Classroom Simulation for Trainee Teachers Using 3D Virtual Environments and Simulated Smartbot Student Behaviours

PhD Thesis

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Declaration of Authorship

I, Fahad Alotaibi declare that this thesis entitled Classroom Simulator for Trainee Teachers Using 3D Virtual Environments and Simulated Smartbot Student Behaviours and the work presented therein are my own and original work. It is submitted for the degree of Doctor of Philosophy at De Montfort University. The work was undertaken between October 2010 and March 2014.

To my dear parents and my beloved wife …

Abstract

This thesis consists of an analysis of a classroom simulation using a Second Life (SL) experiment that aims to investigate the teaching impact on smartbots (virtual students) from trainee teacher avatars with respect to interaction, simulated behaviour, and observed teaching roles. The classroom-based SL experiments' motivation is to enable the trainee teacher to acquire the necessary skills and experience to manage a real classroom environment through simulations of a real classroom. This type of training, which is almost a replica of the real-world experience, gives the trainee teacher enough confidence to become an expert teacher. In this classroom simulation, six trainee teachers evaluated the SL teaching experience by survey using qualitative and quantitative methods that measured interaction, simulated behaviour, and safety. Additionally, six observers evaluated trainee teachers' performance according to a set of teaching roles and roleplay approaches. The experiment scenario was set up between smartbots, trainee teacher avatars, and observer avatars in the virtual classroom, where smartbots are intelligent agents managing SL bots, and where groups are similar to one another but are under programming control.

SL teaching enhances the trainee teachers' abilities, skills and experience in a 3D virtual learning environment. In this thesis, SL teaching presents contributions to knowledge with certain challenges faced by the trainee teachers' avatars. The first challenge concerns the framework implemented to deal with an intelligent agent or smartbot with an individual trainee teacher's avatar in a classroom simulation, whereby the smartbot represents the open source software which is intended to help the trainee teacher acquire the necessary experience. The second challenge is concerned with the issue of creating a built, design-modelled, interactive classroom simulation set up between a trainee teacher avatar and student smartbots through chatbot, IM message, and email. The third challenge is creating a rich environment that promotes the creation of a classroom in the 3D virtual environment, depending on object platform and learning content with integrated MOODLE tools with a SL system, in order to manage and resolve course problems for the trainee teacher. The fourth challenge is to ensure that the observer avatar can be made autonomous for the purpose of assessing the performance of the trainee teacher avatar using qualified teacher status (QTS). On the other hand, the

smartbot's behaviour can be controlled by using SBSL (SmartBots Scripting Language), which is a simple programming language that allows a bot to react to in-world events and residents, and provides increased reliability for moving the smartbot to any position in the SL 'land'.

As a result, the involvement of smartbot services within the teaching environment helps to build a 3D classroom simulation using a SL experiment that enhances trainee teacher experiences and attitudes toward teaching methodology during a simulation. A set of empirically derived guidelines is therefore suggested by this thesis that can be used to improve trainee teacher performance using smartbot services in classroom simulations using Second Life experiments. Also, teaching roles are standard skills transferred from an observer avatar to a trainee teacher avatar by notes sent between them. According to this experiment, a teacher trainee has 'high level' from teaching roles that led to understand teaching methodology in a SL environment.

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Publications

- Alotaibi, F & Dimtroiv, J. (2012). A classroom simulator for trainee teacher using 3D virtual learning environments based simulated students' behaviour: Literature review. *Intentional of Computing Journal*, July 2012. Available at: http://www.ijric.org/volumes/Vol10/tenth_volume_2012.php

- Alotaibi, F & Dimtroiv, J. (2012). Classroom simulation for trainee teacher using 3D virtual learning environments based simulated students. In *Saudi Conference on Brunel University*. Available at: http://issuu.com/aahariri/docs/sic2012proceedings/1?e=0

- Alotaibi, F & Dimtroiv, J. (2012). Classroom simulation of interactive web-based courseware at the virtual learning environment. *Mansoura University Journal*, 6(1).

- Alotaibi, F & Dimtroiv, J. (2013). Implementation and evaluation of classroom simulation for trainee teacher using Second Life environments. In *IEEE Conference*, London.

- Poster in Saudi Conference on Brunel University: *Behavioural Classroom Simulator in Second Life Environment*. October, 2012.

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Chapter 1: Introduction

1.1 Background

Virtual learning is learning not from materials such as books and websites, but from social interactions between students in a virtual platform. Therefore, the most distinctive feature of the virtual learning environment is that it is populated, which means that it is connected to all students, and especially those interested in the information provided by a website and its links to a social world. Students can use the simulation environment as a place to provide logistic management structures or designs for their lessons to help them understand their course materials. Bai & Fusco (2011) confirm that students benefit from the reproduction of their materials within the virtual learning environment for learning, such as by using video clips. For example, students (individually or in groups) can use 3D video clips of their course materials to understand their lessons by viewing, replaying, pausing, and commenting on the same videos. Ever since computers and the Internet developed, both have been used in the teaching and learning fields; one application has been their deployment inschools, creating special rooms for computers. The National Education Association explains that schools use computers and Internet networks to teach students their course materials using new teaching methods, such as online learning within a virtual learning environment. Teachers are considered to be the main element in the virtual learning environment; therefore, teachers must be trained well to face the challenges of this environment. These challenges are related to providing balanced opportunities for students in order to provide efficient and appropriate teaching.

Broadldy (2007) argues that in order to have qualified teachers in a virtual learning environment, teachers must understand all teaching methodologies; for example, they must be trained in teaching using modern learning tools, communication methods, and information accessing. They must also be flexible, with high standards of teaching, and they must be trained in conducting online conversations. As well as schooling trained teachers to be able to teach students their materials, the new methodologies also train students to be able to learn their materials by using Internet networks. Obviously, schools can train students to use the virtual learning environment by conducting several

sessions with their teachers, in which the teachers demonstrate the working process in real life, and then let students ask technical questions about the same subject. Finally, using a virtual learning environment leads to great benefits for both the teachers and students, thereby becoming more effective than traditional learning environments. Also, virtual learning environments provide socio-cultural environments for the learning process, as Baragas (2009) confirms. In addition, using the appropriate implementation of a virtual learning environment provides an effective learning process because of the suitability of training both teachers and students on using Internet networks within the learning process.

1.2 Motivation and Significance

This study's motivation is to offer the trainee teacher the experience of controlling a realistic classroom environment. This study will provide a much-needed 'laboratory' in 3D Second Life wherein a trainee teacher can apply different teaching methodologies and generate teaching and learning experiences. An additional bonus of this approved system is the possibility of introducing an independent observer (human) with the teaching roles of evaluating the performance of the trainee teacher.

1.3 Aims

The thesis aims to investigate the impact on teaching by a smartbot service that represents several instances of virtual student work with trainee teacher avatars through the classroom-simulation based Second Life (SL) teaching methodology with respect to interaction, simulated behaviour, and observed teaching roles. This environment also enables trainee teachers to acquire the necessary experiences and skills before conducting teaching in a real classroom setting.

1.4 Objectives of the Research

The proposed field of study is intended to:

1- Create virtual classrooms that support simulated student behaviour for the purpose of helping trainee teachers negotiate an interactive classroom using 3D objects.

2- Conduct experiments using SL tools to create an interactive virtual learning environment (VLE) to support teacher avatar and smartbot machines using the roleplay method.

3- Evaluate teachers' responses to predefined students' behaviour, and provide feedback to the trainee teachers using descriptive statistics relating to trainee teachers and observers.

4- Develop a rich environment for providing autonomous students' behaviour through smartbot techniques, e.g. interaction, collaboration behaviour, animation behaviour, etc.

5- Prove that SL teaching is a useful complement to traditional teaching for trainee teacher experiences.

1.5 The Research Problem

The research problem is that training for trainee teachers in a real classroom is substantially lacking. In an earlier study, Broadldy (2007) argued that for trainee teachers to improve they need to be well trained and understand their teaching role to a high standard, but that they cannot improve their ability and experience in front of their students in the initial stages of conventional teaching. The classroom-simulation based SL environment enhances the trainee teachers' ability, skills and experience in a 3D virtual learning environment using avatars and smartbots through roleplay.

However, there are certain challenges facing classroom design in SL. The first challenge is creating appropriate interactive tools and establishing a teaching role in the SL environment that can effectively facilitate the teaching process. The second challenge is measuring the interaction between the teacher avatars, smartbots, and students using the chatbots to measure the response time in the course of their real-time interactions. The third challenge is providing accurate behaviours for students in the classroom simulation in SL.

The hypothesis of this research is that enhancing the proposed framework offers a viable complementary method to traditional teacher training, as classroom-based SL is a

flexible environment situated in a learning simulation that supports confidence in and gives experience to a trainee teacher. The research problem is shown in Figure 1.1.

1.6 Research Questions

The main question in my research is:

How can we prove that Second Life classroom teaching is a useful tool for the trainee teacher experience?

The attempt to answer this question has led to various secondary questions which needed to be addressed; these are:

Q1) How can a virtual classroom be built in the Second Life environment that can be used for teaching and supporting trainee teachers in the virtual academic world?

Q2) What is the challenge of using the virtual classroom in the Second Life environment and through MOODLE software?

Q3) How can behaviour be simulated between a trainee teacher avatar and a student smartbot inside the classroom SL environment?

Q4) How can the trainee teacher performance be evaluated in SL teaching?

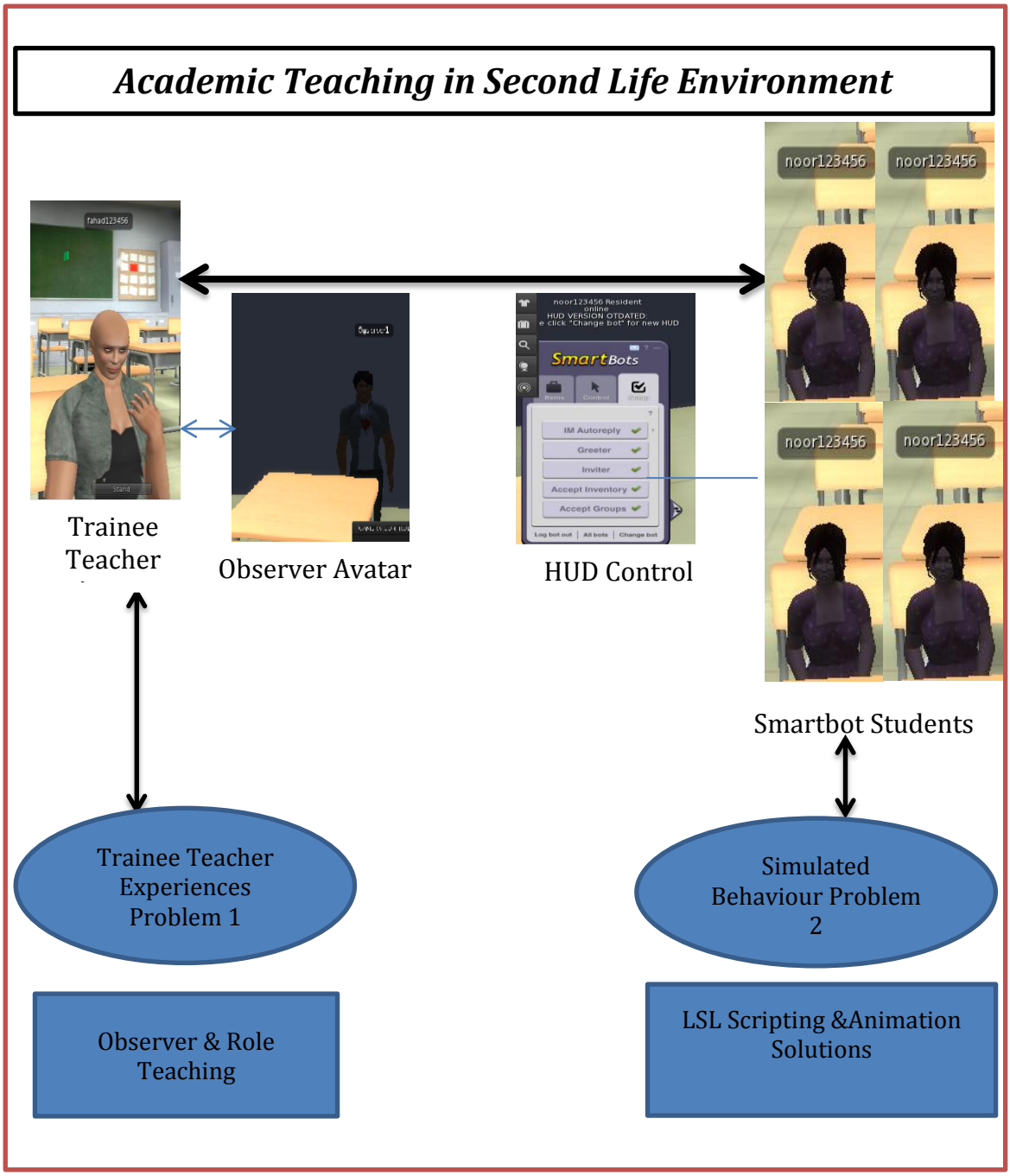


Figure 1.1: Research Problem

1.7 Research Methodology

This thesis uses an experimental approach which presumes that the best way of figuring the impact of the proposed theory is to implement it in an appropriate field. The most distinctive feature of this experimental approach is that it tries to define or understand social problems within the teacher experiences. In this study, researchers have used student, trainee teacher, and observer responses as samples in order to elucidate their

behaviours in the simulation of the learning process. In order to find the impact of students' behaviours on simulating the learning process, researchers train teachers on dealing with the virtual learning environment, and then study the impact of the students' behaviours in this case.

The thesis follows a set methodology, and the research plan is divided into components, as follows (see also Figure 1.2):

- **Literature review:** A collection of data from previous studies in the research domain is presented first, offering a solution in the literature to the displayed research problem. The section concludes with a comparative critical review for evaluation. This review is divided into two sections, dealing successively with a research question and solution (Zadok 2010).

- **Framework for classroom simulation:** A descriptive framework is created to show homogeneity between avatars and smartbots in a Second Life environment based on academic teaching in SL. This framework depends on a used approach, a simulation model proposed and a validation process (Crisp et al. 2010).

- **Analysis process:** A simulation-based classroom is created which improves the trainee teacher performance in the Second Life environment. The roleplay approach is developed, and expresses this relationship between teachers and students through classroom simulation in SL.

- **Validation and implementation:** Based on this framework and its component model, a design-model proposed component is progressed to functionalities data that represent classroom simulation by 3D building objects in SL spaces (Dalgarno 2010).

- **Evaluation:** An experimental evaluation is carried out based on two methods. *Firstly*, a questionnaire method is used to analyze and evaluate the proposed solution in this thesis, which is the SL environment. The questionnaire is based on a sample of trainee teachers, students and observers. Also, quantitative and qualitative methods appear to fit well with this research, the methodology is an experimental research design, and the type of research is development focusing

on Second Life for classroom simulation. *Secondly*, a case study provides scenarios for trainee teachers, students, and observers in the SL environment (Tullis & Albert 2008).

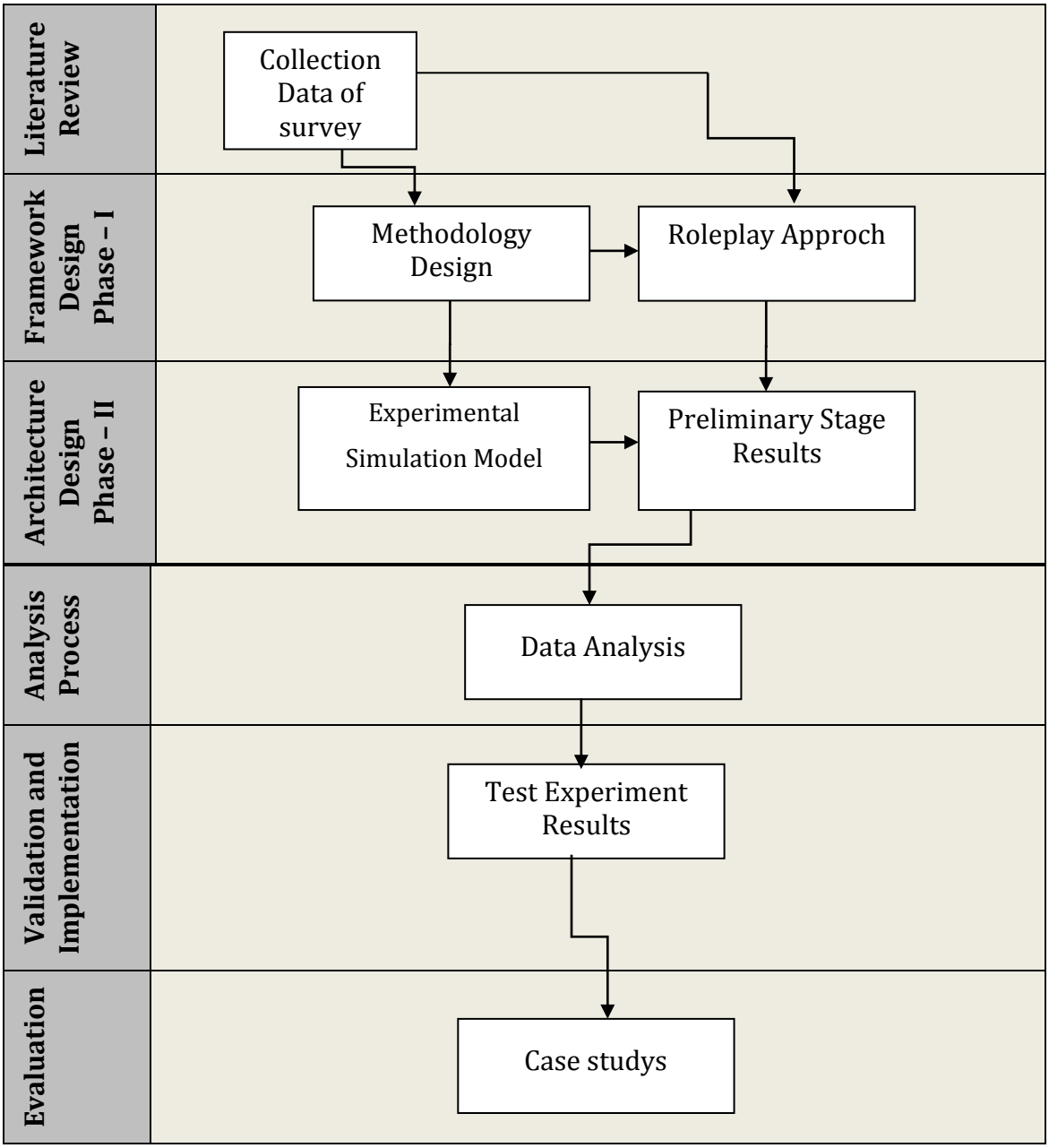


Figure 1.2: Research Methodology

1.8 Criteria of Success

The research criteria to assess the success of the research are set out here:

- The roleplay approach should be able to provide trainee avatars and student smartbots with roles and tasks within the Second Life classroom.

- The simulation-based learning approach should how behaviour is simulated for smartbots, as student bots interact with teacher avatars.

- The proposed design model for the classroom simulation in SL should describe how it is integrated within the Second Life and MOODLE environments to give teachers the opportunity to select a suitable teaching methodology.

1.9 Thesis Contribution

Using a simulation-based learning environment motivates students to solve their problems in real life without any difficult consequences, because in this way they can learn how to solve problems in the virtual learning environment. Also, using the simulation-based learning environment increases the performance of students in learning their materials and courses. This thesis presents three main contributions:

The first contribution is producing a framework for the classroom simulation in the Second Life environment to enable teacher trainees to get more experience in teaching, as well as simulating student behaviour in the form of bots in the same environment, and using a roleplay approach to determine the kind of behaviour that takes place in the real-world classroom (see chapter 3).

The second contribution is creating a design model for the classroom simulation in a 3D virtual learning environment, based on supporting the interaction between teacher avatars and smartbot students (see chapter 4).

The third contribution is merging the virtual classroom simulation in SL with the MOODLE system using the SLOODLE package, which offers a 3D object for supporting teachers in managing the course evaluating all students, and inserting smartbot services that represent virtual students in a Second Life teaching environment, thereby enhancing simulated behaviours using scripting languages, and programming HUD control through supported trainee teacher experiences (see chapters 5, 6).

This thesis facilitates the process of upgrading the system of trainee teacher experiences in developing countries by analyzing the experiences of educational institutions in advanced countries and transferring the best practices to developing nations. It is crucial for all universities to have their own islands in SL for the purpose of promoting exchange of experiences, and for enhancing collaboration on educational projects with renowned universities and educational experts from all over the world. Collaboration and exchange of ideas with other educators and learners is much easier in a Second Life virtual learning environment than in the real world. This is because in SL, educators and learners can collaborate and learn during their ordinary lives, and do not have to travel long distances in order to meet other educators and learners. Hence, education in a virtual learning environment is very efficient, and superior to the traditional method of learning, since it saves time and money.

1.10 Outline of the Thesis

Chapter 1 outlines an initial classroom simulator for trainee teachers using virtual learning environments and simulated students' behaviour. After that, I give an idea of the aims of the research, the research problem and the research question, the methodology of the research, and its contribution.

Chapter 2 is a literature review in which I tackle the advantages and disadvantages Second Life as well as provides an overview of a classroom simulation, classroom simulation management, a definition of Second Life, and examples of a Second Life campus in some world universities. the trainee teacher role, student behaviour, their views and experiences, the 3D virtual learning environment and avatar-based Second Life, evaluation of the students' performance, and the reactions of teachers towards using a virtual learning environment. Also, some related work in this domain and conclude with a critical review and summary of this chapter.

Chapter 3 presents information on the architectural framework in classroom simulator environments. Then I explain and justify my research component.

Chapter 4 presents criteria, theory learning, and a design-model classroom simulator in the Second Life environment that situates the educational uses explored in this platform

within theories of learning. Then I identify the implications of this platform and discuss its future. Also, I provide educators and institutions with a few recommendations. All these chapter's sections are in compliance with my discoveries in chapter four, and with my literature review.

Chapter 5 discusses experimental implementation based on Second Life 3D objects.

Chapter 6 presents an evaluation of my experiments using quantitative and qualitative methods, and set out a case-study scenario for trainee teachers and smartbots and observer avatars based in the Second Life environment.

Chapter 7 presents the conclusions and future work of the research.

Chapter 2

Literature Review

Objectives

- *Overview*
- *Related Work*
- *Critical review*

Chapter 2: Literature Review

2.1 Introduction

In the classroom simulation field, the combination of education and technology has been considered the main key to human progress. Education feeds technology, which in turn forms the basis for education. There are two basic relations between education and technology; the first one is *technology education* which according to Petrina (2009) refers to the study of technological fields which allow the students to know more about knowledge related to technology needed to solve human problems. The other relation is *educational technology*, which is mainly concerned about technology in education (i.e. the use of the technology as a way to enhance education and teaching process across all subjects). However, it can be seen clearly that if educational technology needs development and enhancements, it will need technology education. On the other hand, if there is a need for special technicians, educational technology is less efficacious. Ultimately, educational technology and technology education have a lot in common and are optimized by complementary use (Petrina 2009).

This work will represent the 3D virtual learning environment through defining it as well as explaining its usage. In order to mention the virtual learning environment in a well formed way, this work defines the classroom simulator and its importance, then describes the merging that happens between trainee teacher and student behaviour in 3D VLE. Subsequently, the definitions of virtual learning environment by numerous researchers are explained. Finally, the relationship between training teachers and students to use the virtual learning environment as well as their reactions to it are explored. Different studies' perspectives on the 3D virtual learning environment are compared and contrasted.

2.2 Overview

2.2.1 Simulation concept

Simulation learning is a technique of teaching and learning or assessing learning instructions based on a real classroom context in a virtual environment. It is an imitation of the 'real-life' classroom situation wherein students can engage in various roles, such as problem solving, decision making, data analysis and practicing cross curricular-skills. Students react to changes within the simulation by actively participating in it. Their participation ranges from carrying out various activities, assessing their own decisions and actions, and anticipating future challenges and solutions. In the course of the simulation, students engage in activities that enhance their learning or are intended for assessment.

A simulation is a method of teaching that can be suitable for students as far as suitable teaching materials are utilized. Of course, the higher the level of education the more complex the simulation will be. Although there are commercially available designed simulations, most teachers prefer to design their own simulations that suit their learners interest. Simulations should be formulated in a way that it simplifies real situations while maintaining the complexity of the system. Students will be in a position to take part in activities and experience situations that would have taken a very long time and more material resources in the 'real' world.

