and are affected by the presence and behaviour of their fellow students and tutor (Kalay, 2004). This approach to communication and learning has been demonstrated to be effective and powerful, (DeFreitas, 2006).

Second Life is an example of the MMORGs offering a virtual 3D environment where the presence of each user is visible through Avatars that provide a point of view for the perspective of what can be seen, they can walk, fly, look around, build, interact and communicate with others in real time (Talamo and Ligorio, 2000) and (Avisthi, 2006). Text-based communication in SecondLife is mainly through real-time Chat, the transaction of this communication occurs immediately. According to (Johnson, 2006), the fact that the Avatars exist in the virtual world changes the feel of a discussion, because being able to "see" the person you are talking to gives a great effect on the conversation, the participant senses the presence of others, and makes his/her presence apparent to them (Kalay, 2004). Using SecondLife in distance education has been the interest of a growing number of educators around the world (Avisthi, 2006). Linden Lab, the company that created and runs Second Life, has sold more than 100 islands for educational purposes (www.secondlife.com).

2 Rationale for the research

In order to explore the possible potential of using SecondLife in distance learning in architecture education, the study was developed to investigate how a small group of students use SecondLife environment as a computer-mediated tool for communication with their tutor in a virtual criticism. This study was produced out of a real distance learning situation; for the tutor was going to be travelling during the time of the criticism.

Providing that SecondLife 3D virtual environment possesses high perceptual qualities obtained from the graphical and spatial attributes that give the sense of being in a place and provides a rich context of the activities that take place in it; it gives a good opportunity for exchanging design ideas and drawings at a distance in both text-based and graphic-based means of communication. Communicating in a distance learning environment can be better for some students who participate more while not being observed. Avatars controlled by real people in real time contribute a human dimension

to the creation of a sense of 'real' learning environment in SecondLife; this can provide the students with a sense of community and realism as well as the sense of engagement and participation.

Therefore the main objective of this paper is to provide evidence – through observation- of the appropriateness of using SecondLife virtual environment as an online 3D graphical-based tool for computer-mediated communication in a distance learning situation in architecture. The research questions emerging from this objective are:

(1) What is the effect of the usability of SecondLife tools on the success of the communication in the virtual criticism?
(2) Did SecondLife graphical and text-based modes of communication and interaction provide a good means of exchanging design drawings, ideas, and feedback instructions?
(3) What was the effect of being in a distance learning situation in comparison to face-to-face one, in terms of understanding, stress and formality?
(4) Was there a sense of personal communication and realism through using Avatars?
(5) How well did the design and contents of the learning space support the learning activity?
(6) What are the participants' opinions about the virtual criticism in SecondLife?

The paper presents the experimental framework designed to test the suitability of SecondLife for text and graphic based communication at a distance. It presents the participants involved, the procedure for carrying out the experiment and the means of data collection. The data analysis and the results are then presented, followed by a discussion about main features of the criticism. Finally the study ends with the conclusion section.

3 Experimental Framework

3.1 EXPERIMENT BACKGROUND

To experimentally investigate the appropriateness of using SecondLife's graphical-based environment for CMC in distance-learning, researches on similar experiments have been reviewed. The work of Althaus, (1996) and Leh, (2001) on the appropriateness of using CMC modes in distance education provided references for the design and procedures of the experiment. Althaus (1996) questioned the use of online discussion in the classroom; he investigated the richness of the text-based conversation, issues of participation and users evaluations of the experiment. Leh (2001), discussed the social attributes in text-based emails in distance learning for a small group of students, although she investigated a different learning environment, her work was influential in the means of selection of variables and aspects of the experimental procedures. Other researchers studied the influence of using Avatars in virtual worlds in distance communication, for example Talamo and Ligorio, (2000) presented an experiment using a similar virtual environment to SecondLife, which is "ActiveWorlds", the

goal was setting up a community of learners and practice. They used and developed a method for synthesizing the data collected from questionnaires and analysing chat transcripts. Brown and Bell, (2004) studied "There" which is a virtual environment also similar to SecondLife, in a social activity context. The method used for documenting the online activity was influential to this study, it is characterised as "virtual ethnography" which makes extensive use of textual materials such as chat transcripts, in addition to the observer's interpretation and experience. The work of Kemp and Livingstone, (2006) explored the benefits of integrating SecondLife closely with traditional learning systems and provided valuable guidelines for experimental design in the virtual environment of SecondLife.