2.2.2 Deciding to use a simulation

Using a simulator as a teaching/evaluating method can be considered whenever the curricular content can be discovered or undergraduate learning of necessity content can be analyzed, through their contribution in a concept real life scenario in which their choice of activities decides the result of the scenario. Training through a simulator requires an occasion commitment and carefully orchestrated business program from the instructor. The role of the instructor includes developing or modifying the simulator to fit the unique needs of a group of learners, teaching content/skills necessary to participate in the simulator, tracking undergraduate communications, tracking and modifying the simulator as necessary, assessing undergraduate studying, assessing the

simulator as a chance to learn, and introducing the studying activity with great excitement and passion. Materials must be created and copied; each daily activity should be scheduled. In addition, the instructor needs to allow time throughout the simulator for discussion. Because the instructor must do much of the perform prior to the simulator being run, instructional time during the simulator is available for the statement and coaching which are excellent ways to evaluate undergraduate studying. Using a educational setting simulator is a lot of perform but the success of learners in a well-designed, appropriate simulator is extremely fulfilling for learners and instructors.

The genuine characteristics of many models can be extremely encouraging. The teacher's passion can be inspirational, especially if the role-playing is offered to learners with the possibility to modify their details. Students are actively involved in the studying process as they fix problems and make choices, as this is done in the mature world. Simulations provide a community in which innovation and divergent choices are legitimized and appreciated. Because models are much more like the 'real world' than many academic setting techniques, learners do not quit studying when the category period is over. Their interest spills over into casual out-of-class conversations with other learners and instructors by which encounters and concepts are distributed and analyzed. Enthusiasm pockets and university presence is high. Students become academic ambassadors as they precede their conversations at home. Students explain this kind of studying as genuinely engaging and not tedious. When models are used for evaluation or evaluation of before studying of the material necessary to efficiently get involved in the simulator, some learners may not be effective due to inadequacies in their understanding of the prerequisite material. If the possibilities and motivation are offered to go back and learn the material and try the simulator again, every undergraduate could gradually be effective. Other learners will offer to help in these extra models organised after university or at lunchtime because it is fun.

After considering these aspects, if a practitioner thinks his or her teaching/learning goals can be achieved through a educational setting simulator, the following areas of this document will analyze kinds of models and provide support in their execution in the educational setting (Lamoureux 2007).

2.2.3 Classroom simulation definition

A classroom simulation involves the reflection of time and the processing which helps the student in sharing their experience. Apart from this, their learning ability is checked and at the end of the simulation an assessment is made, which allows the teachers to know that whether the students have gotten the lecture or not. Though this is an interesting activity, the students can easily learn a number of things and they can develop their interest in this real-world system in which can live the way they want to live (Jahangiri 2008).

Classroom simulation is teaching method that can be used for the teaching purposes through world universities with the proper use of learning material. The difficulty level of these simulations depends on the sophistication of the material that is being used for the study purposes. The teachers have two options with these simulations; they can either buy the already available simulations or can create their own. Most teachers prefer the latter option, which enables them to create and use their own materials.

The best simulations are those that use the real-world system along with high awareness about the complexity of these classroom simulators. Students can easily participate in such systems and learn the real system operations without spending days, weeks or months on it (Antonacci 2008).

2.2.4 Types of classroom simulations

There are two main types of simulations:

- Roleplay simulations
- System dynamic simulations

Both these simulations are similar, but they differ in focus and the use of computer technologies.

2.2.4.1 Role-playing simulations

In these classroom simulators the students are allowed to play the main role; they take real-world roles in problems which they have to solve. They have to take autonomous

decisions to solve these problems. The students have to see the results and they can discuss the problems within the given parameters in these simulations. In terms of the real-world application, students can hypothesize the impact of the actions but he never knows the consequences that itinerary of activities would generate in the real world. By taking part in these simulations, students can easily learn how the real-world systems operate and can get the experience of taking decisions within them.

The main focus of these simulations is to make the student learn by doing that thing. With the help of these solutions, teachers allow their students to learn different things like decision making within the system. While students are in this simulation, they have to ignore their school identities and maintain the identity of the role being played. This practice allows the students to do what they want without caring about reputational issues, which gives them more chances to learn without any kind of hesitation. As this activity is quite interesting, students are always curious to generate these transformations. The computer is not fundamentally essential in these simulations as the teachers and students can easily access the data they want, store it and later retrieve it. Computers allow teachers and students to save their time of research and provides the best chances of research work. Apart from storing and retrieving data, computers are not used for the other purposes in the roleplaying simulations (Druckman 2008).

2.2.4.2 System dynamic simulations

System dynamic simulations allow the students to play the real-world roles so that they can face the real-life situations. These simulations are based on the mathematical models of the interrelated quantities that describe the situation in the numerical way. System dynamics have a narrower scope as compared to the roleplaying simulations because of the elements used. In system dynamics the actual enactment of the role is not as necessary as it is in the roleplaying simulations, which gives the space to students to maintain their school identity (Jarmon 2008).

In the system dynamics simulations, the computer is very important. It plays a vital role as it contains information about the principal model. The model allows the computer to simulate, but one step at a time, creating the real-world environment and allowing the students to take the decision but within the given parameters. In every round, students

have to take the decisions independently; once the decision is taken it is entered in the computer. After that, the computer will make the calculations, with the help of the principle model, for the other elements in the system. Once the calculations are done, the output will be shown to the students in the form of graphs or numbers, depending upon the parameters. After that, the student makes new decisions depending on the previous calculations and the graphs and moves on, providing new calculations and allowing the student to take decisions over and over again. In this way they can easily learn to take the decision while keeping their previous experiences (and mistakes, if applicable) in mind. In this way, when they will face similar problems in the real world, they know how they have to react and how to solve them.

2.3 Example of Classroom Simulation

Over the past few years, increasing affordability and usability of information and communication technology (ICT) hardware and software has made computers ubiquitous on both the personal and institutional levels. As late as the 1990s only some schools were able to afford computers, but now some degree of computer access is almost universally provided in all schools worldwide. Computers provide the most obvious investment for schools wishing to provide a modern education and new techniques of teaching. After the introduction of the classroom simulator, almost all the schools in advanced countries started using it as they want their students to be the best. Among these schools are Catalina Foothills Schools District, in Arizona (US), which has been pioneering the use of classroom simulations for many years. They have used these simulations to teach social studies to their students with great success. They are using different models to teach different things to their students like; they use mock trials to teach the court system to their students, a mock Congress is used for teaching how laws are made and so on. They have set different models for different topics. The teacher only has to select that specific model and start teaching the students. Apart from this they have designed the simulations in such a way that students not only learn how a specific phenomenon occurs, but also the drawbacks of that thing. For example, mining simulations teach students about geology along with the environmental effects of the industry, and students must decide how to undertake mining while causing the least harm to the environment. Although the entire simulation is virtual, the students'

decisions about real-world issues (such as mining in the example) will ultimately be informed by their experience (i.e. the knowledge they gained) from the simulation.

Environmental issues have been particularly prominent in simulation learning, reflecting new teaching methods for new issues in pedagogy involving some degree of moral instruction (e.g. environmentalism). The Schools District has thus conspicuously restricted such instruction to social studies classes and some specific topics only. For example, some aspects of history (e.g. genocides) would not be considered suitable topics of simulation learning.

These simulations motivate the students and allow them to learn new things without having any problems. Although classroom simulators remain relatively uncommon, the best schools worldwide are increasingly using them, and this reflects the belief of those schools that students will benefit from them educationally, particularly in terms of decision making skills.

2.4 Classroom Simulation with Interaction and Behaviour

Interaction and behaviour are the key factors in classroom simulators. Students have to interact with the simulations so that they can have a better understanding and to take the right decisions. While working on these simulations, sometimes situations arise wherein students panic as they are not able to take the decision, but they have to stay calm as the whole simulation is depending on their one decision.

If they will take one wrong decision the whole classroom simulator will be affected. Apart from this, in the roleplaying simulations, student are in the identity of their roles rather than their school identity, so some students start behaving like their roles in the school and outside the school, which affects their repute. So it is necessary that these simulations are only kept within the class so that the other students are not affected by these simulations. This fun learning activity has to be maintained as a fun learning activity, and all the models, parameters and stages that are being created for these simulations should remain only in the simulations and should be selected wisely. As the students are learning from these simulations, anything wrong shown to them will affect their learning (Zadok 2010).

2.5 Classroom Simulation-Based 3D VLE

Computer simulators are versions of real-world objects or processes generated by computers. The simulators are present in three different formats: two-dimensional (2D), text-driven formats, or three-dimensional (3D) multimedia. Ranging from computer versions of 3D geometric shapes to the experiments performed in a computer laboratory. 3D virtual learning environments enable students to learn explore and modify the computer made multimedia environments in real time. The way we communicate on the web has changed drastically in the recent years. A few years back one could only distribute and communicate using the web, but now the character of the web has changed; these days one can contribute and collaborate on the web instead of only sharing and communicating, which was not possible in the 1990s. The web has evolved to what is called web 2.0, making new facilities available. For getting a gist of what the web was before the advent of web 2.0, imagine a static Facebook page, where you cannot post on a wall, without sharing functionality. One could read what is on the web page, but other than digesting that material one could do nothing else (i.e. contribute to it in any possible way). No one can read, share, collaborate and contribute effectively using the web of the 1990s. In short, web 2.0 is responsible for elevating our experience on the web to the current level in order to make use of what the virtual world has to offer. This begins the digital integration of identity on the web (or virtual profile) (Jennifer 2007).

Post-Secondary Learning Management System is an important educational concept in web 2.0. It is multi-faceted and has a wide range of tools, but students still face difficulty in openly collaborating in person, in learning the material of the class from a distance, in being creative, and in adjusting to the same environment. Some environments like Second Life and Lively Beta by Google can be accessed over the web with a high-speed internet connection, and they are 3D. For a newcomer they feel like games, but often when one starts exploring, it becomes apparent that these platforms are not all about stimulation; they are intuitive, interactive, collaborative, and social simultaneously. This has attracted the attention of companies who always require better ways of conferencing, and educators who believe immense learning is possible through the virtual world, which does not require the student to be adaptive to the material,

instead offering the course material in a virtualized setting, in which the student can easily become immersed.

Instead of being in the classroom, the student can be taken to an island which is surrounded by water, hundreds of kilometers away. The student can choose a virtualized 3D avatar, and they can dress it and alter the appearance. The students can collaborate with each other and interact with other objects, flying around at the same time. This world transforms the instructors from being dictatorial and one-directional to collaborators on a shared learning experience, offering support and orientation. One can wonder if there is a better way to spend an office hour than exploring a chapter of text with the student in three-dimensions. There is absolutely no doubt that this system has the scope to teach a wider range of students in future, right from kindergarten to university level.

Cynthia M. Calongne, a professor teaching Computer Sciences at Colorado Technical University, has called on Second Life to be used in the nine classes of her curricula, for an enhanced learning experience of the students. Calogne says that a mix of media-rich course material is used in the virtualized classroom environment. Often because the student often lacks clarity when studying complex content, offering information in a variety of ways can help them effectively use the information presented to them to create their own solutions for the projects. Suddenly, from the mindless gatherer and retainer of information, a student becomes part of the learning itself as they can experience the material a the same time as they learn.

One more problem for students is the space problem; they have small and insufficient space in traditional classrooms, while educational providers are compelled to provide the smallest feasible space because of cost imperatives. Based on virtual applications, a whole islet can service as a classroom at almost no cost (given that computer hardware and internet are usually available for other purposes, and thus represent no need for investment). Additionally, the plethora of cost burdens associated with traditional learning at the university level means more students are staying off campus and distance learning is becoming increasingly popular, and more features are being developed for it.

The single interface in computers called graphical user interface (GUI), and the operating system software used, contribute a lot to human life. The computer world has developed in such a way that the 'virtual' reality has become an existential reality in itself. Areas like Second Life are making it happen with the help of 3D applications, and innovative ways of teaching material. The extent to which it is 'real' becomes irrelevant, as educational institutions worldwide increasingly offer learning via a 'virtual reality' platform.

2.5 Virtual Worlds as an Extended Classroom – Benefits

Because of the various opportunities offered by the virtual world, it became essential for various institutions to have a presence in Second Life. For example, the Berkman Center for Internet and Society at Harvard Law School and other institutions are conducting and offering courses or research in Second Life. There are also other institutions that operate exclusively in Second Life. Educational institutions and nonprofit organizations pay a discounted price for setting up virtual campuses or a separate island. Before making a permanent residence, Second Life offers land grants to institutions to establish the virtual world or campus free of cost in order to interact with other institutions, researchers, and students. Although there is increased demand for education around the world, many universities find it difficult to expand due to financial constraints. As a result of this factor, universities have come up with creative ways of handling this issue by establishing virtual universities that can provide access to flexible education to millions of students around the world in a cost effective manner.

According to professor Hannele Niemi(2008), a virtual university can be defined as a space in which university education is conducted through the use of modern information and communication technology. Virtual learning at the universities is done through electronic media such as computers and digital TVs. Studies in virtual universities can also be conducted through a mixture of different interactive channels of distance learning. Professor Niemi further argues that a blend of different technological tools like simulations, video and pictures is enhanced by the capability and speed of technical environments. Ryan (2008) stated that a virtual education institution can be defined as:

- An institution that offers instructional materials and courses to students through information and communication technologies. These institutions also use technologies to conduct activities like administrative functions (such as registration, computing, marketing, record keeping, fee payments etc.), research, materials development and production, financial transactions; career guidance, counseling, and examinations.

- An organization that is composed of several universities and colleges that provide educational programs without the organization itself directly providing instructional material but only acting as a facilitator. The universities are the ones that provide the courses to the students. Such organizations include, the emerging Western Governors University in the United States, the Finnish virtual university (FVU) in Finland, the National Technological University in Canada and the Open Learning Agency of Australia. The creation of Virtual universities is in response to the growing needs of flexible educational programs and increasing fiscal constraints by using information and communication technology (Minocha 2010).

2.6 3D Virtual Learning Environments (3D VLE)

When creating a 3D virtual environment, computer software known as computer aided design (CAD) is used to create the objects in a computer database. Users can then manipulate and communicate with these objects and customize them by adding their own animations. 3D virtual environment is distinct in the sense that the integration of software and hardware makes users feel a sensation of total immersion in a 3D space. In order to feel the illusion of immersion, users should sense the belongings around them. And the user should take these belongings as the objects which has the position and properties. The illusion of immersion can be assessed as follows: a user should feel the presence of an object even though he is moving away from that object since it is just away from one's visibility. The user can sense the presence of the objects, if the objects can respond to the user's movements. And this feeling of things, presence makes the theory illusion of immersion will be taken to the next level. The user can communicate with the 3D objects by using computer input device such as keyboard or mouse. The

following are the three main characteristics that give a clear description of 3D virtual environment: 3D elements, interaction and illusion of immersion. 3D virtual environment simplifies the learning through its features and this is known as 3D virtual learning environment (3D-VLE). 3D Virtual learning environment refers to a teaching and learning program that supports students learning experience. It involves the use of a multi-user virtual environment of a single user virtual environment which enables learners to participate in various learning experience. There are various styles of the 3D VLE which include; mission, challenge quest or tasks. The learners carry out the required activities by moving around the virtual environment using avatars and can communicate using various channels like email, chats Pual (2009). By using digital tools, the students can design their own avatars which are virtual characters as illustrated in Figure 2.1.

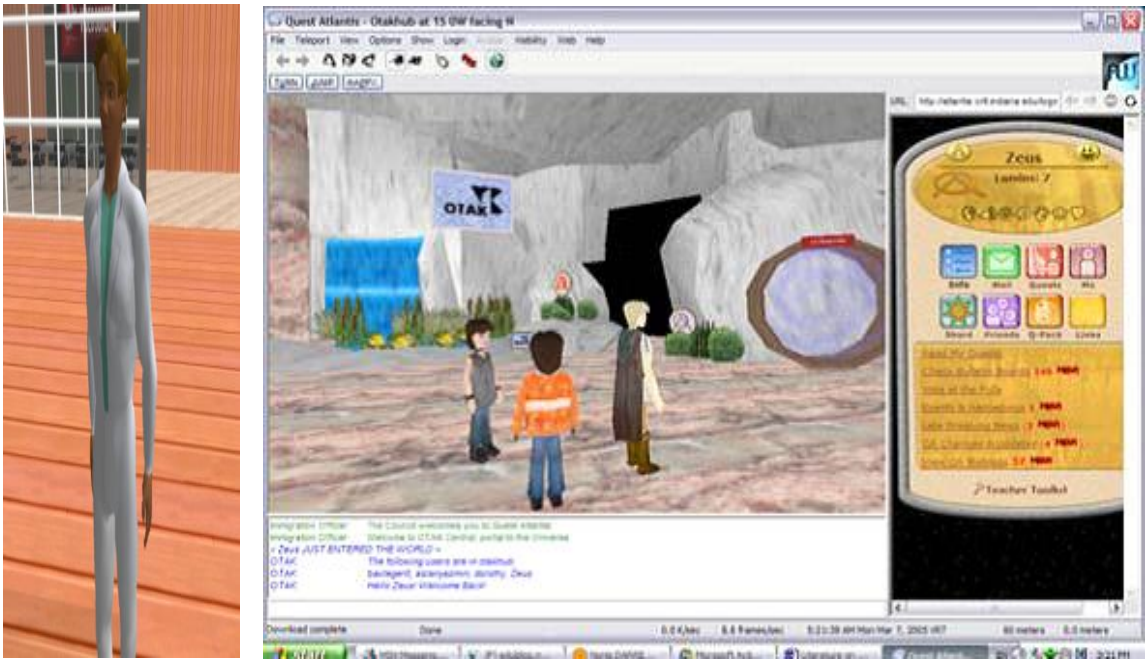


Figure 2.1: Avatar 3D Virtual Environment

2.7 Trainee Teachers in 3D VLE

The tutor has a necessary role because this teacher is the evaluator, instructor for the educational process, and well builders to the applications of virtual learning environment. Also, tutors have the ability to face any difficult situation and deal with different kinds of students. From the other side, Vlachopoulos (2007) said that tutors

play a significant role in three sides; intellectual side, organizational side, and social side. Through all of these roles, tutor simplifies the learning process for students. Through the intellectual role, tutor focuses on the students' main thoughts and theories about education, and the style that students prefer to get learning. Within the organizational role, tutor's duty is to adjust the time of conference, specify the objectives of the discussion, and the techniques that teachers will use to manage the discussion. Then, the social role where the duty of tutor is to build a social learning environment by sending welcoming messages at the beginning of the discussion to motivate students to participate on the discussion through giving examples and sending feedback friendly to correct their mistakes and virtual learning environment has widespread, there is a big amount of stuff does not achieve the advantages of using the functions of the software. This refers to many reasons, such as the admission of the tutors about having little time to expand their use of the system and claiming of others towards having little knowledge for using the system. So, a lot of tutors depend on self-taught environment. In a result, they cannot realize how to use softwares in order to develop the educational values of teaching. Therefore, virtual learning environment will be considered as a rapid method for getting learning.

To reach the required enhancement and to move from traditional learning in a virtual learning environment, there must be training to teachers because the development of tutors is considered as the development of e-learning as well as the progression of e-learning depends on tutors. Even if there are lots of pressures that may appear during training, then these pressures may be harnessed to promote well training by good pioneers in e-learning because good techniques can take the attention of tutors and decrease the threatening that tutors may feel. On the other hand, Scully (2011) mentioned that although there are a lot of teachers who have good computer skills and comfortable essential use to VLE, they need some training in educational issues to let them able to deliver the required information, improve the quality of learning, and improve the system of VLE. Trainee teachers should be in sequence and happens at least once a year to help tutors on being up-to-date with any new developments. Another way of training is online courses because it helps the tutor to try the online learning process and know how students feel towards e-learning.

Namuth (2007) noticed in her study on Eurovolt's trainees that they were trained professionally and personally, and half of the trainees accomplished the target of the course which is improving their own courses and putting them online. On the other hand, the opportunity of getting a succession depends on the support that is given to the trainee by the institute or the organization, because they are familiar with the online needs. So, they have to know how to support their staff and provide them with the equipments of development in order to develop the virtual learning environment. Masse (2010) argued that one of the most important factors in using VLE relates to using the system easily so that tutors must be trained to make them familiar with computer and internet system. The benefit from this focused training is gained through freedom of obligations to attend the training. Furthermore, training should concentrate on using computers and internet technologies and the applications of VLE.

Finally, tutors' training is the key for helping others to acquire new skills, improve these skills, adopt new educational methods, and understand how to apply their experiences in the new educational processes. Tutors' training should depend on practice and formed by educational experienced staff. Training tutors happens through two steps; initializing by common support learning then starting the technical improvement of enlarged existing trainers.

2.8 Teaching methods in 3D virtual learning environments

Both of Bignell and Parson (2010) demonstrated that learning from one occurrence which does not have a parallel life in the real world is suspicion among Second Life residents who are being studied. Psychology grad students are tested for reactions like rude, anger and other disturbing behaviours which is a widespread theory of troublesome avatar behaviours of human beings.

There are several opportunities for scientists, mentors to develop a virtual world. Even the Berkman Centre for Internet and Society at Harvard Law School is offering classes in Second Life, along with the other institutions taking an advantage of unique services that are offered to academics in the program. For a discounted price the educational institutions and the profitless organizations can make a separate island or an in-build lab in the world, with which the access can be controlled by the researchers. Second Life is

giving the land grants to the educators to establish the virtual world or campus free of cost to interact with other educators, researchers, and students before establishing a permanent residence. Terranova is the virtual world blog which are present in the website to communicate with the other researchers. The real life website allows researchers to share their experience and findings in virtual research. The famous studies include like psychology copyright law and intellectual property. The ethical boundaries for the in-world experiments are still in the process of unravelling by both Institutional Review Boards (IRBs) and researchers. According to Yee most of the IRBs are fairly lenient with virtual investigators because for some experiments scientists are "able to forget informed consent, since its public observation. The virtual worlds often allow research type which is omniscient. Sometimes it may happen that without informing to the others mole avatars a main male avatar may precede with the experiments. The experiments haze the line between public observation and participation demanding informed consensus, and therefore, present more of a tough job for the boards which follow the traditional guidelines as it is a new medium. Yellow lees for his virtual schizophrenic hallucinations, he has to work closely with an ethics board to confirm the safety of the participants. "My main important concern was constricting aggressive symptoms and whether this would be stressful for the patients," which is said by Yellow lees. The Usage of Second Life is restricted to people, over age 18 only can use this, and many other virtual worlds allow the user to underage, which give totally another important concern for the researchers. For teens there is a Teen Second Life for young users, but to access researchers are required to undergo a background check and create a private island with restricted access beforehand they are allowed to work in those areas.

2.9 Second Life Environment

The virtual learning environment use a digital online to learn from their course and materials. In other words, this kind of learning is working with the 3D virtual environment Second Life so that students work with an effective way of teaching that used the virtual environment. The importance of using the Second Life with the virtual learning environment relies in its ability on facilitating the learning's technique; therefore, using 3D with the virtual learning environment is considered as an effective

way of learning because it focuses on both of the imagination of the learner and the technology that is used in the 3D. This method works by identifying a case study to help learning in multi skill context; by doing this way, students became able to learn the skills of solving problems since they grouped together to do certain assignments.

The most attractive characteristic in learning with a virtual learning environment of 3D graphics is that it shifts from learning students from their teachers directly to learning students from themselves with their teachers' supervisions and controls. According to Shih and Yang (2008), students learn from themselves because they study their courses or materials in real-world scenarios that are connected with their materials or courses and working with collaborating many students on an assimilation information or finding. In other words, students collaborated together to identify the problem, gathering and assessing data or information, and identifying different solutions. Hamalainen (2008) explained that identifying problems and solutions in a collaborative way can help students with their future since the complex life is require a collaborative team work as well as it can help them with their works which require a collaborative team work employees in the companies.

2.9.1 Second Life definition

Second Life is basically a game. It is controlled and looks like the video games available in the market. In simple words you can say that it is a game in which you can make your 3D representations whom you call avatar and can easily interact with your imaginary world with the help of these avatars.

You can easily interact with your imaginary world, you can talk, reply play and whatever you want to do, you can easily do those things in that world. Second Life allows you to be become the person you want to be in real life. It is also one of the best methods of teaching and also helps you create a virtual environment, in which you can easily create a classroom of your own along with the study environment that you want in your class. For the Second Life you only need the computer and the internet connection. There are a few universities that are providing lectures to their students through the Second Life (Shih and Yang 2008).

Second Life is a multi-user virtual environment tool for both formal and informal learning that provides a new medium in social learning theory which is based on the assumption that we can learn effectively by engaging with the our social context (Ye 2007) Itschief advantages and disadvantages are outlined below.

Advantages

- 3D virtual environment.
- Free cost.
- Highly adaptable.
- Interaction through dialogue and collaboration.
- Discovery learning.
- Promotes an interactive distance learning.
- Facilitates the development of distance communities.
- It provides effective tools for building virtual context, objects and people.
- Simulation and experiential learning/roleplaying approach.
- Quests and problem solving ability (such as games).
- Can maintain anonymity.

Disadvantages

- Distraction factors.
- High quality hardware requirements: speed Internet connection, quick microprocessor, and a good video/graphics card.
- Do not offer tools to monitor and track students.
- It is not easy to store digital documents.

2.9.2 Using the avatar in Second Life

According to Fallon (2010), an avatar can be defined as online self-aspects which used in a virtual learning environment and used to improve the communication within a virtual environment. Also, the avatar can help the online educational fields because it allows the student to have a visible persona in a virtual environment so that they can have the opportunity of working with an imaginary experience which simulates the real life. Using both of the virtual learning environment and the avatar can improve the achievements of students during learning particular material. These high achievements are related to engaging students with the activities of learning which used a collaborative communication between students in a certain position. Another advantage of using avatar in a virtual learning environment refers to the social interaction that is provided to grouping students together. Kennedy et al. (2010) argued that avatar is used to improve the performance of students because it is considered as an environment where students engage, understand, develop, evaluate, and solve the problems or assignments in their courses. According to Fetaji et al. (2007), avatar is used as a digital tool that evaluates the outcomes of the students as well as it develops the qualifications of learning in general. The earliest usage of the avatar was exclusively with some applications, such as games.

According to Baden et al. (2011), using avatar allows students to interact together which then improve their sociality especially for those students who afraid form grouping with others face to face. This means that during interacting students with each other in an anonymity way within a virtual learning environment of avatar, some of them feel that they express themselves better than expressing themselves with people who are in front of them. Therefore, the style of learning form a cyberspace can improve the social skills for students especially those who dislike contacting with others immediately. Both of Vasileiou and Paraskeva (2010) stated that using a virtual learning environment with avatar can enhance the ability of students towards solving some assignments that may be difficult in the real life because of its high price or location. Students proven that learning with an avatar in a virtual learning environment allow them to learn experiences that are uneasily accessible, such as designing and simulating physical processes. Therefore, they received cognitive functions, such as identifying, evaluating,

and solving problems which then put them on the road of meeting their needs and thus changing the role of the teachers so that he becomes a supervisor of his students' works.

There might be a relationship between students and their achievements while learning a course by a virtual learning environment; therefore, the ability of avatar in improving learning students in a virtual environment and then facilitating their achievements. Also, it focuses on enhancing the social relationship between students who used the virtual learning environment and avatar in their materials since they grouped together to do their assignments. Mascitti et al. (2011) confirmed that using avatar in a virtual learning environment make the learning process more effective since students used a team working to learn particular course; by doing this, students can improve both of their learning and social skills. In addition, students can satisfy their needs by using aspects that are found in avatar within a virtual learning environment, such as video, audio, text, and graphics resources.

2.9.3 Universities with Second Life

As we know that 3D or virtual classrooms are a better medium of understanding, and helps the student in getting the things in a better way. And almost all the schools, colleges and universities want their students to learn in a better way and get the top ranks. So they are using the techniques of classroom simulators. But there are some students who want to learn but on the other hand they have some financial problems due to which they have to leave their studies and have to work instead of going to university.

So for the students who want to learn as well as wanting to do the job at the same time should opt the Second Life. But there are very few universities that are offering their students these kinds of offer. Apart from this there are some students who may have missed their classes but now want to get the lectures again can also go to the virtual classrooms where they can easily get the lectures. They can also get these lectures on YouTube, but YouTube does not have the visual effects that can keep the students for a long time on it. But if they are getting the same lectures in 3D they will get the lectures in a better way and will want to learn more and more things apart from the lack of time.

So keeping this thing in mind, many universities have started their virtual classrooms. You just have to login to their website and if they are providing the virtual classes you can join them and just pay the fee. In this way while sitting at your place you can take the lectures ad can complete your studies. The students who want to do something big in their career opt these virtual classes as they do not wish to waste their time. It is expected that in the future almost all the universities will be offering the Second Life. As the number of students are increasing and the number of seats for each subject are less as compared to the number of students. So for the better percentage of the educated students, government as well as universities will take this step and will introduce the Second Life virtual classes (Burins 2012).

But the Second Life has a drawback that can affect the students. Though the students can get the education while sitting at their place but when they will enter the physical world, they will come across the problems and questions that they have even never imagined off. So for that it is necessary that classroom simulators are run along with the Second Life, so that they can help students in learning thing in a better way and can help them in taking decisions. These Second Life classes should be made compulsory for the students that are special so that the percentage of educated people is increased. All the famous universities have offered virtual classes to their students and soon the rest of the university will also do the same. As they all want more and more people get educated and in the best way possible.

2.10 Evaluating Students' Performance

According to Lovatt et al. (2007), the performance of the students differs from learning from traditional course and virtual learning environment; for example, the performances of students who study chemistry in a virtual learning environment were better than those who study chemistry with traditional learning. The main problem that faces the physical sciences' students is referred to their disengagement in their lesson may be because their courses concentrate on achieving scientific knowledge without knowing the motivational side of science. Therefore, the solution appears as using the simulation of the computer technology, such as a virtual learning environment. The virtual learning environment provides the opportunity for students to open resources which include their

materials' notes online. Evaluating the performance of students was conducted by their answers of the assignments that they had in their materials. Moreover, students were able to ask any qualified person about their materials, such as clinician to help them in understanding and solving their assignments. The interacting students with a virtual learning environment, it seems that students have taken positive performance from learning with virtual environment because they increased their taking notes from their materials as well as they decreased their feedback level from their assignments. The virtual learning environment can be used with the deaf children and this kind of learning can measure their attitudes towards it The virtual learning environment contains a virtual learning game so that sign people can learn mathematics easily. Also, this game consists of gloves, wand, and a track. After conducting this game in the virtual learning environment it is very important to evaluate the acknowledgment that the participants' members have gained from using this kind of learning. In order to evaluate the performance of the participants' members, it must put in mind evaluating the cognitive needs of the user, such as his emotional and physical needs, then, finding the preferences of users towards the characteristics of the game, such as light, style, and color, and finally, finding the feedback from the participants' members. The virtual learning environment game had a negative influences on the simulation, while saturated colors provided huge waves of alpha (that provided the awareness) to the brain. On the other hand, it was found that bright colors attract young children because it provides positive responses to their emotions. The final results show that students have a positive performance toward playing with games in a virtual learning environment.

Chen et al. (2009) stated that implementing virtual learning environment is used to encourage sharing information between students, but this does not mean that teacher must grouped students together and then ask them to share information between them. This statement motivated Chen et al. (2009) to evaluate the performance of students towards receiving knowledge from virtual learning environment; therefore, he made a research on MBA students who share information between them in a virtual learning environment. Sharing knowledge is related to the social network and self efficiency. Sharing information is conducted after joining a group of students to share information using a virtual learning environment that simulates the real life. The most significant objective of virtual learning environment is referred to enhance the performance of

students by sharing information between them based on solving other problems and providing ideas to others. After noticing the importance of virtual learning environment between the MBA students, it seems that their performance was a positive one because they it might be a strong connection between the gaining information and the behaviours of students. This means that while grouping students together, they do share information between them which then faced the student with storage of information and then increased his own knowledge positively.

Estrada et al. (2009) evaluated the platforms of virtual learning environment by knowing its usefulness to students. This research had focused on both of the usefulness of virtual learning environment and on the process of learning the language. The process of learning is conducted by sharing information among a group of students and then creating a feedback for their information also between them. Also, this information is sharing between all of the parts who have participated in the learning process who are the teacher and the students. After conducting the research which aims to evaluate the usefulness of virtual learning environment and the satisfaction of its users, it seems that there is a positive performance for those two aims because students described that they are tending to using an online course rather than courses with a traditional teacher. Moreover, students stated that they feel very comfortable with the feedback that received from the virtual learning environment rather that the feedback from their teacher in the classroom.

2.10.1 Students' behaviour in VLE

According to Izso and Toth (2008), learning from an online virtual environment is differed from the conventional learning process because learning virtually from online allows students to exchange information and ideas between them with many distances between them. Actually, the general idea behind the virtual learning environment relies on providing much interaction between students; therefore, teachers teach children their materials and courses through using the online and the virtual environment. It is worth to mention that students were chatting with each other as well as learning from their teachers through several steps; for example, students interact with one or two students and then they interact with many different students in order to achieve finally the process of learning. Furthermore, students communicate with each other and with their

teachers by having discussions between them in their virtual classes. These discussions are reflected the status of every student whether he feels sad or happy and also these discussions are conducted from specific chatrooms that manage and organize these discussions.

In addition to that, students are learning from interacting with their teachers and their peer students; this means that students join with their teachers and peer students in a virtual classroom to discuss their material issues. This way is conducted through rating the discussions of their teachers and students by providing comments from the special chatrooms in the program or the software. Actually, these ratings can be provided by several forms, such as comments or attachments. These comments are distributed from the teacher of the virtual classroom by sending a copy to every student in the class so that students learn from each other as they are in a real classroom. Moreover, the teacher tells his students on preparing their next lesson by brining digital formats or contents that describe the content of the next lesson and then submit these formats by uploading them to the main server. This way simulates the participation of students within the conventional classrooms. Finally, students can simulate the participation within the real conventional classroom by conducting workshops which represent the team working. These workshops are assignments that contain huge activity with huge options towards solving a problem that takes the form of assignments. This way provides collaboration between students to evaluate their achievements (Izso and Toth 2008).

2.10.2 Students' behaviour in Second Life

The Second Life is targeting to help the teachers and students in a ready to service manner. This computer program has to improve the practical and theoretical knowledge of the students as well teachers while discussing in the classrooms. It will improve the tactics in teaching skills, and it is also of great help while preparing for workshops. This software energetically pretends an interaction and the nature which we get to see in the real world classroom environment. The GUI helps users to change all of the variables and observe the resulting changes in the students. The Second Life program imitations look real when they run in the real world. Behavioural variables (or attributes) depend on the visibility and latent of a virtual student depending upon the state of his mind,

concentrating on the work (task), knowledge, the capacity to achieve the work and persistence of cognitive. For an example, let consider an employee with a bad mood. He will not be able to complete the task, which makes him to tend towards lack of concentration in the work. Even though he has a good knowledge of the tasks given to him, he cannot contribute 100% of efficiency.

If a person with a distracted state of mind attends an interview, then he will face a lot of consequences like the way he answers the question or the way he show the expression (mood). In the similar way it also depends on the virtual students, depending on the state of mind, concentrating on studies etc. these all can be visualized by a teacher in the real world classrooms.

These all characteristics are captured by the teachers throughout the course completion and will be reflected back to the student/parents Senges (2007). These are the characteristics which say about the effectiveness of teaching on every individual student. To overcome these kinds of effects from the virtual student, the principals to be followed such as assessments, social activities, games, friendly nature with the students, teaching should be presented in a better way. These activities will make the student to pull him out of the virtual world (Figure 2.2).

Figure 2.2: Student behaviour in classroom in SL

2.10.3 Reactions of teachers towards using a virtual learning environment

According to the United Nations Educational, Scientific, and Cultural Organization (UNESCO 1998), many commentators realized the significance of using computers and their networks with the conventional learning environment. This importance relies on the reactions of teachers who confirmed that their interactions with their students were better than before since students can learn their materials or lessons online and virtually. Also, realizing teachers the real meaning of using technologies and networks as well as their development, such as developing the Internet and the World Wide Web increased the perspectives of teachers towards using a virtual learning environment to conduct virtual lessons so that students can learn from easily and rapidly. In addition, teachers describe their tendency towards using the Internet and WWW not only with students at schools, but also with students at universities because teachers claimed that their students (at school or universities) performed better by using the Internet with their learning process. Teachers demonstrated that when connecting students with from different links with the same operating systems which related to their teachers increased their efficiency in the learning process; which means that students reached high performance in their materials or courses since they start using computers and the Internet in the virtual learning process.

It is worth to mention that teachers announced on their positive perspectives towards using a virtual learning environment within the learning process according to many reasons. In other words, teachers describe that using computers and Internet to teach students their materials or course increased their students' literacy on using computers. This point is a very important element that teachers concentrate on because those students will work in the labor markets after their graduation so that they can benefit from using computers and Internet in having their jobs since most of the current jobs depend on using computers and Internet. Barzegar et al. (2010) demonstrated that students argued that using virtual learning environments in teaching students their materials or courses enrich and support the curriculum because learning curriculum in a virtual learning environment contains different images, audios, and videos which can be saved in the computer disk so that students can benefit from them anytime more than once as they need. Therefore, this step is a powerful step to support the process of

learning the curriculum in a better way than before. Moreover, teachers describe that learning by a virtual learning environment increased interacting their students with them because students were more active with using computers and the Internet to learn their materials or courses than learning in the conventional learning environments.

Bailenson et al. (2008) argued that although using virtual environment in the learning process is considered as a new method or way of teaching, teachers describe that this new way (which related to teach lessons online and virtually) is a positive one that can be used to develop the learning process. For example, teachers demonstrate that they were much able on focusing on all of their students rather than focusing on them in the conventional environment because teachers were able to receive information from all of them as well as sending feedback to all of them since teachers can see all of their students directly without any problem. Another reason behind the ability of teachers on concentrating on all of students by using the virtual learning environment is related to get rid of the problems of breaking the rules, such as sleeping or eating during the lesson time. The most distinctive feature in the virtual learning environment that help teachers with their learning process is that teacher in a virtual learning environment can be much closer to the students because of existing all students in the center field of the teacher.

Some teachers provide negative aspects towards using a virtual learning environment in the learning process. Those teachers demonstrate that teaching their students online and virtually erase their role in teaching at all, because they stop playing their traditional role in coming at schools and seeing all students in front of them. Therefore, those teachers describe learning from a virtual environment is insufficient and provide little values for teachers in general. Also, some teachers mention that learning materials and courses to their students prevent them from being the available resource to their students because by using virtual learning environments students have the ability to search on the Internet sites for the same information that they receive from their teachers. Other teachers illustrated that their negative perspectives towards learning students from a virtual environment related to the limited time schedule that they have compared with the schedule of time within the working hours in the school itself. Finally, some teachers who have negative aspects towards using virtual learning environments

demonstrate that teaching students from online and virtually provide their students with low confidence since they do not engage with other students in reality. Therefore, engaging with other students virtually lack students the self confidence because they will not speak and chat with other students directly.

2.10.4 Reactions of students towards using VLE

According to Alobiedat and Saraierh (2010), since the development of technology has reached the classroom simulator, teachers teach their students from a 3D virtual learning environment rather than the traditional way of learning which depends on mixing a teacher in a classroom with all of his students. Teaching students with a virtual environment depends on gathering both of a teacher and his students online and then learn information in a virtual way. Although this way is considered as a new way of learning for both teachers and students, students explained that they receive positive perspective towards learning from a virtual environment. For example, students learn more information as well as they spend much time on reading because they were attracted to the characteristics of that virtual learning environment, such as audios, videos, and images. All of these characteristics attract students to learn more information on reading their materials and doing their homework's. Also, because students were attracted to use computers and the Internet, they do their best to do their homework since they have to search on the Internet. Thus, students mention that they were more satisfied with using virtual learning environments than learning with the traditional way.

Hodhod (2010) demonstrated that learning from a virtual environment provides many positive aspects to the students, such flexibility as well as freedom of space and time. Students claimed that although learning from online is a new way, it is considered as a very interested way that allow students to access it anytime and anywhere easily and rapidly where students can read books freely without any problems. Also, one of the most significant advantages in the virtual learning environment is that students can contact with their virtual students or peers anytime their schedule permits without any problems. In addition, virtual learning environment is free software that allows each student to access into information quickly and easily. The most distinctive feature in this free software is that it is conducted by experts of programmers from all over the world.

Also, students can use this software freely as well as they can use, download, and modify on it without any problems. Another significant feature that students benefit from positively with learning from a virtual environment relates to the contents of the software which consists of available books, information, and quizzes from all kind so that students can benefit from positively.

According to Bronack et al. (2008), students can learn from virtual environment better than the traditional way of learning because virtual learning environment keep students reflective, active, conversational, and active students. Therefore, students illustrated that they learn better than before because of the characteristics of the virtual learning environment. In addition, it is good to know that learning from a virtual environment provides students with a new experiment which starts from the most appropriate usage of computers and the Internet. Furthermore, students describe that they were much comfortable because they learn from their homes as well as they can interact with their teachers and peer students anytime without any problems comparing with the traditional way of learning. It is good to know that students who learn from a virtual environment are more socially comparing with those students who learn from the conventional learning styles; they are more social because they participate in groups to do their homework.

Some students argued that they receive a negative impact from learning from a virtual environment as Jebakumar and Govindaraju (2009) mentioned. Those students claimed that learning from a virtual environment make them fell frustration and confusion because of many reasons, such as their inability on communicating with other students directly as well as they can face different technical problems with using problems that motivate them towards getting anxious from these technological tools. It is worth to mention that some teachers demonstrate that students especially in schools are not mature enough to work on the Internet because it has different dangerous on students who can be classified as children. Some students describe that they find it difficult to find real friend because they were socially isolated which means that they do not see those virtual friends directly or in reality. Other reasons behind feeling negative towards learning from a virtual environment are related to the level of utilizing computers and the internet; this means that not all students have laptops or even personal computers.

Therefore, students who do not have computers do not have the enough skills in using computers and the Internet which then makes them feel frustrated because of the technical problems that they can face by using computers and especially the Internet.

2.10.5 Trainee teacher roles standard

The role of the teacher as an educator is to provide quality education for students.They should be role models for the students in terms of their behaviour and moral values. Teachers have to dispense their duties with honesty and integrity. They must be competent in their subject area of speciality, update their skills and knowledge regularly and maintain a professional relationship with the students, parents and co-teachers.

A teacher must:

1. Set high expectations which inspire, motivate and challenge students

- Create a safe, supportive and stimulating learning environment for learners, built on mutual respect
- Establish objectives and targets that challenge learners of different cultural and social backgrounds, talents and characters.
- Adhere regularly to the highest ideals of values, good attitudes and behaviour which are expected of learners (Table 2.1).

Table 2.1: Teaching standard role (inspire, motivate, challenge)

Trainees achieving the standards at a high level may demonstrate these characteristics: They regularly motivate learners to participate actively and contribute to a favourable learning environment. They regularly establish high standards for learners in different training situations. There is a culture of a high degree of mutual respect between the trainee and learners. They are very effective in enhancing students' confidence, trust, adaptability and self-reliance when dealing with complex tasks. They develop high levels of excitement, engagement and dedication to learning.
Trainees achieving the standards at a medium level may demonstrate these characteristics: They are dependable for motivating learners to engage and contribute to an environment that is favourable to learning. They regularly establish high standards for students in their different training situations. They are well respected by students and successfully enhance learners' trust,

confidence, self-reliance and adaptability when dealing with complex tasks. Because of these factors, students develop a sense of enthusiasm and are motivated to participate.
All trainees to be awarded QTS will have demonstrated as a minimum (low level) that: They can motivate learners to engage and contribute to an environment that is favourable to learning. In the midst of varying school experiences, they demonstrate that they have set suitably high expectations, assuming that all learners have the capacity to improve. They can establish a mutual relationship with various learners and groups. Consequently, the majority of the learners participate in the learning process. They regularly exhibit professional conduct, respect for learners, co-workers, and parents and promote the culture of the school. They show commitment to teaching and learning and excitement about dealing with learners.

2. Promote good student progress and outcomes

- Be responsible for the achievement, improvement and the performance of learners.
- Prepare teaching materials that suit the learner' abilities and prior knowledge.
- Help learners to reflect on the progress they have made with their learning activities and their emerging needs.
- Show knowledge and awareness of how students learn and how this impacts on their teaching.
- Motivate learners to take a responsible and conscientious attitude to their work and study (Table 2.2).

Table 2.2: Teaching standard role (promoting student outcomes)

Trainees achieving the standards at a high level may demonstrate these characteristics: They accept a high level of responsibility for the achievement, progress and results of their learners. They show confident judgement in preparing and planning students' development both in the course of the lessons and over time and can articulate effectively the purpose for building on prior accomplishments. They actively promote student engagement and use effective strategies that help learners to reflect on their own learning. They can plan complex activities that take into consideration the level of the students and their previous knowledge and experience, which is achieved via the use of the correct evaluation systems. They consistently design materials that promote students to develop autonomous learning. Consequently, most of the students make excellent progress.

Trainees achieving the standards at a medium level may demonstrate these characteristics: They accept responsibility for the achievement, progress and results of their learners. They show a reasonable awareness of the need to improve students' learning over time. Their short- and medium-term planning regularly takes into consideration learners' previous experience and knowledge. They continuously give learners the chance to reflect on their own learning and use this, together with other methods of evaluation, to improve their preparations and teaching. They utilise their skills of effective teaching and learning approaches to promote autonomous learning, and design relevant challenging activities that match the learners' abilities and needs. Consequently, most of the learners make good improvement.
All trainees to be awarded QTS will have demonstrated as a minimum (low level): They are aware that teachers are responsible for the achievement, progress and results of students and accept responsibility for this with the help of the regular class teacher or other professional. Their short- and medium-term planning and teaching shows an awareness of, and provision for, learner development taking into consideration previous accomplishments. They enable learners to reflect on their learning and recognise their development in learning and emerging needs. During lesson preparation, they create appropriate opportunities for students to assess and enhance their performance. They can describe how effective teaching methods are enhanced by an understanding of how students learn and provide a justification for the choices made in the course of their practice.They prepare teaching and learning materials which promote autonomous learning. Consequently, most of the learners make adequate improvements.

3. Demonstrate good subject and curriculum knowledge

- Demonstrate satisfactory and competent knowledge in the appropriate subject(s) and curriculum areas, promote learners' interest in the subject, and deal effectively with any misunderstandings.
- Show a thorough understanding of the new developments in the subject and curriculum areas, and champion the importance of scholarship.
- Accept responsibility for enhancing high standards of literacy, articulacy and the correct use of Standard English in the subject area.
- Show an in-depth knowledge of systematic synthetic phonics when teaching early reading.
- Show an in-depth knowledge of suitable teaching methods when teaching early mathematics (Table 3.3).

Table 2.3: Teaching standard role (subject and curriculum knowledge)

Trainees achieving the standards at a high level may demonstrate these characteristics: They demonstrate an in-depth knowledge of their subject area, plan adequately and sustain the students' interest. They have an in-depth knowledge of pedagogy of the subject of their specialty and can anticipate general mistakes and misconceptions during their preparation. They are aware of the need for career development and are very proactive about updating their knowledge and skills in their specialty area, curriculum and the methods of teaching through regular training. They set high standards for writing and speaking skills in all of their professional undertakings. They effectively utilise every opportunity available to improve the students' competence in, reading, communication and writing. **In relation to early reading:** primary trainees use their strong awareness of synthetic systematic phonics and its role in teaching and assessing reading and writing to teach literacy very effectively in the context of the age groups of the students whom they are training to teach. **In relation to early mathematics:** primary trainees use their in-depth know how and understanding of the principles and practices of teaching early mathematics to choose and utilise highly effective teaching methods in the context of the age groups of the students they are training to teach.
Trainees achieving the standards at a medium level may demonstrate these characteristics: They demonstrate an advanced knowledge and understanding of the subject/curriculum areas they are training to teach. They use their knowledge and skills effectively to capture and sustain the learners' interest. They employ their strong skills of the curriculum and pedagogy to enhance the students' skills and understanding, handling common errors and misconceptions in the process of teaching. They understand well the need for career development and hence regularly update their subject, curriculum and pedagogical skills and use relevant professional development and experiences to further their career. They set high standards for writing and speaking skills in all their professional undertakings and motivate their students to achieve these skills in the process of teaching. **In relation to early reading:** primary trainees demonstrate a strong knowledge and understanding of synthetic systematic phonics and its role in enhancing teaching and evaluating reading and writing skills across the age group of the students whom they are training to teach. **In relation to early mathematics:** primary trainees have a good knowledge and understanding of the principles and practices of teaching early mathematics and use appropriate teaching methods in the context of the age group of the students whom they are training to teach
All trainees to be awarded QTS will have demonstrated as a minimum (low level) that: They have an adequate knowledge and understanding of the specific subject/curriculum areas they are training to teach in the context of the age group of the students. They understand how learning develops within and across the subject/curriculum age groups they are training to teach, with regard to the development of the main ideas and general misconceptions of the learners. They can give adequate responses to learners' inquiries

about the subject area while using accurately and constantly the special terminology associated with the subject area they teach in order to develop learners' knowledge and skills related to the subject. They are recognizant of the fact that they have to update their subject and pedagogical skills as a main factor of professional growth and demonstrate a capacity and willingness to do so. They show an understanding of the necessity to enhance high standards of communication, reading and writing skills in all students and begin to build this into their lessons. **In relation to early reading:** primary trainees show an adequate knowledge and understanding of the principles and practices of teaching and evaluating reading and writing, which involve the use of systematic synthetic phonics, and can use this within the context of the age groups whom they are training to teach.