The experimental work of Gabriel and Maher, (1999) was conducted using three different levels of communication and the results were comparative, the main aim of their experiment influenced this study in terms of considering the effect of textual and graphical communication modes in exchanging design ideas between the students and the tutor in architecture education.

For this experiment, it was decided to use the method presented by Sarantakos (Sarantakos, 1993) for Demonstration Experiments using one experimental group only, where the main aim is observation and evaluation. The experimental design and methods of electronic observation and synthesizing data were built upon the previously described experiments.

3.2 PARTICIPANTS

The participants were 18 undergraduate and post-graduate students of module (ARC8027): Advanced Visualisation Techniques, Semester2: 2006/2007, their participation was optional. The sample consisted of 17 males and 1 female. There were 14 undergraduate students in the school of Architecture, 2 M.Sc. students in Architecture, and 2 undergraduate students in the School of Computing Science in the University of Newcastle upon Tyne, UK. All who participated in the experiment where geographically separated.

3.3 PROCEDURES

The tutor introduced the experiment to the students; he asked them to voluntarily participate in the virtual criticism to present their work in SecondLife for feedback.

The students were given a pre-test questionnaire providing background information such as their interest and familiarity with SecondLife, if their PC and internet connections can run SecondLife or not, and the format of the

designs that will be displayed. This information helped design the learning space, and make an instruction sheet for the participants.

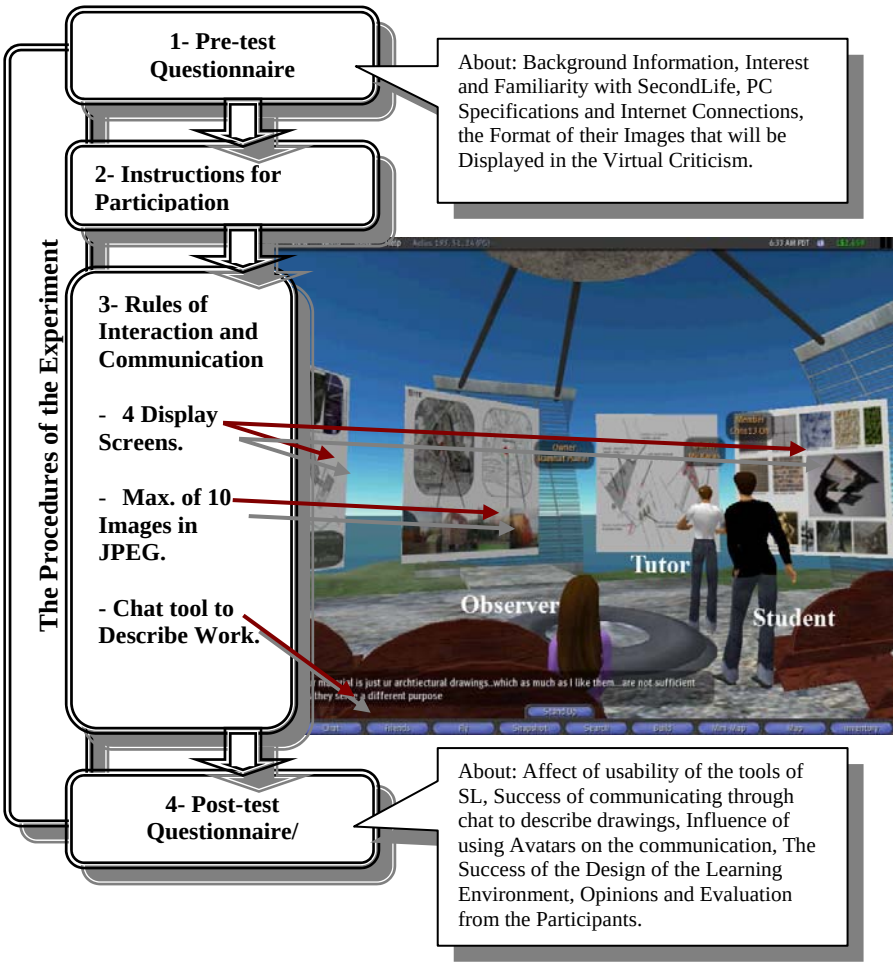

Figure 1: The Procedures of the Experiment

The instruction sheet was then e-mailed to the students participating in the experiment, it included information about the minimum PC and internet requirements to run SecondLife, how to register and create an Avatar, how to teleport to the location of the criticism, and how to upload and display their images in SecondLife.

After the experiment took place, the students were asked to complete a post-test questionnaire that focused on the communication and interactions using SecondLife environment, and their opinions about different aspects of the virtual criticism. Figure 1 summarizes the experiment procedures.