4. Plan and teach well-structured lessons

- Enhance understanding and teaching through the effective use of the lesson time.
- Foster the students' passion and excitement for learning and arouse their interest and intellectual curiosity.
- Set assignments and design out-door class activities that enhance the students' skills and understanding.
- Assess the effectiveness of the teaching strategies employed in the course of classroom instruction.
- Participate actively in the design and provision of the subject area(s) curriculum that effectively engages the students (Table 2.4).

Table 2.4: Teaching standard role (planned and structured lessons)

Trainees achieving the standards at a high level may demonstrate these characteristics: They design lesson plans using creative strategies that arouse the learners' interest and enthusiasm and reflect their needs. They are highly analytical and reflective of their own teaching strategies. They can accurately evaluate the impact of their teaching practices on individual and group learners and can utilise the evaluation records to enhance their teaching and the learners' performance. They show the initiative to participate actively in curriculum development for the purpose of designing appropriate learning resources.
Trainees achieving the standards at a medium level may demonstrate these characteristics: They demonstrate initiatives to employ multiple teaching and learning strategies. They are aware of individual differences in learning and hence design lesson plans that reflect the needs of all students by setting differentiated learning outcomes that empowers the students to attain the required objectives. They gain experience and learn from both effective and ineffective methods of teaching by using assessment strategies that analyse the suitability and effectiveness of their teaching practices and its impact on the students. They engage in curriculum and materials design in their placement settings.

All trainees to be awarded QTS will have demonstrated as a minimum (low level) that:
They use multiple strategies of teaching methods and a variety of learning materials. They sufficiently prepare lessons that suit the learners' needs and promote the students' performance, interest, creativity and positive thinking. They adopt a flexible approach when dealing with classroom events and allow the students to move at their own pace. They have confidence that their teaching methods will meet the students' needs and are able to design a learning environment that is engaging. They are aware of the importance of assignment and outdoor activities in captivating learners' interest and improving learning and can plan suitable activities for learning. They evaluate and reflect on their teaching strategies in order to improve their future planning of activities and teaching. They work with other experienced teachers in adopting and/or designing medium and long term plans, schemes of work, lesson plans, curriculum and outdoor activities.

5. Adapt his/her teaching to respond to the strengths and needs of all students.

- Be aware of individual differences among learners and use teaching strategies that yield effective learning.
- Demonstrate a clear understanding of the various factors that hinder learners' ability and willingness to learn, and know the appropriate ways of dealing with them.
- Be aware of the physical, social, emotional and cognitive development of the learners and adopt an appropriate method of teaching that suits the various stages of development.
- Demonstrate a clear awareness of the needs of the different types of learner, including students with special educational needs, gifted learners, those who are physically challenged, and those who speak English as a Second language, and use the correct distinctive teaching strategy to engage them (Table 2.5).

Table 2.5: Teaching standard role (responding to student needs)

Trainees achieving the standards at a high level may demonstrate these characteristics:
They are able to recognise very quickly and accurately their students' strengths, weaknesses, interests and needs and are proactive in differentiating and using various effective approaches that enhance learning and the development of the learner. They recognize how a range of teaching methods can have a positive effect on engaging learners.
Trainees achieving the standards at a medium level may demonstrate these characteristics:

They regularly use teaching strategies that meet learners' needs and support learning and personal development. They understand how to achieve learner progress and how to assess individual and group progress. They are aware of various effective approaches that they can employ to deal with hurdles and address the needs of their students. They understand well how to handle any possible hurdles to teaching and learning by using purposeful intervention and the proper use of the available resources.
All trainees to be awarded QTS will have demonstrated as a minimum (low level) that: They know their learners very well and understand their needs, weaknesses and strengths. They can adopt teaching methods that are suitable to the learners and address those needs to enable the students to achieve their potential. They are aware of the various factors that can hinder success and are aware of the various approaches used by experienced teachers to deal with those factors. They use these approaches on their own or can work with experienced teachers and other support staff whenever it is deemed necessary. They understand the development of young learners and take this into consideration in their teaching and planning. They show some awareness of the challenges and opportunities associated with teaching in a diverse society. They show a developing understanding of the needs of all learners and can use specific methods of teaching that can engage learners and are suited to helping those with specific needs, such as EAL and SEND. They utilise opportunities well and can assess the effect of their teaching strategies on the development of learners.

6. Make accurate and productive use of assessment

- Demonstrate a knowledge and understanding of how to evaluate the subject and curriculum areas, including the statutory assessment requirements.
- Use formative and summative evaluation techniques to assess learners' progress.
- Use appropriate records and data to set objectives, plan lessons and monitor learners' progress.
- Provide feedback to students either orally or by correcting assignments and motivate learners' to respond to the feedback.

Table 2.6: Teaching standard role (assessment)

Trainees achieving the standards at a high level may demonstrate these characteristics: They can effectively evaluate learners' achievements against the national standards. They regularly utilise a variety of evaluation techniques for the purpose of monitoring the learners' progress accurately and also for future planning. They constantly monitor learners' understanding during the lesson and anticipate where intervention may be necessary to improve understanding and proficiency. They constantly evaluate learners' performance for the purpose of promoting achievement.
Trainees achieving the standards at a medium level may demonstrate these characteristics:

They can effectively evaluate learners' achievements against the national standards. They use a variety of suitable formative assessment approaches and can modify their teaching strategy depending on the learners' abilities and responses. They keep accurate records of learners' work and performance and use them to set suitable targets. They constantly evaluate learners' progress and provide feedback on their performance and discuss with them their weaknesses and methods for improvement.
All trainees to be awarded QTS will have demonstrated as a minimum (low level) that: They strongly understand the statutory assessment requirements for the subject/curriculum in the age group that they are training to teach and generally can make accurate evaluations against the national standards. They use a variety of formative and summative evaluation techniques in their planning, mainly designed to enhance the learners' progress. They utilise these techniques effectively to assess the effect of their teaching on learner performance and as a foundation for adjusting their instructional strategies. They have knowledge of how school- and pupil-level summative records are used to set targets for groups and individuals, and employ that knowledge to monitor their learners' progress. With the help of experienced teachers, they monitor the performance of their learners, keep accurate records and set new targets for individuals and groups. They correct learners' work and give oral feedback for the purpose of improvement.

7. Manage behaviour effectively to ensure that a good and safe learning environment is created.

- Set specific, clear rules and routines for behaviour in class, and take responsibility for enhancing affable behaviour and personality both in the classroom setting and in the immediate vicinity of the school, consistent with the school’s behaviour policy.
- Have high expectations of behaviour, and create a framework for discipline which consists of various approaches, using praise, sanctions and rewards consistently and fairly.
- Manage the classes effectively through strategies that motivate students to act in ways that meet the needs of all learners.
- Develop good relationships with learners, exercise leadership and appropriate authority, and find the confidence to act decisively when facing difficult situations.

Table 2.7: Teaching standard role (behaviour management/safety)

Trainees achieving the standards at a high level may demonstrate these characteristics: They quickly adjust to the various contexts in which they train and operate within the school's established behaviour policy by implementing the rules systematically and fairly. They set high expectations of their students and employ various approaches that are used by competent and experienced teachers to enhance positive behaviour, including: the use of sanctions and rewards such as praise, mainly for the purpose of creating a conducive learning environment. They easily manage learners' behaviour, using a range of strategies in order to enable them to demonstrate high levels of engagement, cooperation and good manners. They earnestly seek appropriate support services in order to deal with learners who exhibit serious disruptive behaviour.
Trainees achieving the standards at a medium level may demonstrate these characteristics: They operate within the school's behaviour policy and implement the rules and routines consistently and fairly. They regularly have high expectations and understand and use effectively various techniques employed by experienced teachers to enhance positive behaviour, including the use of sanctions and rewards such as praise, mainly for the purpose of creating a conducive learning environment. They effectively manage students' behaviour to enable them to demonstrate positive attitudes towards the teacher, their learning, the school and their peers, enabling the smooth delivery of the lesson. They earnestly seek appropriate support services in order to deal with learners who exhibit serious disruptive behaviour
All trainees to be awarded QTS will have demonstrated as a minimum (low level) that: They operate within the school's behaviour policy and can implement the rules and routines consistently and fairly. They have high expectations and are aware of the various methods used by experienced teachers for enhancing positive behaviour.They can implement effectively school policy regarding sanctions and rewards, such as praise, for the purpose of creating a conducive learning environment. They know when to seek for support services in order to deal with learners who exhibit serious disruptive behaviour. They are recognizant of the fact that effective planning, the use of various appropriate teaching strategies, and the use of appropriate evaluation techniques, all contribute to effective classroom management. They understand that barriers to learning can affect students' behaviour and hence collaborate with experienced teachers and use other support services to deal with these issues. They know that behaviour management is context-dependent and hence understand the factors that contribute to the disruptive behaviour in their classes.

8. Fulfil wider professional responsibilities

- Contribute positively to the general life of the school and live up to its ethical principles.
- Maintain healthy professional relationships with colleagues, understanding how and when to seek advice and other specialist support services.

- Use support staff effectively.
- Accept personal responsibility for the progress of all the learners and improve learning and teaching by using relevant professional development, responding to advice and feedback from colleagues.
- Communicate student progress and well-being to parents using appropriate methods [.education.gov.uk].

Table 2.8: Teaching standard role (wider responsibilities)

Trainees achieving the standards at a high level may demonstrate these characteristics: They proactively look for chances to participate and contribute significantly to the general life of the school and live up to its ethical principles.They develop healthy professional relationships and constantly work with colleagues.They accept personal responsibility for using support staff in their lessons and for consulting the appropriate professionals with regard to learners with personal needs.They earnestly seek opportunities to engage in professional development and respond positively to all the feedback they receive. They communicate student progress, their well-being and other emergent needs effectively to parents or guardians both orally and in writing whenever necessary.
Trainees achieving the standards at a medium level may demonstrate these characteristics: They proactively seek chances to participate and contribute significantly to the general life of the school and live up to its ethical principles. They are active in establishing healthy professional relationships with colleagues and demonstrate this by cooperating and working with them whenever necessary. They take personal responsibility for using support staff in their lessons and for consulting the appropriate professionals with regard to learners with personal needs. They proactively engage in professional development and appreciate the feedback they get from experienced teachers, using it for further development to enhance their teaching strategies. They communicate student progress, their well-being and other emergent needs effectively to parents or guardians both orally and in writing whenever necessary.
All trainees to be awarded QTS will have demonstrated as a minimum (low level) that: They understand and promote the ethical principles of the school and demonstrate it by contributing to the general life of the school in a suitable manner. They develop healthy professional relationships with other teachers and possess the collegial skills necessary to work with others. They interact well and guide any support staff who provide assistance during the lesson mainly for the purpose of enhancing individual or group performance. They know when to seek advice and/or data from specialist professionals with regard to learners with special needs. They ask and respond positively to the advice given to them by experienced teachers. They reflect on their own practice and thus determine professional development targets, then seek opportunities to meet these targets. They understand the significance of guardians or parents' engagement in

enhancing learners' performance and well-being. They communicate effectively the emergent needs of the learners at set points in the school year, especially at parents' meetings and school board meetings, using written reports and charts.

2.11 Related Work

2.11.1 Second Life with constructivist learning theory

Multi-user virtual environments are becoming very popular and hence provide an opportunity for the constructivist learning environment to inspire the design of the 3-D virtual world. Constructivism learning theory argues that people form their own knowledge and meaning based upon their experiences of the world. Based on this concept, the process of learning includes the following principles: knowledge is acquired and understanding can be broadened through active (re)constructions of mental frameworks and learning is an active experience which includes strategic progressive construction that leads to an in-depth meaning and understanding. Knowledge of these characteristics enables teachers to anticipate and act in response to learners' understanding.

SL provides a constructivist learning environment and can enhance learning by: offering interactive, exploration opportunities in the virtual world, offering an opportunity to connect and discuss with other learners in the environment and enabling them to develop various skills, depending on their interests and needs (see Figure 2.3).

SL enables users to create whatever they like in their environment depending on their own understanding or meaning and enables the same users to visit other environments designed by other users and interact with them.

Figure 2.3: SL enables learners to design their environment according to their understanding

According to a study conducted by Gul, Gu, and Williams (2008) entitled "Virtual worlds as a constructivist learning platform: evaluations of 3D virtual worlds on design teaching and learning", the design and learning environment of SL promotes constructivist learning by analyzing the affordability and limitations of the modeling, communication, and computational characteristics of the 3D virtual environment.

2.11.2 Connectivism learning theory

The theory of Connectivism and cognitive load were both created to develop a learning environment. These theories were developed before the inception of a Multi User Virtual Environment rich with Web 2.0 applications.George Siemens proposed a newer educational framework that reflects the effect of these technologies. Siemens analyses the constraints of these learning theories and indicates that, “Learning theories are concerned with the actual process of learning, not with the value of what is being learned. In a networked world, the very manner of information that we acquire is worth exploring. The need to evaluate the worthiness of learning something is a meta-skill that is applied before learning it self begins” (Siemens 2008).

Siemens believes that there is a need for a new learning platform that reflects the changing world, where technology has made life more convenient and enhanced networking and connectedness (Figure 2.4). In today's digital age, we derive our competence from making connections within this new paradigm. Siemens (2008) pointed out that, “A community is the clustering of similar areas of interest that allows for interaction, sharing, dialoguing, and thinking together”. Downes’ research paper, entitled "Connectivist Learning and Personal Learning Environment" further analyzed this theory and indicated that connective knowledge requires an interaction (Figure 2.5). The nature of SL enhances higher connectivity and interaction between users through simulated relationships.

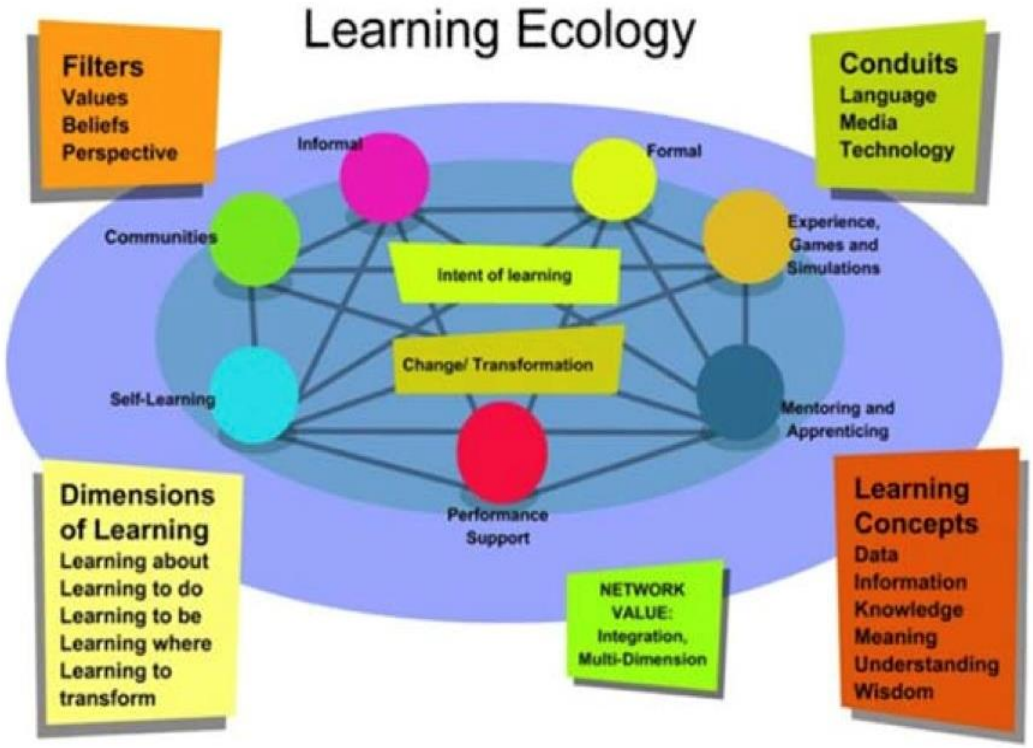


Figure 2.4: Connectivism: a learning theory for the digital age

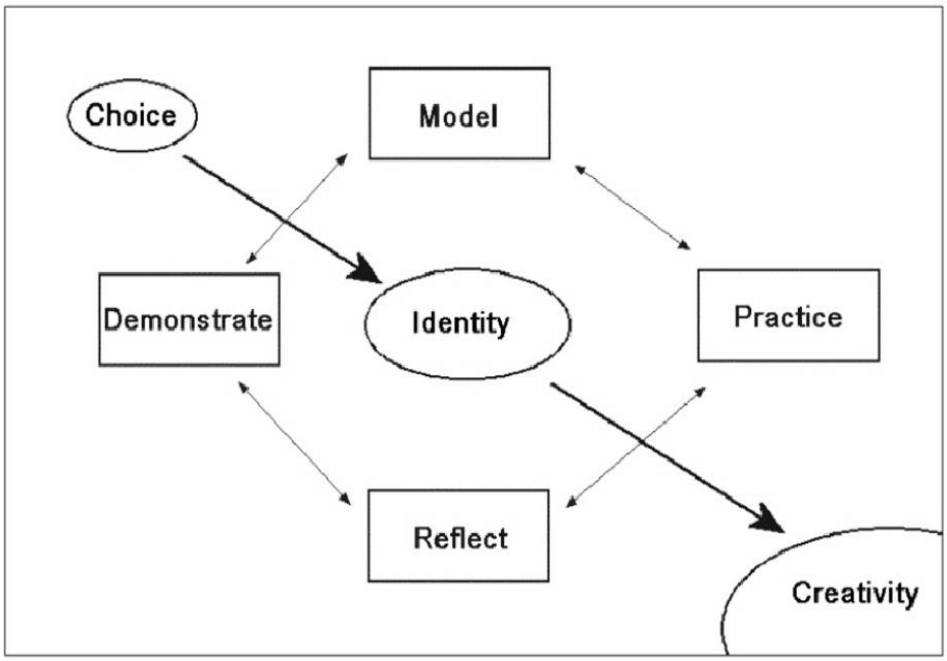


Figure 2.5: The Connectivist Learning Model

2.11.3 Highly Interactive Virtual Environment model

Using a different and a more unifying framework, employed another more consolidating platform and stated that the objective of the virtual experience should determine the formulation of the environment (Figure 2.6). Hence, just like SL, the virtual world is founded on a larger continuum that Aldrich refers to it as Highly Interactive Virtual Environment (HIVE). Teachers can analyze a variety of environments and learn new ways in which learners can enrich their interaction in order to enable them ti understand and use effectively the essential concepts and interface necessary to exist in the virtual world. These challenges can also be broadened by motivating learners to move on to the play and practice stages Aldrich (2009).

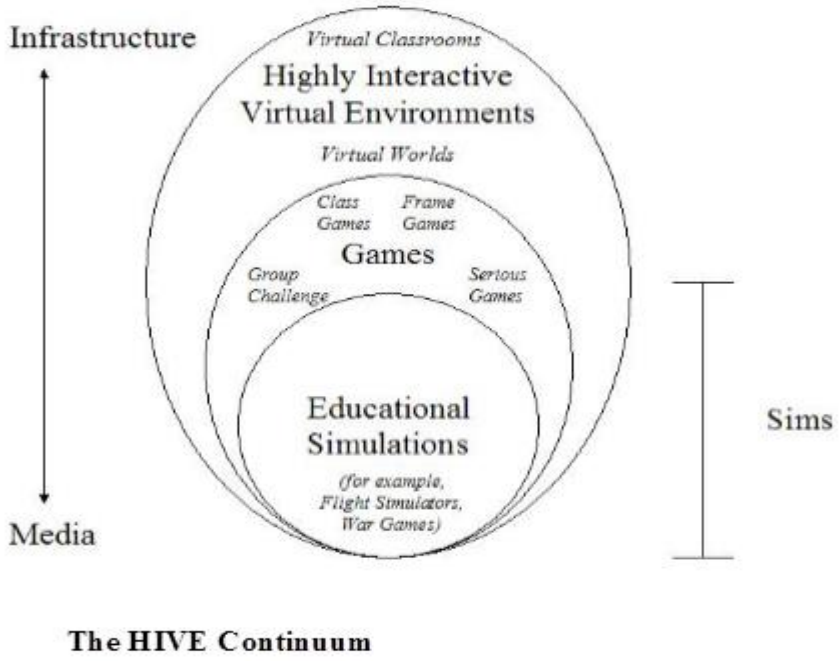


Figure 2.6: The HIVE Continuum

According to Aldrich, the materials designed for the virtual environment should demonstrate the nonlinear essence of HIVE learning and use the opportunity to learn by doing. The objective is not to repurpose the present materials but to reconsider its aim, and design new materials and new ways of displaying them that can captivate the capacity of HIVEs for teaching and learning. Although the most effective procedures may be transferred from stand-alone educational simulations to virtual world-based simulations, the metrics and learning objectives for the different contexts should be different. Learning objectives and assessments around games, for example, should concentrate on engagement, exposure, while with the use of simple interfaces, on the other hand, educational simulations should measure the development of complex, transferrable skills (Aldrich 2009).

In conclusion, it should be pointed out that, with regard to the further development of SL through research, the study of Jennings and Collins (2007) can be regarded as out of date. There are several virtual learning environments that were designed after this research and, every month, there are many academic projects which are being conducted. In addition, several UK universities today own SL campuses as shown by

SimTeach wiki of SL universities, contrary to the eight only indicated by Jennings and Collins (2007).

Aldrich's model mainly focuses on learning to do rather than learning to know. His model is based on games, simulations and the virtual world, which are intended to enable the learners to learn how to do. However, the model has some disadvantages which include the following:

1. The HIVE model uses games and simulations to create high interactions. The games may not provide a structure for ensuring learning. An entirely simulating educational game may not also be fun because the content can be frustrating despite the graphic nature of the simulation.

2. Overlap between processes.

3. The same technique used to help students access the virtual world is also used to help them to access the educational simulations and vice versa. Such techniques involve the help desk, downloads and username and passwords. There is a need for an introductory level to enable learners to familiarize themselves with the basics of manipulation, navigation and communication prior to engaging in the real part.

4. If institutions focus more on immersion in their teaching and learning, there is a possibility that hand-on experience with real objects might be neglected.

2.11.4 Design of learning spaces in 3D virtual environments (DELVE Model)

According to Minocha (2010), this Model will try to contrast the learners' experience of the learning environment with the varying levels of realism within SL. In order to explore immersion, the project contrasts the learners' experience in an existing virtual reality environment with an environment designed within SL.

The number of educational institutions using SL is growing very fast; however, there is a lack of research body that directs teachers on how to design learning materials and how to teach in SL. Several educational institutions have islands that are specifically designed for learning, offering students a sense of belonging, purpose and acceptance.

The structure of a physical learning environment in a 3D virtual world portrays the teacher or educator's dream related to teaching and learning.There are varieties of 3D learning environment which range from a duplicate of real-life structures and spaces. On the other hand, one can create unreal or imaginary locations.

This model will analyze the creation of a learning environment in SL from these two perspectives. As indicated before, this research mainly concentrates on two perspectives of a 3D learning space: realism and immersion. There are various levels of realism in a 3D virtual space. The level of immersion provided for the users may also vary from one environment to another. Complete or full immersion in virtual reality occurs when the user is psychologically within the virtual environment. Users in full immersion can actually experience the graphics, audio and other effects of the virtual environment and also respond with appropriate effects. These two perspectives, realism and immersion, can be integrated to form the model of 3D virtual environments as illustrated by Figure 2.7. In the first phase, the focus will be mainly on assembling data on various learning environments within SL. After analyzing a range of learning environments, only three learning spaces will be chosen to depict various points on the realism spectrum. The following are the three learning spaces that will be discussed this content:

a) One highly realistic learning space, for example, the virtual representation of a real university campus.

b) One learning space with a moderate level of realism, for example, an imaginary outdoor setting.

c) One non-realistic learning space, for example, a fantasy environment.

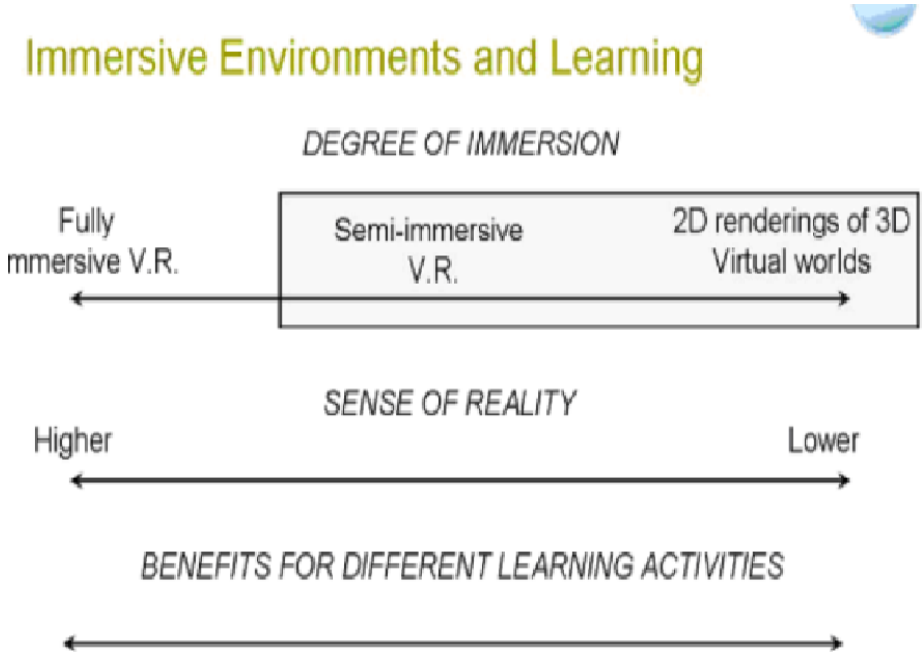


Figure 2.7: A Model of 3D virtual environment with varying degree of realism

This model provides learners with an opportunity to acquire an in-depth understanding of the materials through immersion. However, the model has some disadvantages which include the following:

1. The type and background of participants: The attitudes of the participant in this project towards the learning activities in the virtual world and the issues they are affiliated with concerning realism and immersion will be affected by several factors such as their technical knowhow, their ability to blend this technology into their life and work and the various factors that motivate them. Hence, it is important to understand the background of the participants and how that might affect their responses.

2. Balance between learner and educator input: The data collected about realism mainly focus on the educator while those collected about immersion mainly rely on the learner. Therefore, these create different kinds of data that require different sets of analysis. The degree of merging between these two types of data is limited.

3. Limited longitudinal nature of the study: In order to understand better how the learners' experience and attitudes may change over time, a longitudinal study is required.

2.11.5 Building interactive Modeling (BiM)

Virtual worlds have the potential to engage and support non-specialist building end users, novice students who are learning about the building design and construction process, and also facilitate the interaction among multidisciplinary design team members who are geographically dispersed. For example, virtual worlds can involve helping end users to reach collective design decisions and control the way in which decisions are made, monitor results, and improve the productivity of meetings. According to Maher and Merrick (2008), a networked and multi-user virtual environment can be used as a tool to support a broad range of activities, including communication, collaboration and education. This idea proposes the concept of Building interactive Modeling (BiM), which facilitates real time communication and interaction to allow enhanced collaborative visualization, inspection, interaction, and the manipulation of complex 3D models to break down the barriers of knowledge and information flow from the client briefing to operation and maintenance phases. Building interactive Modeling (BiM) combines BIM and virtual worlds and facilitates the interactive simulation of tasks including real time collaboration for construction planning, design reviews, interactive training, and facilities management performed by multiple project players who are not always collocated and technically proficient to interact with the digital models produced in Building Information Modeling software environments (Figure 2.8).

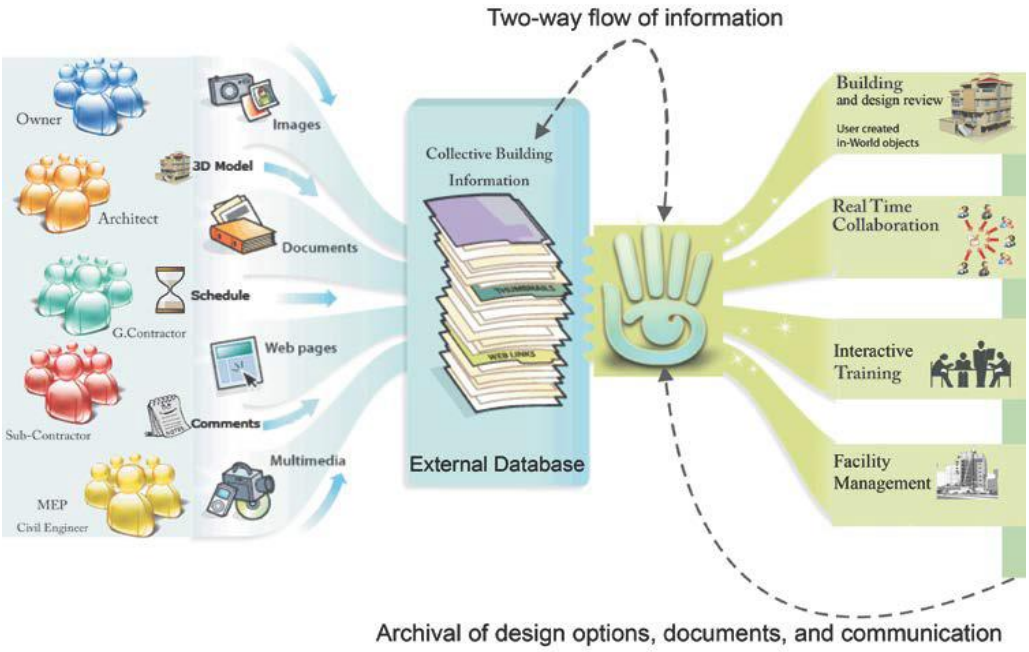


Figure 2.8: Building interactive Modeling

This model is effective in enabling learners to engage in the construction of materials. It also provides an opportunity for training. However, the model has some disadvantages, which include the following:

1. Multiple model views: Currently, the virtual world environment does not support multiple representations of a 3D model and this reduces the amount of detail necessary to build accurate drawings and produce multiple views. Traditional construction requires a 2D format and the virtual world cannot produce a 2D format; hence this creates a problem when implementing a virtual world as a tool of integration.

2. Interoperability: In order to construct a graphic design, SL uses the basic geometric shapes of objects known as "prims". The texture of real-world objects can be mapped onto the models to make them more realistic but, to create a more realistic model, users require skills in handling the specific tools available in SL along with a third party program. In contrast to the purpose-built 3D models, designed in the CAD or BIM software environment, there is not only a lack of accuracy in the SL models but also difficulty in obtaining the same level

of representation. Hence, it is very important that the SL environment supports interoperability with external modeling software. In this model, the authors used middleware software (such as AC3D), where the imported objects are reduced or broken into an additional number of faces and hence the imported model may result in an incomplete 3D model due to the restrictions in the number of prisms authorized in SL. Also, this method does not support the importation of cylindrical and conical objects into SL.

3. The unrealistic behaviour of avatars and limitations of the Scripting Interface: The client programming interface used in SL is the Linden Scripting Language (LSL). LSL has many limitations for end users with regard to replacing variables, that may create difficulties in terms of updating or linking with other data files. The authors of this model have tried to address part of the weaknesses of the Linden Scripting Language by using an LSL script that communicates with HTML and PHP script so that users can make input without changing the LSL scripting.

2.12 Critical Review

This literature review mainly discusses "Classroom Simulation for Trainee Teacher using Virtual Learning Environments and Simulated Students Behaviour". The research justifies the use of virtual learning environment in teaching and learning on the grounds that the technology is today used in all sectors of life such as medical, economical and communication sector and hence the use of technology in education should not be exceptional. The use of technology in the classroom set up, and supported by other research work such as Fallon (2011). Accordingly, technology brings fun and entertainment to learning and reduces boredom, contrary to the traditional mode of teaching.

The research suggests that virtual learning is suitable for teaching and learning and sites other research finding that support this argument. The study done by Graven and Mackinnon (2008) which indicates that Second Life develops the critical thinking of students and gives details on these critical thinking that is enhanced by a virtual learning environment. These include problem solving, discussing ideas and decision making. But

the research needs to go further and discuss how the development of these skills in the virtual learning environment as Second Life that different from their development in a real classroom situation.

The research identifies lack of computer skills on the part of teachers and students as stumbling block to the adoption of virtual learning essentially Second Life in teaching and learning. The suggest ways of tackling this problem by teachers training on the technical aspects of the virtual learning through workshops and conferences. The findings of this literature review suggest conflicting attitudes of teachers and students in a 3D virtual learning environment. Although most teachers welcome the use of virtual learning environment, some of them are worried that it will diminish their old status of being the only custodian of knowledge since learners will have access to available learning materials.

On the other hand, most trainee teachers expressed a positive attitude through Second Life environment in get experinces depend face to face interaction. However, there are almost Saudi unvirsities not used Second Life environment to present virtual classroom simulation for teacher and student and get interaction with supported tools in this environment.The virtual education has provided universities with a way of dealing with their financial constraints while expanding their educational programs. The literature review cites virtual organizations such as the Finnish Virtual University (FVU) in Finland, which are composed of groups of universities which provide virtual education using Second Life environment.

Most researchers concluded that virtual learning environments such as Second Life are the future medium of teaching and learning because of its significant positive impact on students' learning abilities based on smartbot.

Finally, the research problem is divided into two parts how can the teacher avatar trainee get experience before he teaches real students through the virtual world? And how can student behaviour be simulated? The research result imagines the solution those problems are smartbot to support teachers in his lecture and deal with him as realistic environment as well as there are roles for teacher training if he applied allows

at full time in his lectures with found the observer avatar as an expert teacher to write notes about him and the teacher will Successful in this idea.

2.13 Conclusion

Although the use of technology as a tool in teaching and learning cannot be underscored, it is greatly underutilized by most teachers. 3D Virtual learning, Second Life, is a new medium of e-learning that has a tremendous positive impact in achieving educational success. 3D virtual environment, Second Life, is a computer based simulation of the real world where users interact via avatars. One of the advantages associated with virtual learning is that it engages the learners in the learning process. This is because the use of features such as graphic animations, audio and video attracts students to the 3D virtual learning environment. Students interaction skills, communication and computer skills are greatly improved by a 3D virtual learning environment.

Despite the significant roleplayed by 3D virtual learning environment, some students have developed negative attitudes. This is due to the fact that there is no face to face interaction in the virtual world and some students feel isolated hence reducing their self-confidence. In general, learning institutions have to create an environment in which both teachers and students can effectively use virtual learning environment. Teachers have to be trained in computer skills and other applications used in a 3D virtual learning environment considering the enormous impact of virtual learning in the field of education. The technology made the learning process very effective. At the beginning of its appearance it solves a lot of problems for some categories of students like special needs students, and then it helps most of the students' categories because it proves that technology really changed the educational process which finally leads to new educational methods like distance learning and e-learning.

Distance learning caused a big evolution in educational process meaning and gives everybody in this world the chance to get educated in any subject that he needs. Virtual learning environment is considered as a helpful way in learning students their courses or materials because it allows students to prepare their lessons online as well as it shifts the role of the teacher to be a supervisor on learning students' strategy. The most interesting

features in virtual learning environment is that it learns students their courses with an entertainment process because it uses the simulation of the real Life (such as 3D and avatar) which consists of audio, sounds, and videos so that students learn their materials rapidly without any problem. In addition, virtual learning environment is considered as an alternative way of learning of some kind of learning especially those which require huge designing and building. The virtual learning environment is considered as a new method that is used in the learning process; therefore, researchers try to do their best to make students learn more information from their materials. For this main goal, governments make major steps towards implementing the virtual learning environment in schools as well as universities. For example, governments focus on training teachers about using the virtual learning environment in an appropriate way so that they can teach their students rapidly and effectively. Also, governments focus on the students themselves where they trained them to use the virtual learning environment effectively and easily. Then, after governments train both of teachers and students on using the virtual learning environment, governments search on their reactions towards using this virtual learning environment. By doing so, governments can know the influence of using virtual environment in the learning process as well as it can know the differences between it and the conventional learning process. For instance, training teachers conducted by several ways; for example, governments train teachers by sending computers' pioneers or experts who train teachers about the way of using the virtual learning environment which is a software so that teachers can use this software easily and rapidly. Also, those experts train teachers on dealing with students who do not have any background about this software in order to use it perfectly with their learning process. On the other hand, teachers train students on entering this software in order to read information from it as well as download, save, and modify it easily in order to do their homeworks efficiently. Finally, governments find that reactions of both teachers and students differ towards using the virtual learning environment, where some teachers and students provide positive perspectives since learning from a virtual environment can provide new ways of learning, while other teachers and students provide negative perspective since this environment erase the role of the teachers and the schools.

Chapter 3

Framework Classroom Simulation based Second Life

Objectives

- *Aims of this Framework*
- *Theoretical Framework*

Chapter 3: Framework Proposed of Behavioural Classroom Simulation Based Second Life Environment

3.1 Introduction

In the modern world today, the emergence of sophisticated learners as a result of increased access to modern technology has created greater challenges for educational institutions to reinvent themselves and come up with better training approaches for teachers. Although modern technology has permeated every aspect of our life, the use of information and communication technology in the classroom setting remains very limited and/or absent.Imagine a situation in which both learners and teachers can travel back in time and witness events in distant history as if they are happening today. Such kinds of experience are made possible by Second Life (SL), a virtual world where the participants interact as avatars (virtual characters that represent real people).

In the virtual world, distance and geographical location are no longer an obstacle. Teachers from various parts of the world can meet in a virtual world, share and discuss ideas relating to pedagogy and listen to lecturer and educational presentations. The use of SL, a virtual world, as a professional development tool is today a reality. Professional growth is very important for teachers. SL virtual world provides teachers with a flexible opportunity for professional training through e-learning without the need to leave their working environment. Teachers can use the virtual world to attend lectures, workshops, tours and any other events that they desire without leaving home.Using avatars, teachers can learn and network with other professionals. A virtual world hence provides the means whereby skills and knowledge are shared among the learning communities.

SL can be used to enhance teacher training. This is a unique method of training that enables trainee teachers to interact with avatars and participate in a virtual classroom that has modern equipment. Photos of real life classroom setups or imaginary situations are used so that learners can actually experience learning without being in a real classroom environment (Seven-Baden 2011).

3.2 Aims for this Framework

This framework aims to evaluate how the trainee teacher obtains the necessary skills and experience and acts when faced with a range of predefined student behaviour in a virtual classroom setting. The outcome of this framework indicates that training teachers through the SL environment allows teachers to gain increased experience in the virtual world. However, in order to optimize teaching and learning through SL, improvements are required in terms of building the design, roles and simulations.

3.3 Theoretical Framework

The effective training of teachers leads to effective learning and teaching. The effective teacher is "one who contributes to a student's acquisition of knowledge and skills by using a number of techniques associated with the promotion of learning and who displays personal characteristics commonly associated with a positive learning environment" (Jahangiri 2008). Second Life is an option within the e-learning spectrum that utilizes Web 2.0 technology. Second Life is an example of a 3D virtual reality environment that can be used to create a simulated learning experience (Honey et al, 2009). This virtual world was developed by a company called Linden Labs and was launched in 2003, with the main aim of providing entertainment, commerce, education, training, etc.

The adequate training of teachers geared towards achieving effective classroom teaching and management can be attained through the use of SL, a 3D virtual environment with simulated behaviour. The trainee takes the role of the expert teacher in a simulated classroom.

SL provides an interactive online environment in which students can create representations of themselves (known as avatars) that can 'interact' with virtual objects and landscapes in a manner reminiscent of online games. (Crisp et al. 2010)

On the other hand, teachers create virtual characters of themselves, known as teacher avatars. These avatars can then be moved around and interact with each other, when using SL for teacher training.

This system makes the foremost contribution to knowledge underpinning this research, and a similar training teaching system that works to connect the following set of components using a SL environment to support the trainee teacher's ability to acquire experiences.

- Trainee teacher avatar
- Observer avatar
- SL environment and interaction tools
- Inventory
- Smartbots
- Behaviour control

Figure 3.1 illustrates a virtual classroom simulation for trainee teachers in SL.

The trainee teacher avatar: The role of the trainee teacher avatar is to manage, organize and teach the learners effectively. The trainee stands in front of a virtual classroom composed of autonomous student bots and presents the lesson. An observer avatar representing the education instructor supervises the trainee teacher's performance and provides feedback to him/her.

The observer avatar: The role of the observer avatar is to assess the trainee teacher's performance during the simulation of the lesson and inspect the classroom facilities. The observer avatar also observes the feedback between the student bots and teacher avatar and demonstrates a variety of basic and animation behaviour. Figure 3.2 clearly shows the system of monitoring and evaluation in SL using classroom simulations.

Interface SL, a 3D virtual world, provides simulations of real life scenarios and allows both students and teachers who are represented by avatars to discover innovative methods of enhancing their skills and imaginations. The trainee teacher can use 3D virtual reality to teach complex scientific concepts. For example, students can take a tour of outer space and visit various planets. They can view the solar system in 3D virtual reality and gain a profoundly unique experience.

SL provides a great opportunity for cooperation between the teacher and the learner, contrary to the traditional methods of e-learning, such as emails and blogs. Trainee

teachers are invited to engage in situations which are similar to the real life classroom context. The teacher and students in the SL can communicate through different channels using their avatars. These communication channels may include chat, instant text messaging, audio, file sharing, etc. Instant messaging (IM) is used during private conversations between two avatars or between group members.

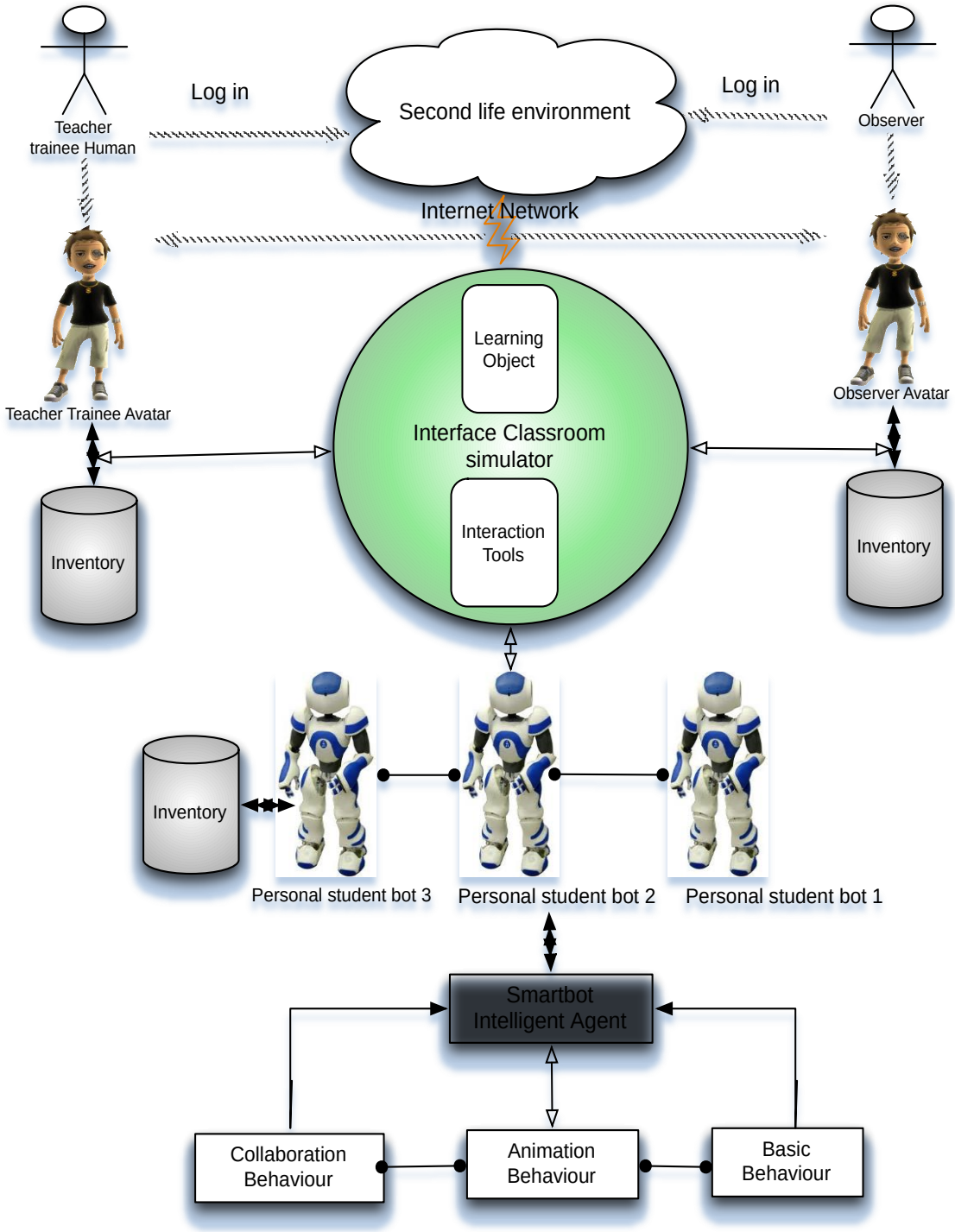


Figure 3.1: Framework Proposed for Behavioural Classroom Simulator in SL

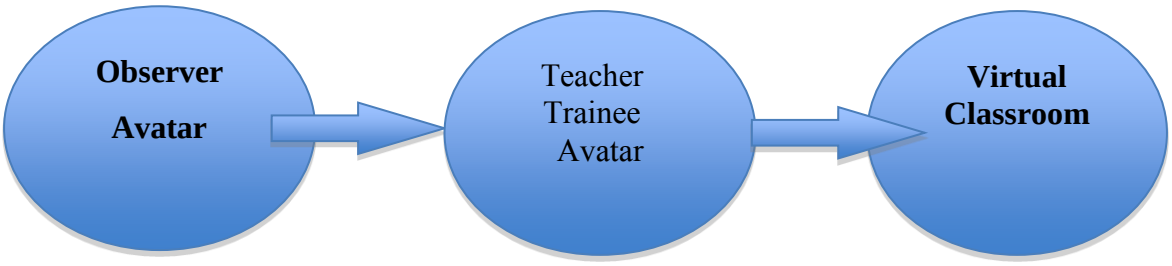


Figure 3.2: Evaluations Between Observer and Teacher

The most popular means of communication in SL are chatting. When communicating through chat, the avatar can type, say, shout or whisper a message. Other users will then see the message. In this case, chat is normally public. The intended person will only receive an instant message. SL also has an audio function where the avatars can communicate through their voices.

There are two types of avatar: human controlled avatars and automated avatars, called bots (short for robots). A bot is an avatar that is controlled by a machine. It participates in social interactions and plays different roles. Interaction through bots has a greater impact in the SL. For example, it can be a non-player character in a roleplaying game, auto responder, security bot, or automatic group manager, or can play the role of group invitor. Group invitations refer to inviting other residents to join the SL group. Security bolts detect spammers and abusers of the program. Automatic group management includes the translation of chats and anti spam monitoring. They can also be used to welcome human avatars to a particular region. The creation of a bot is the same as the creation of a human controlled avatar. The difference between the two is that the bot account is marked as a scripted agent. An SL bot account can run on personal computers or can be hosted at SL bot hosting.