3.4 DATA COLLECTION

Quantitative research is considered by some researchers to be the scientific approach to evaluation. Others contend that qualitative research, rich in its exploration of experiences, opinions, feelings and knowledge, tells us more about what is really going on (Kirkpatrick, 2001). In this research both quantitative and qualitative data were gathered using three methods; electronic observation, pre-test and post-test questionnaires, and an interview with the tutor.

3.4.1 Electronic observation

According to Sarantakos (1993) the observer can be a participant or a non-participant in the experiment, in this experiment, the observer's Avatar was present in the criticism as a non-participant, although, some instructions had to be explained to the participants during the criticism. The data in this method was collected from three sources:

(a) Taking notes in real-time: Taking notes was through pre-structured sheets categorised to help document the experiment and compare the notes with the data collected from the other methods. Notes were taken about the usability of some tools, how some interactions occurred in real-time, and general indicators about how well they virtual criticism was carried out.

(b) Chat transcripts: The data collected from this source indicated to some extent, the success of the communication, some comments during the experiment highlighted some difficulties and considerations. The transcripts of the saved dialogues were sent to the students, to help them review their tutor's remarks and notes on their work afterwards. Figure 2 shows the chat history box in SecondLife.

Figure 2: The chat history box

(c) Movie clips and snapshots: SecondLife movie recording tool and capturing snapshots were used. Viewing these movie clips and shots multiple

times gave a better understanding on how certain interactions were carried out.

3.4.2 Pre-test and Post-test questionnaires

A pre-test questionnaire was given to the students two weeks before the experiment. It was design to collect initial data about:

- The students' interests, experience and familiarity with SecondLife.
- Their PCs ability to run SecondLife high-end technology.
- The format of their deliverables that will be displayed in the virtual criticism.
- Their opinion about participating in the experiment.

A post-test questionnaire was posted online after the experiment, and consisted of two parts. The first part for all the students to complete, this part was to determine:

- The participation of the students.
- The reasons for not participating, or not completing the sessions.
- The second part for those who completed the experiment, it asked questions about:
- The usability of SecondLife tools.
- How suitable were the modes of interaction and communication in the virtual criticism.
- How different/similar was the distance communication compared to a face-to-face one.
- The effect of using Avatars appearance and identities.
- How suitable did the students find the learning space and its contents.
- Their evaluations of the criticism, and what features they would have liked to be different.
- The questionnaires were constructed to be quick and easy to fill out, most of the questions were yes and no questions, a multiple answers format for factual closed questions was used, there were open-ended questions that require opinions on specific issues, and questions using a Likert scale to indicate an attitude of agreement (May, 2001), (Floyd and Flower, 1995) and (Sarantakos, 1993).

3.4.3 Interview with the tutor

Interviewing as (May, 2001) and (Sarantakos, 1993) imply is a form of questioning characterized by the fact that employs verbal questioning as its principal technique of qualitative data collecting. A face-to-face interview with the tutor was designed to record his experience of different aspects of the experiment; it consisted of open questions only, structured in a written form to take notes, with the aid of an audio recording for review. The interview asked about how well the tutor found using the tools of SecondLife, specially the chat tool, for communication and other interactions like pointing; He was asked about his opinion about the avatar's representation in the virtual world, and also about the learning space and other features of the environment.

3.5 DATA ANALYSIS

The analysis of the data was at some point inductive and used some of the data to discover new categories and relations rather than through predetermined deductive hypotheses. The data collected from the electronic observations and reviewing the chat transcripts and movies, helped capture some key interactions in the virtual criticism while the questionnaires and the interview with the tutor provided self-assessment about the experiment, which completed the missing data.

The data collected were analysed using both quantitative and qualitative methods (Floyd and Flower, 1995) and (Sarantakos, 1993). Synthesising the results from all data sources created a descriptive analysis of the whole experiment.

Basic guidelines on methods of analysing electronic observation data in (Brown and Bell, 2004) and synthesizing data in (Talamo and Ligorio, 2000) were followed.

4 Results

4.1 RESULTS OF THE PRE-TEST QUESTIONNAIRE

Only 15 of 21 students replied to the pre-test, the results were as following:

(1) **Interests and experience:** The students were asked if they played online games before, and if they are familiar with SecondLife, the results are shown in Table 1.