On the other hand, bots can also be used for other purposes, such as spying on users in SL and collecting data. For example, they can collect data regarding the virtual age of users in SL. When users find the behaviour of a bot abusive or suspicious, they can report it to the SL provider, although it might take time for any action to be taken. The SL provider automatically removes a bot that has not moved for a long time (about fifteen minutes).

Role play approach: Roleplay has grown from other common forms of expression, such as drama, play, games and simulation. This research has set out several categories of roleplay: experiments/investigations; games; presentations; metaphorical roleplay; simulation; and theatre in education. Which approach to take depends on the assignment, whether the design of the virtual classroom is similar to a real classroom, and how the teacher trains students in the teaching field. There are standard teaching roles that will be sent from observer teachers to trainee teachers and communicated into the Second Life environment if the trainee understands this role very well; then he/she will become an expert teacher with enough experience.

Inventory Basics: An inventory refers to all items that you have collected and purchased in SL. Items attached to your avatar are considered to be in your inventory but items actively placed in the 3D virtual world are not included. Most of the things in SL are created by the users and hence they become the inventory. If you have a large inventory, this can create lag problems, such as slow movement. Figure 3.3 below shows the various types of item that can be stored in the inventory. The original copy of your inventory is stored in the SL database. A copy of the item list is downloaded to your computer and saved in the cached data for the software. In most cases, the cached copy becomes corrupted, but the problem can be fixed by clearing the cache and redownloading it. You can carry your inventory with you wherever you go and access it from anywhere, provided that you are logged in, and the "Asset Database" is not overloaded or experiencing a temporary slowdown. In this situation, access to the inventory may be slow or unavailable temporarily. Access to your inventory is only possible if you are logged onto the site, so that other users cannot see it or directly alter it. SmartBots and personal bots: You can manage your SL group or personal bot by using a service called SmartBots. SmartBots is a service provider that deals with renting out bots. SmartBots services use the capacities of SL bots. These services include the automatic notice delivery system, group chats translators, group inviters, etc. Then, if you have a lot of activities to do but do not wish to be online in SL all the time and also want to invite other members while offline, you can use SmartBots. All you have to do is to host your bot on the server. These intelligent bots can perform various automated tasks on behalf of the user. They can invite people to join a group. They can also

perform other function such as welcoming visitors to a region. The bot will carry out the necessary activities such as instant messaging and sending notices while you are offline. SmartBots allows you to control the movement, appearance and behaviour of your personal bot. You can remotely perform functions, such as teleporting, walking, sitting, etc., on your personal bot using SmartBots Huds.

Figure 3.3: Inventory diagram

SmartBots offer two types of personal bot: the standard bot and the model bot. The difference between the two lies in their functions. The standard bot plays such roles as greeting and submitting notices, and can support all SmartBots services. On the other hand, Model Bot performs such roles as beautification, mannequin and dancing. model bots dont support additional services.There are several other features which are available at Smartbot. These other features include exporting the group members list, for example SL names, to the text file.

The behaviour of the intelligent bot in SL can be controlled by scripting language MPML3D. The script defines the bots' animated behaviour, whether it is verbal or nonverbal behaviour. SL provides different sets of animation. Users can also upload their own animation. "Bots can be programmed to mimic many human behaviours such as stepping back when faced with something unexpected or to show a shocked

expression if inappropriate chat is being received from a user. For educational purposes, bots can be designed in such a way that they can interact with student avatars in an intelligent manner. During the simulation of the lesson in SL, the bot can help the teacher to conduct the lesson. The bot can alert the teacher when a student raises his or her hand to ask a question, if a student is not paying attention or when a student's avatar changes appearance. The bot can also call out the students' name when they want to ask a question. There is necessary for teachers to be trained in scripting so that they can develop classroom activities related to the curriculum they teach. Teachers can be trained in such a way that they can design bots that can enage in conversations with the students'bot. These bots can be created and scripted in a manner that enables them automatically to respond to key phrases and words.

Linden Scripting Language (LSL) is used to programme SL bots. LSL includes 330 built-in functions, including: vehicles, collision detection, physics simulations, communication among users, inventory management, playing audio and video files, etc. (Friedman et al, 2006). The users of SL are called residents. These residents can walk, run, fly and teleport themselves to various places using their avatars. The keyboard and mouse can be used when walking and running but, when it comes to teleporting, users can click on the teleport tool in the search list. Teleporting refers to travelling from one place to another without actually crossing the physical distance between the two places. Residents fly using helicopters and planes in order to move to a particular destination. Residents in SL can own land, participate in various activities and interact with others using their avatar. Of course, all of this can provide entertainment and fun in the field of teaching and learning.

Basic animation and collaborative behaviour: There is a set of instructions in SL that one can use to create animations so that avatars can exhibit specific behaviour or carry out various activities. You can use animation to make your avatar clap, walk, fly, etc. Users can also share ideas and engage with one another, making SL a collaborative environment. Both student bots and teacher avatars can demonstrate a variety of basic and animation behaviour, such as facial expressions and body movements, to depict a mood or signal something. For example, the student bot can raise their hand when asking a question as a mark of respect for their teacher, point at anyone in the classroom

and also nod their head as a sign of confirmation. When teachers use SL, the trainee teacher avatar controls the behaviour of the student avatars in order to create a conducive learning environment. For example, the teacher can ask a student who is out of control to stand in front of the class or to go to the head teacher's office. The progress of the students and the teacher's decisions can be monitored using embedded tools. These kinds of simulation will help the teacher to gain a wide range of experience of the types of encounter that he or she might encounter in the real life classroom context.

Teaching instructions based on classroom simulators in the 3D virtual learning environment empower students by providing them with an opportunity to make their own decisions about performing the required tasks and hence the students' creativity is enhanced. Students can design avatars with any type of appearance they like. For example, the avatar can take the form of an animal, human or object or the students can use their own image in real life. We can therefore say that SL provides students with a comfortable and conducive environment in which they feel confident and hence able to experiment with it.

When using avatars, students can attain immense experience beyond what they can experience in the real classroom context. For example, they can experience empathy when they take on different roles, such as taking on a different gender, race, or a physical disability, etc. In the virtual world, they learn about what a person can experience in real-life situations.

Interactions and behaviour: Residents in SL can interact with one another just like people in the real world, using their avatars. Users can socialize and participate in various activities. Users can communicate with one another using various methods such as chats and messages. The rich interaction between learners leads to enhanced learning.In the SL virtual classroom, the teacher avatar observes the behavioural variables of student avatars, such as distractibility, knowledge and interaction, and then takes the necessary action depending on the behaviour exhibited by the student bot, just as in real life classroom situations. The teacher avatar can use movements or real worlds to attract the students' attention. For example, he can ask a distracted student to pay attention or test the level of a student by asking questions. Any changes in the students' behaviour is observed and monitored by the teacher.

All of the occurrences during the simulation are saved in a database so, at the end of an episode or lesson in SL, the trainee teacher can analyze and reflect on everything that occurred during the simulation. These include the decisions taken during the lesson, how the lesson was conducted and how it affected the individual students. This self-evaluation helps the trainee teacher to make improvements to his or her teaching method. SL has its own economy whereby residents can engage in trade, such as buying, selling, and renting out land, goods and services. Virtual properties in SL include vehicles, buildings, clothing, etc. The services exchanged in SL include entertainment, wages, content creation, etc. The internal currency used in SL is called the Linden dollar, which can be purchased using American dollars and other currencies. Residents in SL can make a profit by selling virtual goods, renting out land and offering other services. Considering the virtual economy in SL, which is similar to that of the real world, teachers can be trained on how to enable their students to make a sound investment in this virtual world. Business teachers, for example, can give students homework in SL so that the learners can experiment with business models in the virtual world. Using SL, students can be taught how to become entrepreneurs.

SL enables teaching to become learner centred in the sense that the teacher becomes a facilitator. The trainee teacher will learn how to assess students and recognize their differences in terms of ability. The teacher can then assign to students different tasks with different degrees of difficulty and then supervise all the students at the same time. For example, in SL,the teacher avatar goes around the virtual classroom and provides assistance for the students whenever they need it. Through interactions, the students are able to teach and learn from each other. In this virtual learning environment, teachers can be trained how to deal with the various challenges that might arise within real classroom situations.

3.4 Conclusion

SL is crucial for enhancing the web-based virtual learning environment. It offers teachers effective pedagogical opportunities that enhance the engagement and participation of students in simulated lessons conducted in a virtual classroom. Classroom simulation encourages teamwork among student bots, leading to a

collaborative learning environment. The trainee teacher avatar interacts with student bot in the virtual classroom, helps them with their learning activities and manages them effectively, ensuring that they behave well during the lesson.

This study proposes a framework for classroom simulation between a trainee teacher avatar and bot students in an SL environment, the main target of which is to increase the interaction between the student bots and the teacher avatar. Also, this framework will enable trainee teachers to acquire more experience, knowledge and ability to handle a real life classroom situation. However, this framework depends on artificial intelligence represented through smartbots; that is, simulated student behaviour in SL.

Trainee teachers can improve their practical and theoretical skills related to teaching and learning by using a 3D virtual learning environment in SL. This helps to overcome some of the challenges associated with the traditional methods of teaching. In general,the essence of this study is to explore the SL virtual world, as environment for promoting teaching and learning.

In the next chapter, the research reviewed how trainee teacher performance through teaching role inteaction and linking MOODEL system with design model proposed for classroom simulation depend on Second Life teaching for presented and mange the course and smartbot student based SL environment.

Chapter 4

Design Model Proposal using Classroom Simulation in Second Life Modeling

Objectives

- *Introduction*
- *Second Life Modeling*
- *Features Design model proposed*
- *UML Diagram Relationship Trainee, Observer and Smartbots*

Chapter 4: Design Model Proposal Using Classroom Simulation in Second Life Modeling

4.1 Introduction

This model consists of a set of components that can help the trainee teacher to acquire the necessary skills and experience that will enable him or her to effectively teach personal bot students in SL virtual environments. There are three layouts available, depending on real-world teaching and Second Life environment users, classroom services, and software supported. Also, the MOODLE system helps to integrate classroom simulation in SL using SLOODLE objects to help trainee teachers manage their courses and students to evaluate them (Alotaibi, 2013).

There are a number of benefits of this model:

- It supports interactions between trainee avatars and smartbot students.
- It emerges between the framework proposed for the classroom simulation system and the MOODLE system.
- It controls students' behaviour through animation behaviour using software and SL scripting language.
- It provides system monitoring via observer avatars.

This model makes the second contribution to knowledge underpinning this research, using design model based simulation between avatar and smartbot that create interaction and SL environment safety to enhance the trainee teacher's ability to acquire experiences.Figure 4.1 and Table 4.1 show the features of this model.

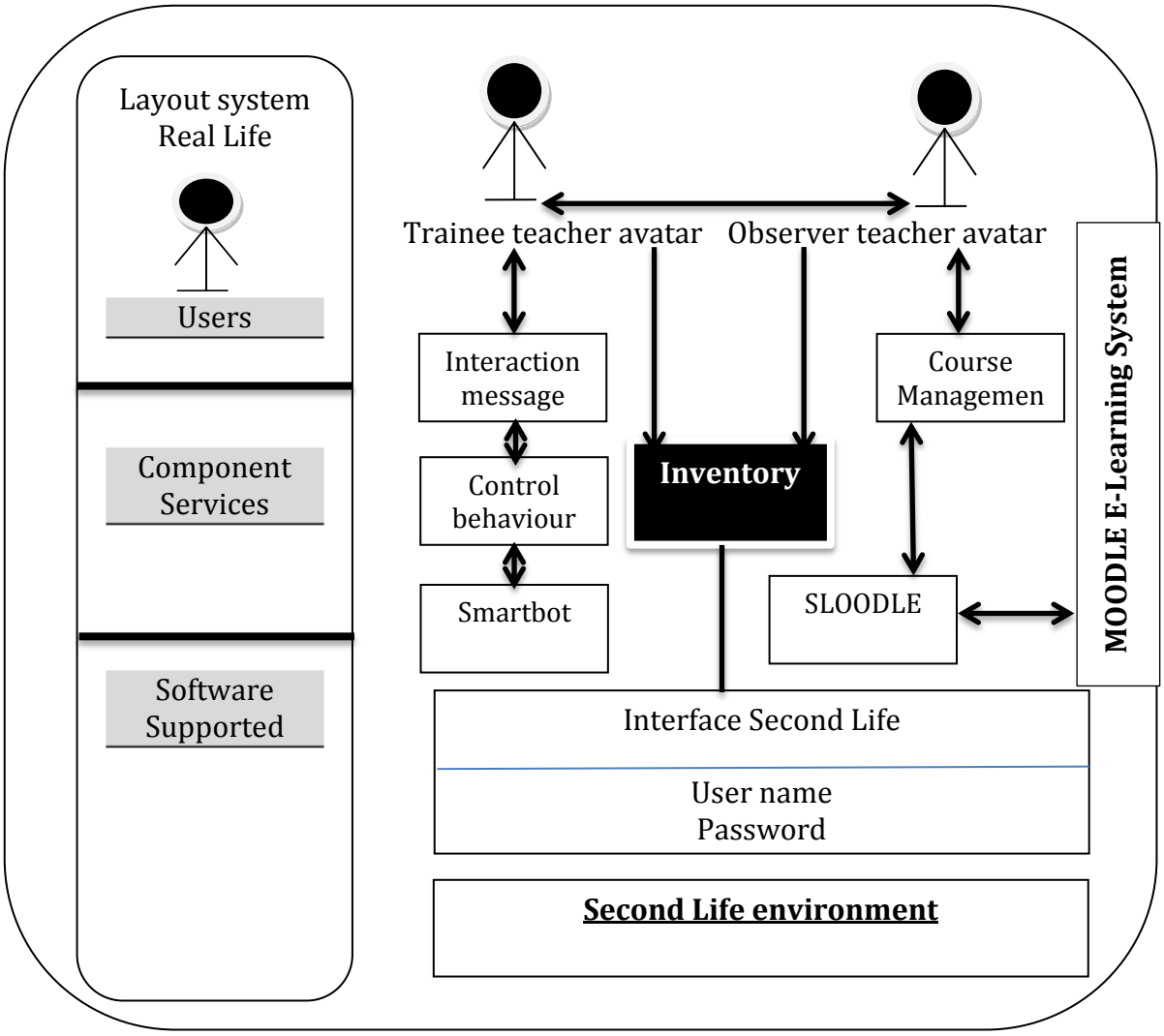


Figure 4.1: Design Model Classroom Simulation based SL

4.2 Design Features

Table 4.1: Design Features

Trainee teacher avatar  **Figure 4.2: My avatar**	The trainee teacher avatar is the teacher undergoing training who is responsible for creating an environment that will enable all learners to acquire new knowledge and skills. The trainee teacher adopts appropriate educational techniques and applies their experiences to them to form new educational processes. There are two steps involved in teacher training: initializing by common support learning, and initiating the technical improvement of existing trainers. The trainee teacher avatar is a graphical representation of the user in a 3D simulation in the SL environment. In order to log into the SL virtual environment, the teacher needs a username and a password. The teacher avatar is also a leader of the group in SL, and he or she can reject or invite any person. The trainee teacher is responsible for managing this course for their students and administering enrolment through MOODLE e-learning and SLOODLE objects, so the teacher must perform the roles of a teacher, such as monitoring the students and simulating behaviour, and supporting all students. Figure 4.2 shows the trainee teacher avatar in my experiment represented by my name, Fahad123456, inside the SL land.

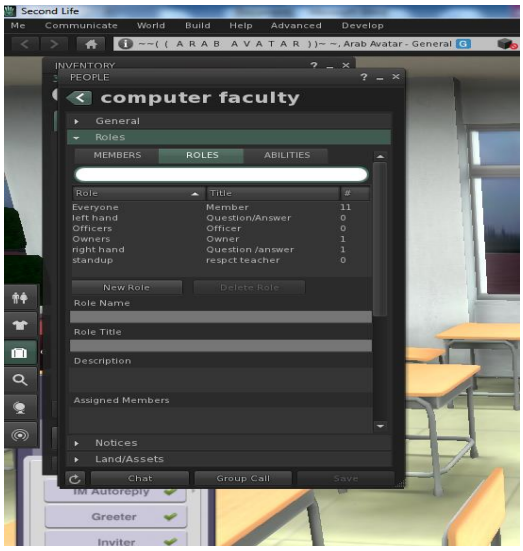


Figure 4.3: Role & observer avatar

The observer avatar is an expert teacher who is highly experienced in the field of teaching and learning. He or she uses his or her relationship with the trainee teacher to help him or her acquire the necessary experience. The observer avatar also helps the trainee teacher to acquire a set of teaching qualifications for the purpose of accreditation, known as the Qualified Teacher State (QTS). Also, the observer can place notifications in the trainee teacher's inventory. The observer can also add these roles directly via the SL group through the role button, writing names, roles, and role states along with brief description that can then be distributed among all trainee teachers' avatars (Figure 4.3).

Students smartbot

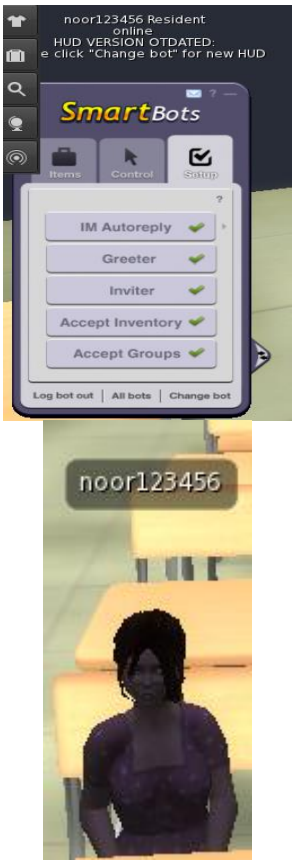


Figure 4.4: The Smartbot and HUD as noor123456Student bot

The student bot is similar to the avatar, but is under the control of the programming software. Smartbot is an important tool for managing SL bots and groups.

Bot tasks:

- Is always present in the SL classroom, 24 hours a day
- Responds to any action
- Participates in group chats
- Invites student to visit the SL class
- Can walk, talk, stand up, and sit on a chair
- Can teleport to any place
- Can change its appearance
- Can invite other residents to the group
- Can send group chat messages
- Listens to the group chat (yes, it is possible to now!)
- Can eject members from the group
- Can send group notices

When any person uses smartbots, the HUD control device must be employed in order to control the personal bots in the SL environment (Figure 4.4). HUD bot tasks:

- Login and logout bot
- Teleport bot to different locations
- Move bot around on the parcel
- Command bot to sit on objects
- Accept inventory, chat, group

IM Massages(Chabot)

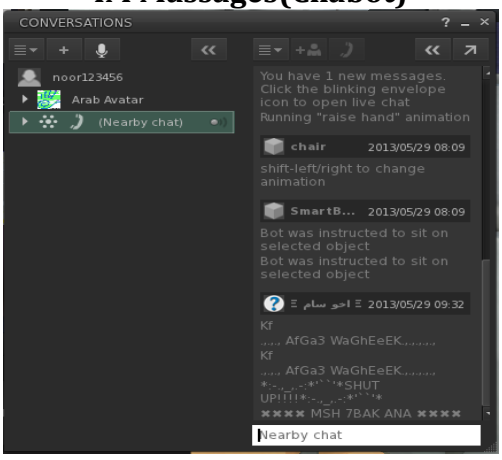


Figure 4.5: IM Massages between Avatar and bot

The main idea in this section is the communication between avatars and bots, or between the avatars themselves, in SL. As shown in Figure 4.5, all avatars and bots enter the chat room (IM messages), which is located on the left-hand side, and then they can chat and ask questions using the right side of the chat window. The teacher avatar can directly enter SL without any support whenever he or she wishes in order to discuss something with any member of the group, but the smartbots need the support of HUD bots to accept chat if they are to enter SL and interface with other bots. Even though the avatars send messages very quickly, the bots receive them slowly. The designer used some questions posed to six avatars designed to

	assess the bots' receipt of messages, and the time was recorded by the ***counter time manually*** for the send time, received time and respond time, where **Respond time = Received time - Send time**
Behaviour control	Behaviour control is way of regulating the interaction that occurs within objects in SL, such as changing the option for the object to be temporary, physical, or active. The behaviour of the avatar to be controlled might include movements, appearance, and/or mood changes. The avatar can be controlled by changing its clothes or moving it to different location. Avatars can also interact with any object through a whiteboard, which allows drawings, images, and text to be shared between avatars and objects in a 3D virtual world. In addition, the smartbots behave similarly to the avatars in terms of changing mood or clothes; they can also raise their hands in class, which is animation behaviour control.
SL Interface **Real world interface**	This refers to a software application that has a user *interface* and is easy to operate by SL users. The software enables users to communicate with one another. Avatars, for instance, can meet together and hold conference chats. Avatars can also book a conference hall in SL where they can hold meetings. There are also real world interfaces where people can login into the virtual world through simulation.
Inventory	An inventory is similar to a database in the SL virtual world, and it includes a set of components such as animations, gestures, textures, objects, and scripting. There is a relationship between object building, avatar inventory, and bot inventory, because they all share an inventory.
Classroom software service	This is a support service for teacher and learners inside a virtual classroom in SL. Where possible, the software services can be used to support avatar behaviour; for instance, Qavimator software is used to control avatar animation behaviour.

Integrating MOODLE and SL using SLOODLE object

There are various strategies that can be used to merge virtual worlds and virtual learning environments. For instance, the software client used to run the virtual world could be changed in order directly to access the VLE system. On the other hand, an open-source virtual world can be employed to enable the virtual world server software to be modified in order to connect easily to the VLE database. In fact, both systems can run alongside each other as long as there are less users in both the virtual world and the VLE. In SL, there is a free and open tool project known as SLOODLE that integrates customised objects in SL. You can utilse the LSL 'http' functions to connect to scripts that use a MOODLE server. Due to various factors, it is impossible to call the standard MOODLE API directly from scripted objects in SL, which include the nonexistence of cookies, restrictions on the amount of that data users can send or receive in http calls, and the parsing of the HTML formatted data usually returned by MOODLE. Hence, custom 'linker' scripts coded in PhP are installed on the Moodle webserver. The objects chosen by the user (scripted objects) for use in SL and the scripts for installing on Moodle are provided by SLOODLE. Hence, SLOODLE consists of Moodle modules and blocks and SL objects. There are propositions for designing a more powerful and complete SLOODLE 'API' library of functions for communications between the virtual world and Moodle. This will give designers an opportunity to develop new virtual world objects without the need to write new linker scripts – hence simplifying the extention of the functionality of SLOODLE. The following are the key SLOODLE objects and modules:

• **SLOODLE Controller**. This Moodle module can be integrated to a course by either an instructor, a teacher or the admin. This module is employed to pomote the use of SLOODLE in a course and to mange the authorisation of SLOODLE objects in SL. This enables MOODLE course administrators to manage and restrict the objects in SL that can access the course's MOODLE data.

• **SLOODLE Presenter set**. This SL object embodies a set of the various SLOODLE SL objects. It can be used by tutors to 'rez' (create or make appear) SLOODLE objects in SL.

• **SLOODLE Registration Booth** (*right*). One of the most basic function of SLOODLE is to link Moodle users to their virtual world avatars. As a user, if you sign into SL with your avatar, you can click on the registration booth. You are then notified to click on a Moodle registration page. This enables Moodle to confim the accuracy of the SL identity of the Moodle user and the personal data are then saved in the Moodle. You can also use a 'Login Zone' object in SL that provides avatar registration based on Moodle, after which you sign into the SL. Figure 4.6 shows the integeration of Moodle learning into the SL virtual world using the Sloodle object that can control the registeration of all learners and handle the courses effectively through interactive learning activities in the classroom simulator in Arab avatar land.

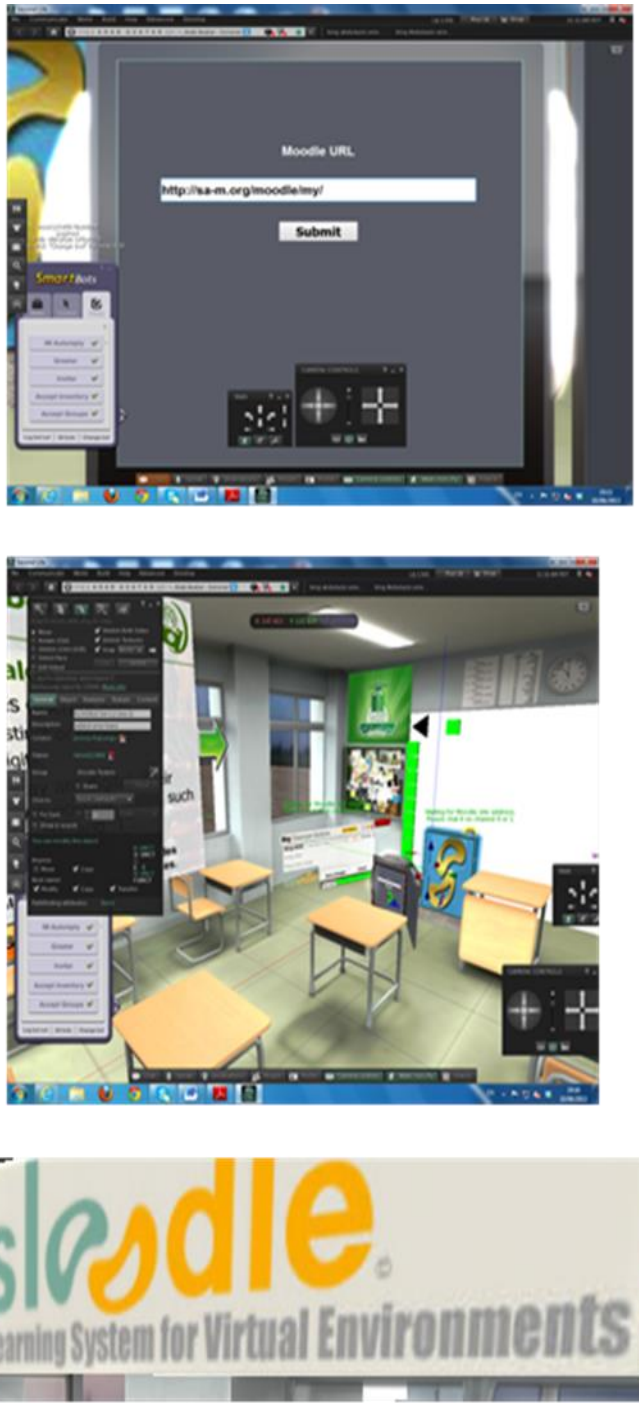


Figure 4.6: Integrate MOODEL learning with SL using SLOODLE object

4.3 UML Diagram Relationship Trainee, Observer and Smartbots based SL

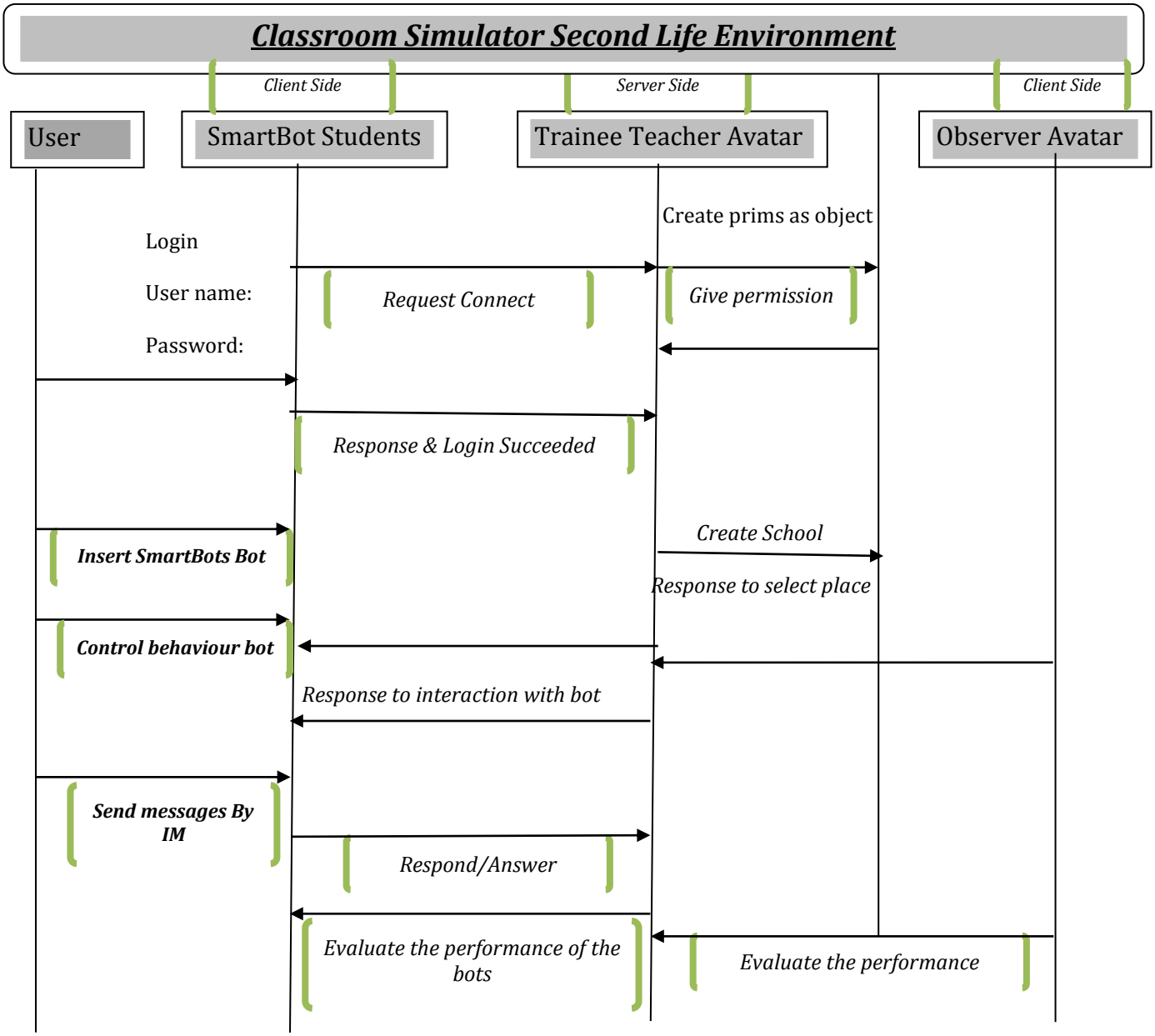


Figure 4.7: UML Diagram Showing Relationship between Trainees, Observer Avatars, and Smartbots in SL

In this section, I have presented a computer based simulated environment in which users can interact with others using software agent bots known as smartbots. When designing a school in SL, it is important to select an appropriate design and place. The construction can be done step by step, using object prisms, until the whole building is

complete. There are three entities that will always be there at the school: a trainee teacher avatar, who is responsible for teaching; one bot student, who represents the virtual student; and an observer avatar, who evaluates the trainee teacher's performance. Figure 4.7 shows these three entities. A smartbot enters the SL virtual class by using a user name and a password, and then receives a response from the server about this entry into the classroom. A smartbot HUD device inside the classroom is normally used to control such bots. Also, the trainee teacher selects the best place inside the virtual class for the bot HUD and interacts with it. It is possible to use the smartbot to control one's own avatar's behaviour, movements, and appearance. These might include movement inside the virtual class, raising a hand when requesting something, and changing clothes. The interaction between the avatar teacher and bot student is crucial, and in this research the focus is on chatting interactions using IM messaging inside SL. Finally, the trainee teacher will evaluate the performance of all student bots, then send the results to the observer avatar (the expert teacher) who will also evaluate the trainee teacher using a set of criteria (QTS).

4.4 Conclusion

In conclusion, SL is today increasingly used by various academic institutions because of its potential to promote teaching and learning. In this chapter, I have reviewed the seven principles necessary for designing a learning environment in the SL virtual world. These principles include encouraging contact between students and the faculty, developing reciprocity and cooperation among students, using active learning techniques, giving prompt feedback, emphasizing time on task, communicating high expectations, and respecting diverse talents and ways of thinking. These seven elements are regarded as the guiding principles in the design of SL for educational purposes. The chapter has also reviewed the guidelines for the ITE training program by discussing the various standards that trainee teachers should meet before being awarded QTS. After this, I highlighted the application of learning theories such as constructivism in the design of SL, the virtual world. Finally, and most importantly, I proposed a new model comprising a set of components which can guide the trainee teacher on teaching and learning in SL. Each of these components and their interrelationships has been discussed in great detail. In the next chapter, one of the ways of building the classroom

simulation in 3D space, through development of a classroom simulation using 3D object SL and behaviour simulated for avatar and bot, i.e. Smartbot Control Behaviour, will be presented, because this technique will be used in this thesis to implement the proposed design model.

Chapter 5

Experiment Implementation

Objectives

- *Introduction and Methodology*
- *Building and Development classroom simulator using SL*
- *Behaviour Simulated for avatar and bot*
- *Smartbot Scripting*

Chapter 5: Experiment Implementation

5.1 Introduction

According Dalgarno (2010), Second Life is a virtual world launched in 2003 by Linden Lab which has been made freely available in the form of the open source project SL, which has been supported by IBM, Intel and Microsoft. Second Life also makes a distinction between the object and agent. However, in SL an agent is not simply a special object that interacts with its environment, but together with its associated avatar, it represents a human user. In order to avoid terminological confusion the SL term 'agent' will be identified by 'sim' consisting of land parcels, as depicted in Figure 5.1.

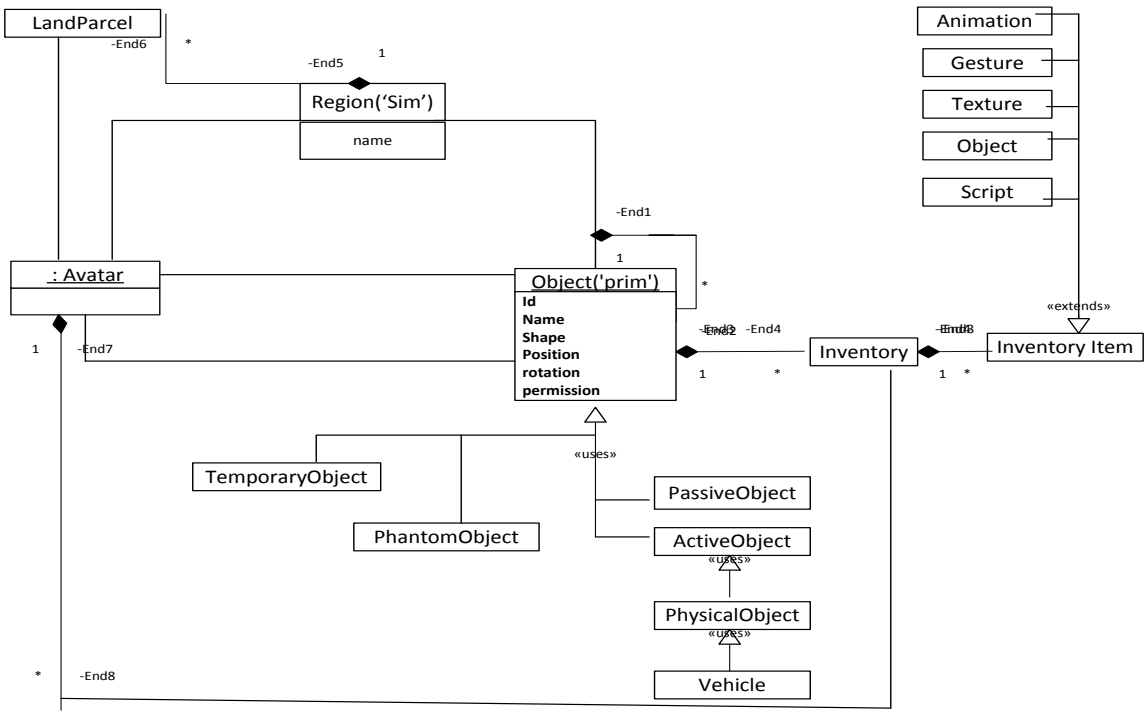


Figure 5.1: Second Life structure

There are set types of SL objects: active objects, as opposed to passive objects, which possess particular behaviours which are defined by scripts written in the Linden Scripting Language (LSL). Physical objects are active objects which are subject to the laws of physical kinematics and dynamics (rendered by the help of a physics engine). Both avatars and objects have an 'Inventory' which contains items such as scripts, objects and textures, etc.

This chapter will start by discussing how a virtual classroom able to support simulated student behaviour based on a Second Life environment has been created for the purpose of interactive teacher training. Moreover, the developer has conducted experiments using Second Life tools in order to create an interactive virtual learning environment (VLE) in the virtual world for helping to support teachers and students. The classroom has subsequently been developed dependent on smartbot technology and scripting to become a richer environment with interaction and behaviour among all residents in SL (Wagner 2010).

5.1.1 Methodology

Communicating in Second Life was conducted via text within a designated chatroom (instant messaging) between the teacher avatar and a set of bots representing students. Second Life provides a *constructivist learning theory*, and can enhance learning by building prims (3D objects) for offering interactive, exploration opportunities in the virtual classroom, and opportunities to connect and discuss with other learners in the environment, enabling them to develop various skills, depending on their interests. This study provides data collection methodologies (quantitative and qualitative methods) used through two formats: surveys and interview questioning. By conducting the research in this manner, the analysis strengthened interpretations based on more available evidence. Findings were corroborated across data sets, reducing the impact of potential biases that can exist in a single study (King Abduaziz University 2012). The study provided data to support the notion that a virtual learning environment via classroom-simulation-based SL can produce an effective teaching and learning environment between a trainee teacher avatar, an observer avatar and a smartbot student.

5.2 Building the Classroom

5.2.1 Building a platform

Constructivist learning theory argues that learning is an active experience which includes strategic progressive construction which leads to in-depth meaning and

understanding. Knowledge of these characteristics enables teachers to anticipate and act in response to learners' understandings.

5.2.2 Prims

Prims is short for primitive. Prims are the building blocks of SL from which everything is constructed (Figure 5.2). All objects in SL are made of prims, with the exception of avatars, the natural ground, and trees. People mention the terms ‘prim dress’, ‘prim hair’ or ‘prim shoes which means that those objects have been made from prims. Prims come in fifteen different original shapes which are chosen by the individual of which the default shape is a cube. In addition prims can be coloured and textured as required [Second Life.com].

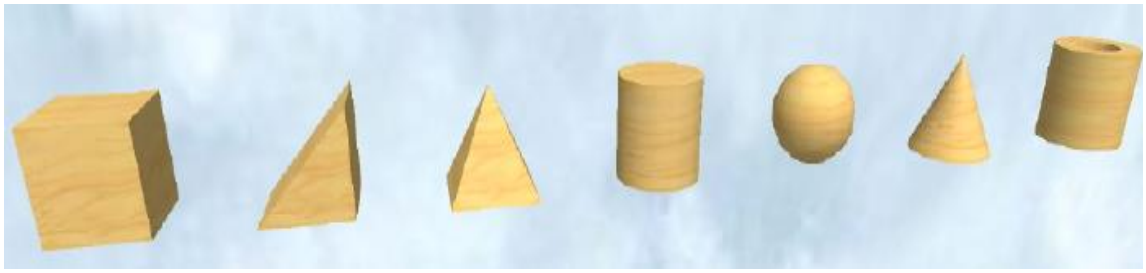


Figure 5.2: Examples of different prim shapes

The developer built a platform which created a ‘prime’ object in SL. This enabled the platform to be built to a maximum size of 64 metre x 64 metre dimensions. The following process was required:

- Right clicking on the mouse and selecting create. The magic wand on the mouse pointer appeared.
- Left clicking on the mouse to obtain one prim (one object).
- The edit menu was already open on the right side of the screen. The user would be required to go to the Object Tab and from the size fields they would need to add new X and Y values.
- The X and Y values should be 64 each.
- The Z value (0.500) should be kept as a default.

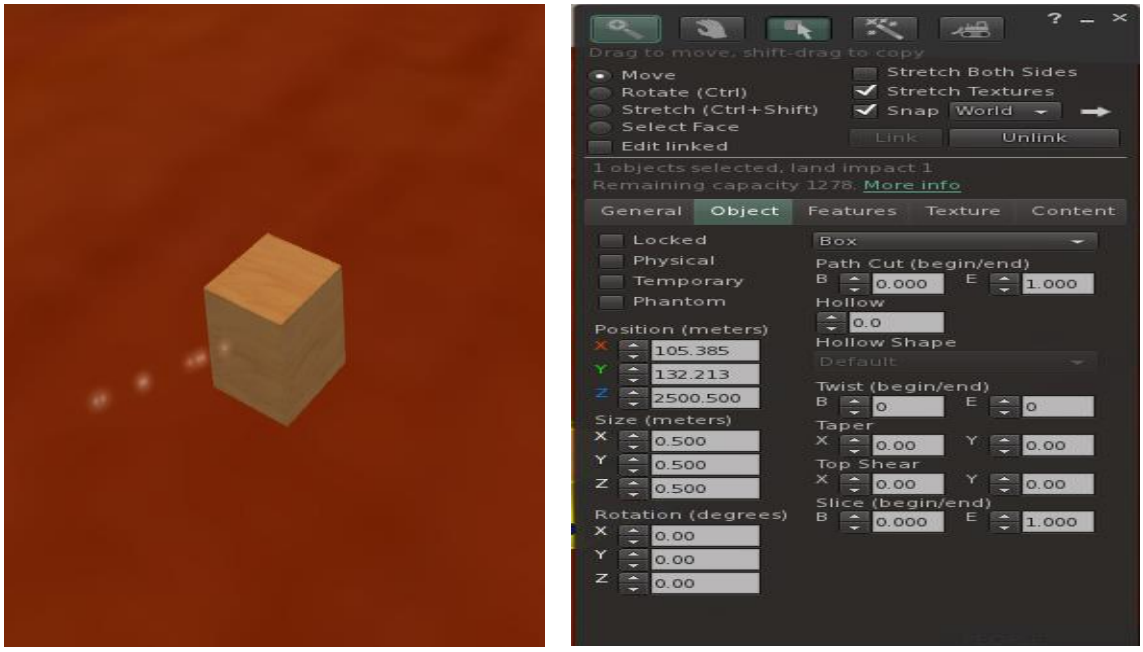


Figure 5.3: Object 'prim' and edit menu

The edit menu could now be closed in order to start to build another object. The following steps were required.

- Right clicking on the mouse again and clicking on 'build' to create a new object. In this case the main building of a school was being built starting with the school floor.
- The building of the walls, doors and windows was started.
- The textures and colours could be added as a final step once it was finished.
- For the floor platform, the size for X needed to be 20.566 metres, and for Y this was comprised of 17.955 pixels.

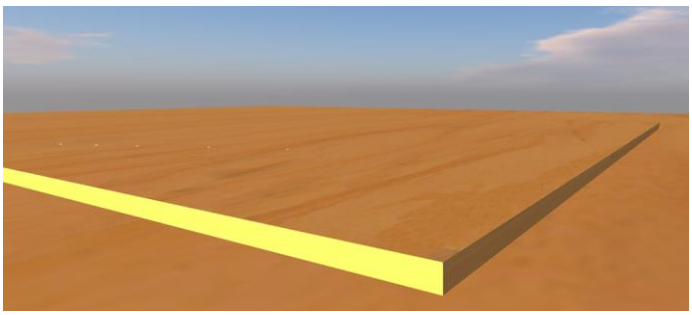


Figure 5.4: Object with textures and colours

5.3 Behaviour Simulated for the Avatar and Bot

5.3.1 The entrance of the teacher avatar

In order to access the SL, it was necessary to access the site http://www.secondlife.com This could be accessed by clicking on the "**Join Now**" button at the top right hand corner, and then following the instructions and filling in the required data such as *user name*, *password* and other account information.

- An *avatar for the required character* was then chosen. This avatar could be later altered and customised by changing its appearance.
- Registration with a work or a personal email address then took place. This could be subjected to change if necessary.
- When requested to choose the type of account, the "free" account was selected but this could be later upgraded to a "premium" account if necessary.

In the process of creating and choosing the avatar, referred to as a trainee teacher avatar in this experiment, an observer avatar guided and supported the developer in the virtual SL classroom. Each avatar in the virtual land owned a special inventory.

Different kinds of materials could be acquired to be used in the SL environment. These materials ranged from physical objects such as clothing, hair, skin, and furniture to non-physical objects which included scripts such as animations and poses which could make the avatar move. When visiting different sims, the developer was provided with notecards and landmarks. All of these items, whether physical or non-physical, were stored in the developer's inventory. To access and open all the virtual staff (Inventory),

the developer clicked once on the “Inventory” button (the suitcase icon) on the right hand side of the screen. The ‘My Inventory’ window which was positioned on the right side of the viewer screen could be opened by clicking on this once.

New users would not have a significant number of items in their inventory. In this case it was necessary to ensure that the “My Inventory” tab was chosen which was positioned at the top; and that the “Filter Inventory” did not contain anything.

In order to reduce the content of the folder it was necessary to click on the white triangle to the left of the “My Inventory” folder. Both folders, “My Inventory” and “Library” needed to be visible. All the acquired items were located in the “My Inventory” folder and acted as a repository for all the items that were obtained. The “Library” contained a base set of items given to every new user. It was possible to click on the white triangle to the left of the “My Inventory” folder to make the contents of the folder visible Friedman(2007).

5.3.2 Inventory behaviour

Animations - These were small programs that enabled the movement of the avatar in a specific manner. For new users, this folder would be empty.

Body parts - This was a folder for storing hair, shapes, skin, eyes, and any other things that affected the appearance of the avatar’s body once it had been created or acquired. For new users, this folder would be empty.

Calling cards - This folder kept the records of friends' profiles. In order to read a profile it was necessary to double click on the name. It would only be after a friendship had been swapped with other users that a calling card would appear.

Clothing - This was a folder containing clothing items for the avatar, for example, shirts, trousers and blouses. For new users, the items for the avatar would be stored in a clothing sub-folder known as an outfit and this sub-folder would contain the shape, skin, and hair. To wear/take off an item of clothing, it was necessary to right-click or (command-click) the item in the list and then select wear/take off/detach from the fly out menu.

Gestures - Gestures enabled the avatar to move in a fewer number of ways than animation. Two folders of gestures would be given to every user: Common gestures and gender specific gestures. In this case it is necessary that the 'Local Chat' bar was active. To the right of the 'Local Chat' bar and to the right of the 'Say' button, was the 'Gestures Fly Out' menu. Once the developer clicked on the 'Gestures word', the menu opened. When the developer clicked on a gesture in the list, the avatar made that particular gesture. For adding or removing gestures, the developer needed to open their 'Gestures' folder and then their 'Common Gestures' folder. To add a gesture to the list, it was necessary to right-click (command click) on a gesture and choose 'Activate'. To remove an active gesture, it was necessary to right-click (command-click) on the 'Active Gesture' and choose "Deactivate" from the fly-out menu.

Landmarks - A landmark refers to the precise location of items in SL and is normally described by using three numbers for the X, Y, and Z axis. Landmarks enable the residents of SL to immediately teleport or move from one location to another instead of walking or flying. To use a landmark, it was necessary to locate the landmark in the inventory and double click. When the window appeared the 'Teleport' option was selected. This folder would normally be empty for the new user.

Lost and Found - Second Life returns lost items that you have been designed and left somewhere else to the user. All the returned items are stored in the user's 'Lost and Found' folder.

Notecards - Notecards refer to small text files that the user is automatically given after entering a sim for the first time and they are normally issued by objects or other users. All notecards are stored in the notecard folder, and no matter how the notecard has been obtained they are all stored in the notecard folder. To open a notecard, it was necessary to double click on the notecard name.

Objects - All items are regarded as objects with the exception of clothing and body parts. Examples may include flowers, airplanes and cars etc.

Photo Album - The photo album contains all the photos taken in SL. To take a snapshot, it is necessary to click on 'File' and then 'Take Snapshot' to open the

Snapshot window. Snapshots saved to the user's SL inventory cost $10 lindens per image. These can be saved freely on the hard drive of the computer.

Scripts - Scripts are small program source codes that animate things. For new users, this folder is usually empty.

Sounds - Sound files are stored in this folder. Sounds can be played during a gesture. As a new user, this folder will be empty.

Textures - These are the files that are employed when designing patterns, surfaces, the grass, and the paintings on the walls etc. All the items in SL have a texture. For new users this folder is usually empty.

Trash - All items that are not required in the user's inventory are stored in this file. All of the inventories are saved in the SL *server* and they can be accessed from any location as long as the user is logged on to a computer (Figure 5.5). To display the contents of the folder, it is necessary to click on the white triangle to the left of the 'Library' folder. The library has similar folder names such as: 'My Inventory', but all of its folders (with the exception of animations) contain something. The user can try to open these files and discover their contents (Alarifi 2008).