Table 1: Interests and familiarity with online games

	N=(15)	**Frequency of playing**
-Interest in Online-Games	8	Less than 2days per week
-Familiarity with SecondLife	2	One time only
-Do not Play Online-Games	5	-

(2) **PC and internet specifications to run SecondLife:** The student were given the minimum PC requirements and Internet connection needed to run SecondLife, they were asked to determine if their systems could run it or not, The majority of the students replied positively about being able to run the programme, as shown in Table 2.

Table 2: Ability to run SecondLife

	Yes	**No**
- Minimum PC specification	13	2
- Suitable Internet Connection	12	3

(3) **Format of deliverables:** The students indicated that their deliverables are documents supported with visual images of their models. For modelling their work, they mainly used: 3DStudio Max, AutoCAD, Unreal editor and Sketch UP. From this result, the students were asked to convert all their work to a final (JPEG) format for images to be able to display it the virtual criticism in SecondLife.

(4) **Opinion about participating in a criticism in SecondLife:** On a Likert scale to measure the students' opinion about participating in the experiment, they were asked to state whether they strongly agree, agree, disagree or strongly disagree with participating in the experiment. The results showed that 9 students agreed and 2 strongly agreed. Figure 3 shows the students opinion about participating.

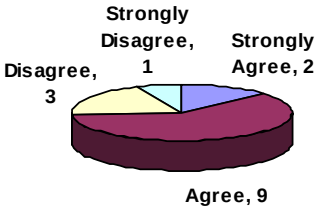

Figure 3: Opinion about participating in the Experiment.

Table 3: Participation in the Experiment

No. of students Joined	13
No. of students Completed	11

4.2 RESULTS OF THE POST-TEST QUESTIONNAIRE

Only 15 students replied to the post-test questionnaire, the results are as follows:

(1) Participating in the experiment: Some of the students could not participate in the virtual criticism due to not having the minimum PC or Internet requirements to run SecondLife. Only 2 students joined but could not complete the experiment, one of them has stated that he had encountered technical problems and slow internet connection, and the other had difficulties recognising the environment and dropped out. The remaining 11 students successfully completed the virtual criticism. Table 3 shows the number of students who participated.

(2) Usability of tools: The questionnaire asked about using tools such as teleporting, moving the avatar (navigation), uploading and displaying images and the chat tool. Figure 4 shows the usability of the tools in terms of difficulty.

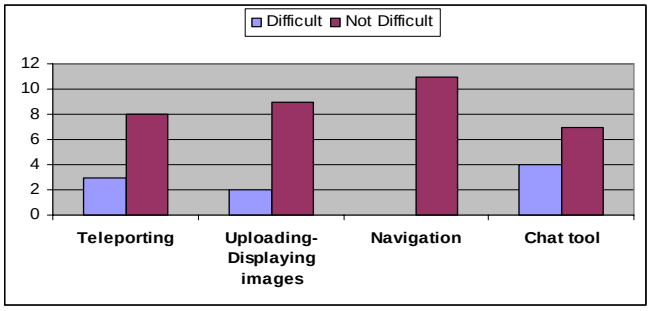

Figure 4: The usability of the tools of SecondLife

(3) Modes of interaction and Communication: The questionnaire asked the students several questions to determine their opinions about different modes of interaction and communication. A question asked whether they had found the text-based mode of communication enough for describing their designs without communicating 'verbally', 6 students found it suitable, the other 5 students found it not suitable, for the reasons shown in Figure 5. Another question asked if it was difficult to describe the images without being able to physically point at them, the majority implied that it was difficult at some point, as shown in Figure 6.

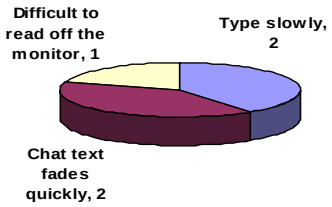

Figure 5: Reasons for difficulty of non-verbal communication.

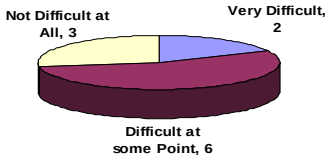

Figure 6: Opinion about describing without pointing

(4) The effect of being in a distance learning situation: The students were asked if being in a distance communication had effect on the formality of the session, 7 students replied that the discussion was formal, as in a real life situation. The students expressed that a distance communication is relatively less stressful than a face-to-face one; they felt more comfortable presenting and describing their work when not being faced by their tutor and observed by their peers. Table 4 shows the effect of the distance communication on feeling stressed.

Table 4: Effect of the distance communication on feeling stressed

(N=11)	**Less Stressed than Real Life**	**Same as Real Life**	**More Stressed than Real Life**
Communicating with tutor.	6	2	3
Peers Observing.	7	4	0

About the effect of the distance communication on how well the students understood the tutors instructions and remarks, 9 students stated that they had fully understood the tutor's instructions, in addition to this; they had a full record of the chat transcripts e-mailed to them.

(5) The effect of using Avatars: The students were asked if they had felt closer to a face-to-face personal communication using an environment with avatars as people representatives, in comparison with e-mail or instant messenger programmes, 8 students agreed, as shown in Figure 7. When asked if they preferred using a similar/ different name and appearance, their answers implied that they were in favour of using the same name and appearance, to be easily recognised.

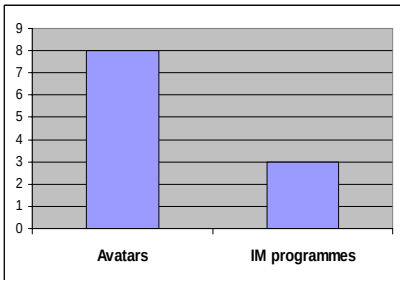

Figure 7: Closeness to a personal communication

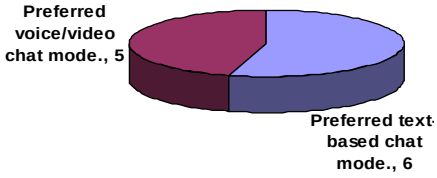

Figure 8: Preferred mode of communication

(6) Opinions about the learning space: When asked to rate the suitability of the learning area, in terms of the area, the size of displaying screens, and the location of screens, the results were mainly positive. Table 5 shows the ratings of the learning area.

Table 5: The suitability of the learning area and contents

(N=11)	Very Suitable	Suitable	Not Suitable
The Area of the Spaces	1	9	1
The Size of the Screens	2	8	1
The Location of the Screens	1	10	0
The clarity of viewing	1	6	4

(7) Participants evaluation about the SecondLife virtual criticism: In order to determine the students overall opinion of the experiment, they were asked about the interaction and communication with their tutor in SecondLife. The results of the questionnaire show that the learning activity in the virtual criticism was beneficial for most of the students, as shown in Table 6.

Table 6: The learning activities in the virtual criticism

(N=11)	Agree	Disagree
Succeed to describe the project	6	5
Fully understood tutor's remarks	9	2
Developed new experiences from the criticism	7	4

When asked if they had preferred using a Voice/Video mode compared to the chat mode alone for communication, some students preferred the chat mode alone, and some were in favour of using a voice/ video mode. Figure 8 shows this result. The students also gave some opinions about how they would prefer using SecondLifeenvironment in different learning situations in the future, the results are shown in Figure 9.

When asked about their opinion about having another virtual criticism in SecondLife, some of the students agreed and the other did not, as shown in Figure 10. Their opinions about their preference were as following:

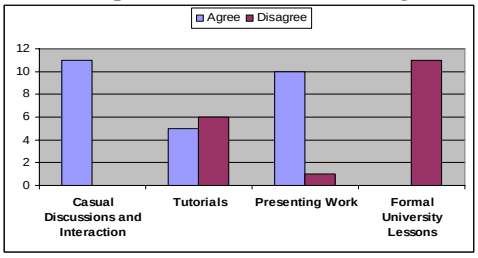

Figure 9: Using SecondLife in different learning situations

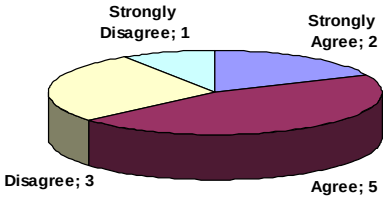

Figure 10: Opinion about having another virtual criticism in SecondLife

One supporting comment was:

-I appreciate the need to experiment in new areas and enjoyed the experience despite the warping problems I was overall satisfied with this interactive interface.

On the other hand, a non-supporting comment was:

-Using a simple messenger programme would have been easier.

5 Discussion

The results of the experiment were descriptive; they gave us a general idea about different aspects carried out in the virtual criticism in SecondLife. From the electronic observation, and the students' and tutor's opinions, some key features were captured about certain details and interactions that, to some extent, affected the process of communicating design ideas in the virtual criticism. This section will discuss how these features supported/weakened the learning activity of the criticism, and what modifications could be carried out for future replications.

5.1 SECONDLIFE REQUIRES HIGH-END TECHNOLOGY

The system requirements for running SecondLife are high, the internet connection must be DSL or high speed Cable, it does not provide an

application proxy for private networks; therefore many students will be unable to run it, or they can encounter slow streaming and communication. Problems of system access can be very frustrating to some students, this can force students to be reluctant to participating (Althaus, 1996). Some students have stated in the questionnaire that not participating in the experiment was due to system requirements. SecondLife also needs frequent updating; for educators who wish to use this environment should make some effort for setting it up on students PCs and updating it regularly.

5.2 THE NEED TO PRACTICE USING THE TOOLS

An instruction sheet was given to the students before the experiment explaining how to upload and display their images, there were some small screens set at the back of the space for practicing during other students' sessions, Figure 11, but not all students had time to practice before the actual criticism.

The tutor and most of the students stated that they would have not wasted time from the sessions if they had practiced before the experiment.

Figure 11: Small screens for practicing.

Figure 12: An avatar pointing at a part of the image

5.3 COMMUNICATION THROUGH CHAT

From reviewing the chat dialogues, two students couldn't follow the tutor's questions and remarks because the text faded after a few seconds and the student was still typing a reply to a previous question. This forced the tutor to retype his sentences. One student actually asked during the criticism how he can follow up with the dialogue, so it was pointed out to him how to use the History Box to see the previous text:

- Student: Sir how can I c ur earlier message? I missed it.
- Observer: Hit on History, next to the Chat box.
- Student: got it..

One student was slow in responding to the tutor, he indicated that he is a Dyslexic (has difficulty with recognizing written words), so the chat tool

was in some way very difficult for him for communication. On the other hand, the tutor found that using the chat tool might be better than voice communication for international students, who could understand better and communicate in written sentences. When asked about having difficulty conveying his statements to his students, the tutor indicated that he would emphasise on some of his sentences by using capital letters, or exclamation marks and other written cues recognized in the chat environment. The tutor was not sure if the students could understand his written remarks to them or not, because he couldn't see their faces and impressions, but he added that a good benefit of the virtual criticism was having a written record of the dialogue for the students to review.

5.4 POINTING IN THE VIRTUAL CRITICISM

It is possible to point at any place in SecondLife with the cursor, and the avatar points to this place with its arm, as in Figure 12, although, some of the students needed to use a pointer to describe their work. From reviewing the chat dialogues, some students used some words to refer to the part they are describing , this saved dialogue is an example:

-Student: then you will find this big entrance right in front of you
-Tutor: which big entrance?
-Student: the one looks likes a long corridor in the middle
-Tutor: ok

This saved dialogue is another example:

-Student: On the plan it's on the top.
-Tutor: Can u point that out on the map?

Then he pointed with his avatar's arm to the place he was referring.

The tutor also stated in the interview that he preferred if there was a pointer that would made discussion easier and clearer.

5.5 THE VIRTUAL LEARNING SPACE

Equipping the virtual criticism space with learning tools such as displaying screens and chairs that resemble an actual learning space was made to enhance the ability to convey a sense of place as discussed by (Kalay, 2004). The criticism space was designed to be an out-door area with transparent walls and a set of chairs pointing to four big screens.

But, the size of the screens was rated by a few students to be Not Suitable, one of them commented:

-There was different size proportion between the screen and the images that got squashed and distorted.

This gives a hint on unifying the images sizes and proportions to fit on the screens.

From the chat review, the tutor commented about the display screens during two sessions:

-There is this annoying transparency, and this horizon line, half of the screen is brighter than the other.

This comment helped realize that there was a shininess value for the screen and was changed. The tutor also thought, that there could be a better strategy of making use of a '*virtual world*' for designing the area. It was mimicking a real-life learning space including seats, where there was no need for avatars to actually sit.

6 Conclusion

This paper has presented a demonstration experiment with the purpose of investigating the appropriateness of using SecondLife as a 3D graphical-based tool for computer-mediated communication in distance learning in architecture. The implications of this study highlighted the potential of SecondLife as an on-line environment for communicating design drawings and ideas, due to its high perceptual and spatial qualities and the presence of Avatars. The modes of communication and interaction within SecondLife have been proven through the experiment to be, to some extent, a successful environment for a distance virtual criticism, with some limitations such as, the need to use a pointer for describing images, the need to have an aid of a voice or video mode for communication, and the need to consider the high-end technology required to run SecondLife on students PCs. The participants were in favour of using this environment, as the majority got good feedback and wished to participate in future distance learning situations in SecondLife.

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