Figure 5.5: Inventory items

5.3.3 Avatar behaviour in SL

This study has explored the simulated behaviour of a bot or avatar in a simulated environment. The following are three types of behaviours portrayed by users in a SL environment.

5.3.3.1 Basic behaviour

In this study it was possible to be able to choose the mood of the avatar or bot in the SL virtual classroom environment e.g. being sad, happy or angry. This was achieved through the use of items in the inventories which may have included animation and gesture, as depicted in Figure 5.6.

Figure 5.6: Angry avatar and happy avatar

5.3.3.2 Animation behaviour

Animations are sets of instructions that enable avatars to carry out a sequence of motions which are stimuli dependent (Bruns 2012). For instance, in the virtual classroom, it was possible to use animations to make the avatars raise their hand when answering or asking questions. In addition, with the help of loops and frames it was possible to animate the avatars to perform body movements which were consistent with

the natural movement of the body such as head and leg movements. QAvimator software can control the behaviour of avatars or bots (Figure 5.7).

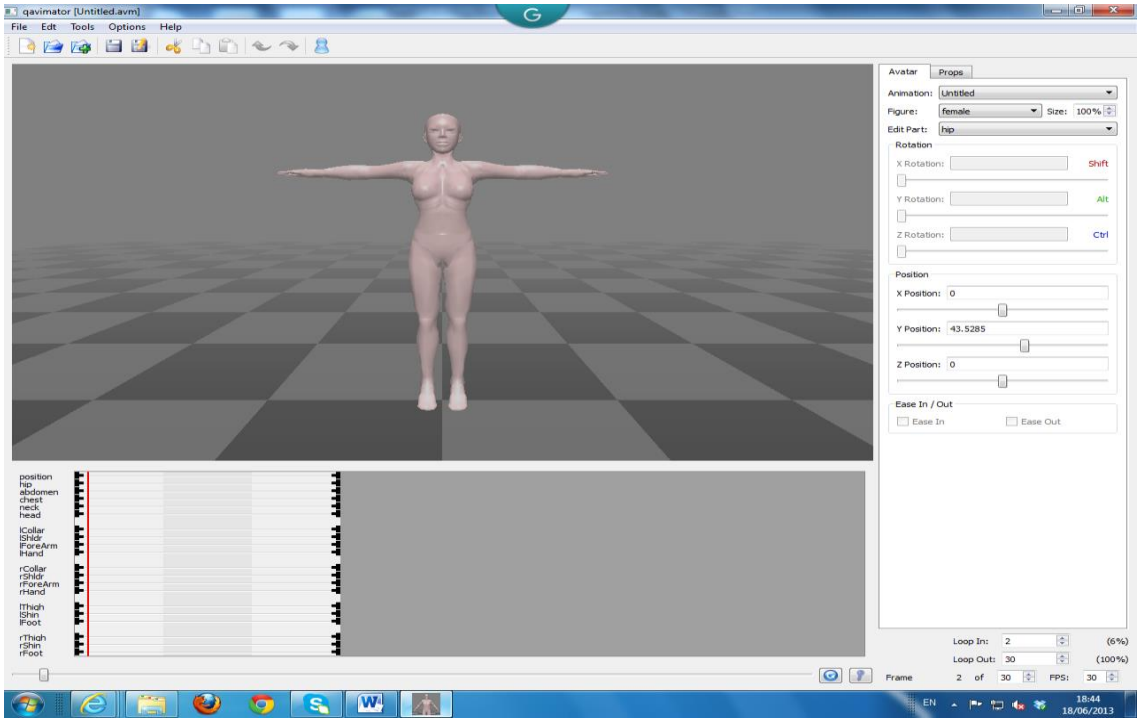


Figure 5.7: QAvimator software used to support animation behaviour and timelines

Figure 5.8 shows the avatar when its hand has been raised to request something as animation behaviour inside the classroom, as well as selecting the frame and loop of the body of the avatar which can be selected for animation**.**

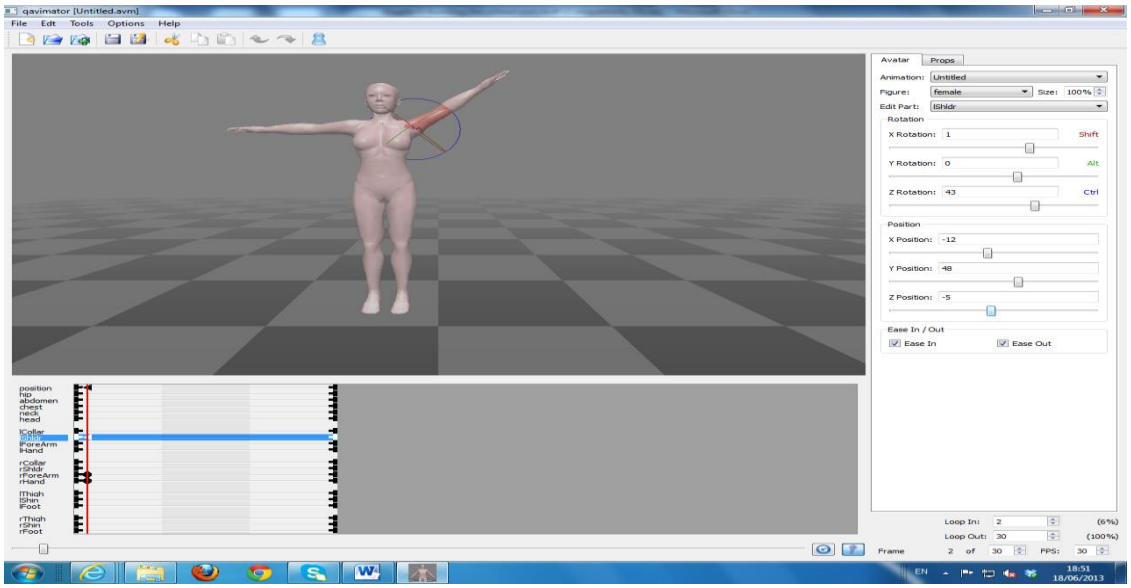


Figure 5.8: Demonstration of the avatar raising hand

The file was saved and uploaded to SL by using the following simple procedures. Firstly, File -> Upload Animation was chosen and then browsed to the developer's newly created animation. A dialogue box which enabled the developer to set and preview various parameters that they could use for animation appeared. For instance, it was possible for the developer to alter the "Hand Pose" list box to "Relaxed" when they wanted the avatar's fingers to closely come together.

5.3.3.3 Collaboration behaviour

The main focus in the research has been concerned with the behaviour of avatars or bots in the SL virtual environment, particularly, a 3D virtual environment which is referred to as a Multi-User Virtual Environment (MUVE) where users interact with one another using their avatars. Usually a MUVE SL, enables users to customise their avatar, and exhibit different kinds of behaviour which exist in the real-world. This may include social interactions, friendship, shopping, travelling, trading, vacationing etc. Users can also design and manipulate items/artifacts in their environment ranging from images and tools, to their own paradise island. With the support of Linden Scripting Language (LSL), 3D objects can be created into new fully module like whiteboard objects. Avatars can write whatever they want to in the chat and the chat subsequently appears on the whiteboard object. They can also use the board to explain something to other avatars.

Example 1 - The whiteboard object

The teacher avatar was able to effectively utilise the board by employing SL public chat in the main page. The avatar could subsequently press the 'enter' button to directly access the main board where all student bots or avatars could see. This object prim tool contained a set of language characters (Italian, French, German, Spanish and other languages), from the notecard, which were crucial for displaying the notecards without the need to upload the texture, as depicted in Figure 5.9.

There was an options menu for this object which included a set of elements:

+privacy - to control who could touch the board.
+**clean** - to clean it up.

+**reset** - to instigate a full reset (Tools->Reset could also be used).

+**chat** - to have the content of the whiteboard written in public chat (what is seen).

+**plain** - to choose the plain font.

+**bold** - to have bold font.

+**italic** - to have italic font.

+**prev** - to go back to the main menu.

Figure 5.9: The whiteboard object

Represented below are the scripts for the blackboard:

```
// be sure the whiteboard is clean now
clean(){
setText("");
integeri;
for(i=-1;i<10;i++){
show(" ",i);
llSleep(0.1);
 }
init_buffer();
iCHALKROW=1;
```

Features:

- High quality internationalised ISO-8859-15 font (Spanish-French-Italian-German) characters ask the user if they need other char/fonts.

- The possibility to change fonts (bold, italic, plain) from an easy to reach touch menu.

- The ability to automatically view notecards with text auto-wrapping and scrolling on various pages.

- Privacy options so that it can be used solely by the owner, group or everybody.

- The possibility for interactive usage to keep ten lines viewable by everybody.

- The possibility to chat about what is on the board to enable people to procure this extremely easily.

Example 2 - The multiviewer board object

In this study, a multiviewer board object was created that enabled the trainee teacher to display a set of teaching methodologies. This multiviewer included a menu that consisted of shapes, images, files, colours and a background etc. In the course of explaining this lesson to smartbot students, a trainee teacher avatar could also add a power point file and media file via the space of this object where all bots could see it. In addition, a teacher avatar who wanted to give a command could use the shapes below this object, see Figure 5.10.

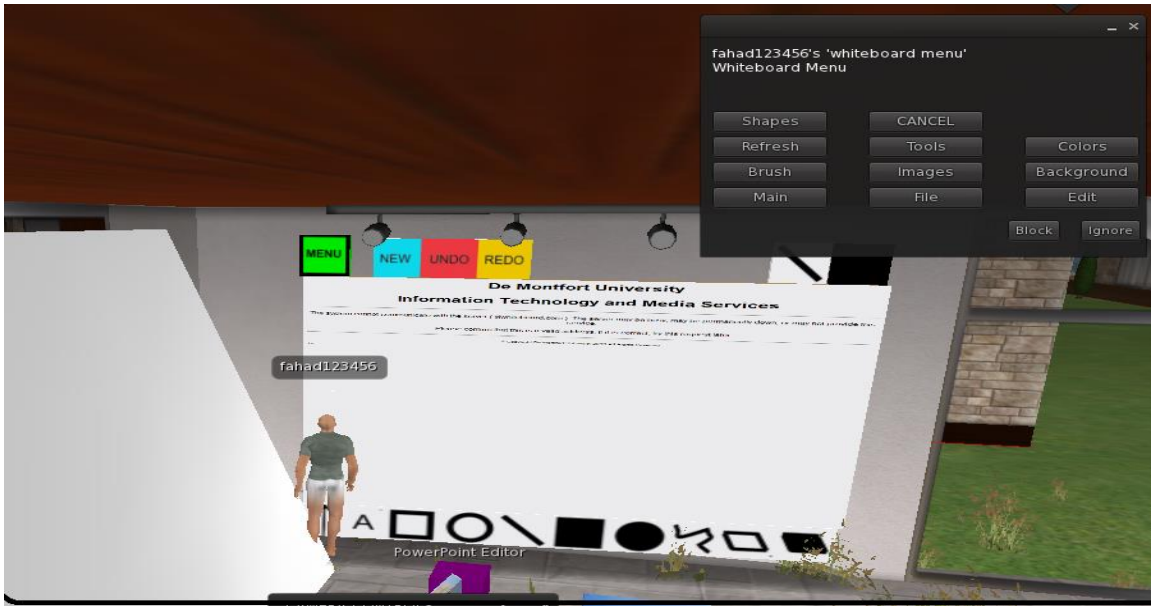


Figure 5.10: The multiviewer object

5.4 LSL Scripting

LSL (Linden Scripting Language) is the scripting language that is used to animate the behaviour of primitives, objects, and avatars in the SL environment. This is a group initiative that offers an accurate and open documentation resource on LSL for all kinds

of scripters with different degrees of skills. Whenever a new script is designed from within the content tab of a prim or from the context menu of the inventory, a script with the LSL code lines below are displayed by the system [Second Life.com].

```
default
{ state_entry()
 {
 llSay(0, "Hello, Avatar!");
 }
 touch_start(integer total_number)
 {
 llSay(0, "Touched.");
 }
```

When designed the script above will essentially chat "Hello, Avatar!" on the public channel and will then chat "Touched" on the same public channel if an avatar touches the prim containing the script.

The scripting is based on the LSL editor that was used to test the behaviour of an object and avatar, as depicted in Figure 5.11.

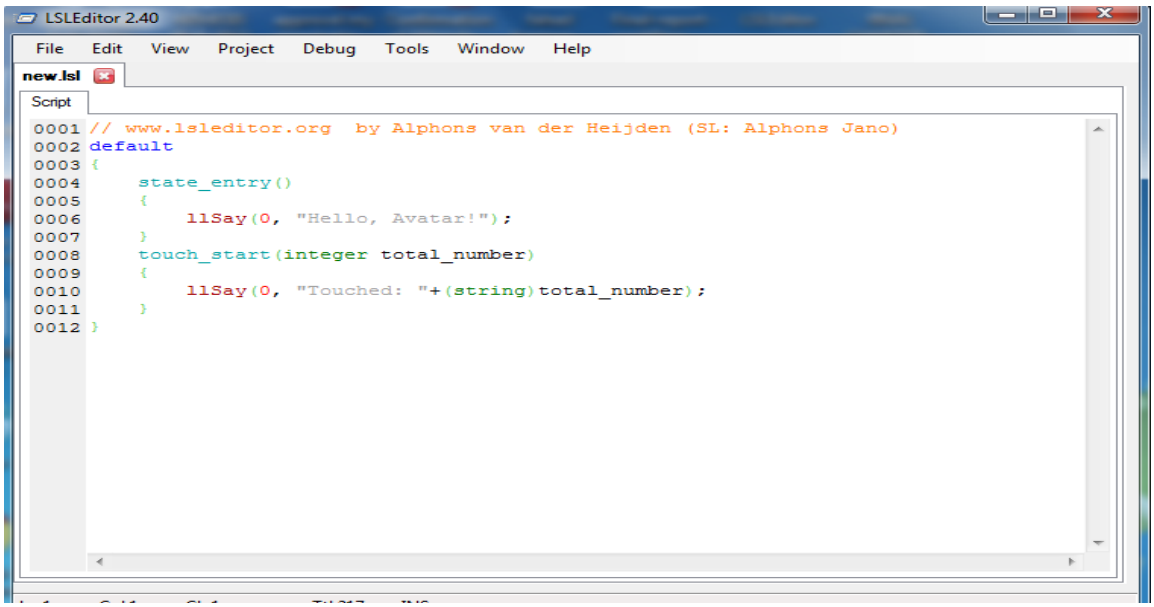


Figure 5.11: LSL Editor

Example 1:

When changing the colour, the user would click on the function 'llSetColor' with the following layout: llSetColor(vector color, integer face). Thus, if the user wanted the cube to be red they could use the vector <1,0,0>, green <0,1,0>, blue <0,0,1>. If it was a linked object the user could use 'llSetLinkColor' which would possess the following layout: llSetLinkColor (integer linknumber, vector color, integer face). The box below shows what the script should look like:

```
default
{
// when the script has been saved (only in default) or when re-entering this
state
 state_entry()
 {
 llSay(0, "Hello, Avatar!");
 }

// when someone starts touching the prim
 touch_start(integer num_detected)
 {
 // color all faces red
 llSetColor(<1.0, 0.0, 0.0>, ALL_SIDES);
 }
}
```

5.4.1 Script Me

Script me is a website (http://www.3greeneggs.com/autoscript/) which assists users in creating scripts for their SL objects and enables them to incorporate interactive elements to their constructs without the knowledge of coding. All of the scripts are released under a creative common license and can be used freely.This site has attempted to map together the way the user and the LSL interpreter thinks. At the beginning, the designer had to select the activities associated with their object, and then choose when they would like these activities to occur.

In addition there could have been a prompt to add some additional information. For instance, the opportunity to design a script which provides a landmark to avatars when clicking on an object, which subsequently prompts them to load to the web site when they say "web" in chat, or simply welcome them to the land [scripte me.com](Figure 5.12).

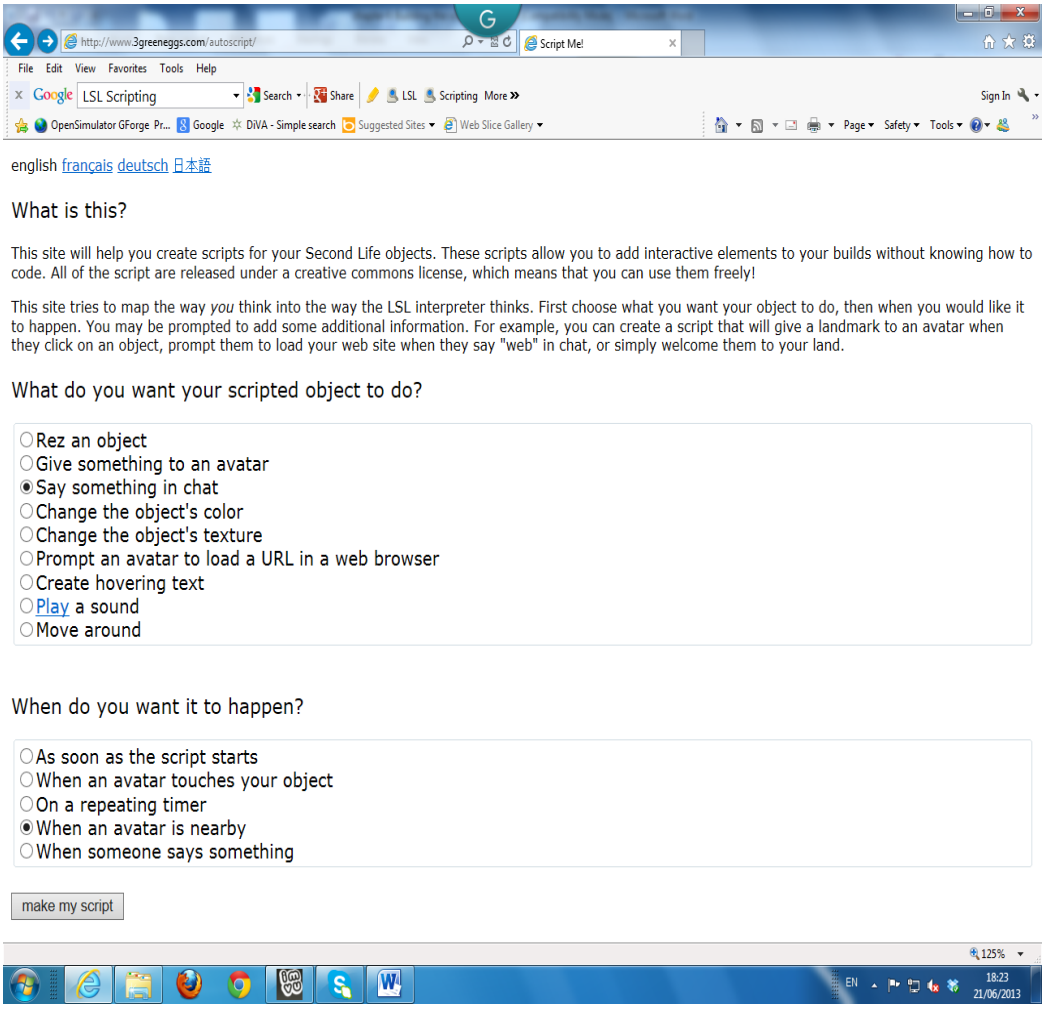


Figure 5.12: Script me website

Example (1)

In this example the designer inserted script in one object of the classroom in SL to represent a welcome screen saying “Welcome in Arab Avatar.” This text is shown when the avatar is approximately five metres away. This is outlined in the following manner:

list recent_avatars;

```
add_avatar(string name) {
        if(!seen(name)) {
                recent_avatars += name;
                if (llGetListLength(recent_avatars) > 25) {
                        recent_avatars = llDeleteSubList(recent_avatars,0,0);
                }
        }
}
integer seen(string name) {
        if(llListFindList(recent_avatars,[name]) > -1) { return TRUE; }
        return FALSE;
}
default
{

        state_entry() {
                llSensorRepeat("", NULL_KEY, AGENT, 5, PI, 5);
        }
        sensor(integer total_number) {
                if(!seen(llDetectedName(0))) {
                // speak out loud!
                llSay(0,"welcom in Arab Avatar");


        add_avatar(llDetectedName(0));

        }

}



}
```

[scripte me.com]

Example (2)

In this example, the designer inserted scripts in one object for the classroom in SL to display the DE Montfort University website [scripte me.com].

```
default
{
        touch_start(integer total_number) {
                // load a dialog with a URL
                llLoadURL(llDetectedKey(0), "Hi DMU",
"http://www.dmu.ac.uk/home.aspx");

        }
}
```

5.5 Smartbot Control Behaviour

SmartBot is a Personal Bot HUD which enables remote control of the SL bot. The HUD consists of: header buttons, function tabs, bot status buttons and a bot movement control panel. The following commands to teleport, move and animate the bot [smartbot.com] are required:

- Come to me - moves the bot to the user if they are on the same sim.
- Teleport – This teleports the bot to the user or the user to the bot.
- Animate – This enables previously loaded animation from the bot's inventory to be played.
- Stop animation – This stops any of the animations.
- Sit – This enables the action of sitting on the bot pose stand or selecting the in-world object.
- Stand – This sets the bot to stand up if sitting on an object.

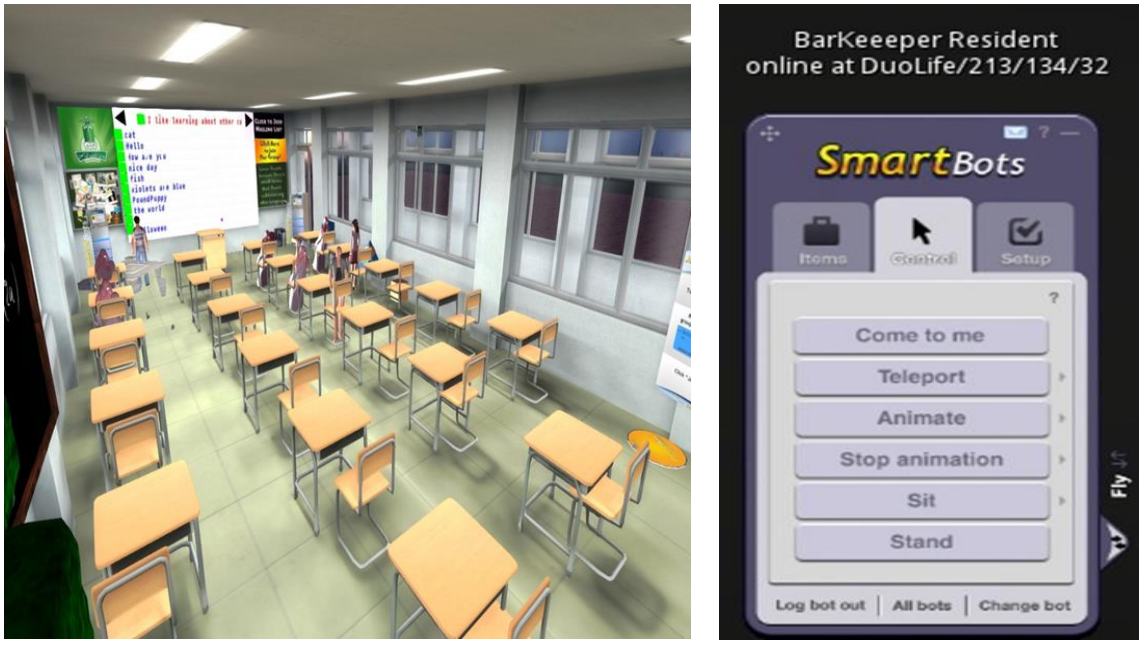


Figure 5.13: The smartbot in the KAU classroom

5.5.1 SBSL - SmartBots scripting language

SBSL (SmartBots Scripting Language) is a simple programming language which enables the bot to participate in-world events and residents' activity [smartbot.com].

Features

Powered with SBSL, this enables the bot to:

- Track residents' messages (chat, IM and teleport offers).
- Track groups' activity (group chat, notices and group invitations.
- Work with inventories (track inventory offers and deliver inventory).
- Undertake custom HTTP requests to the website.
- Act as a live resident.

To control the personal bot, the developer embedded code inside the bot. For the bot to effectively function inside the classroom the developer used the following procedure:

- Accessed the website http://www.smartbots2Life.com/
- Entered the user name and password.
- Selected the personal bot to manage.
- Went to the bot body and selected bot programming> view SBSL scripts, as depicted in Figure 5.14.

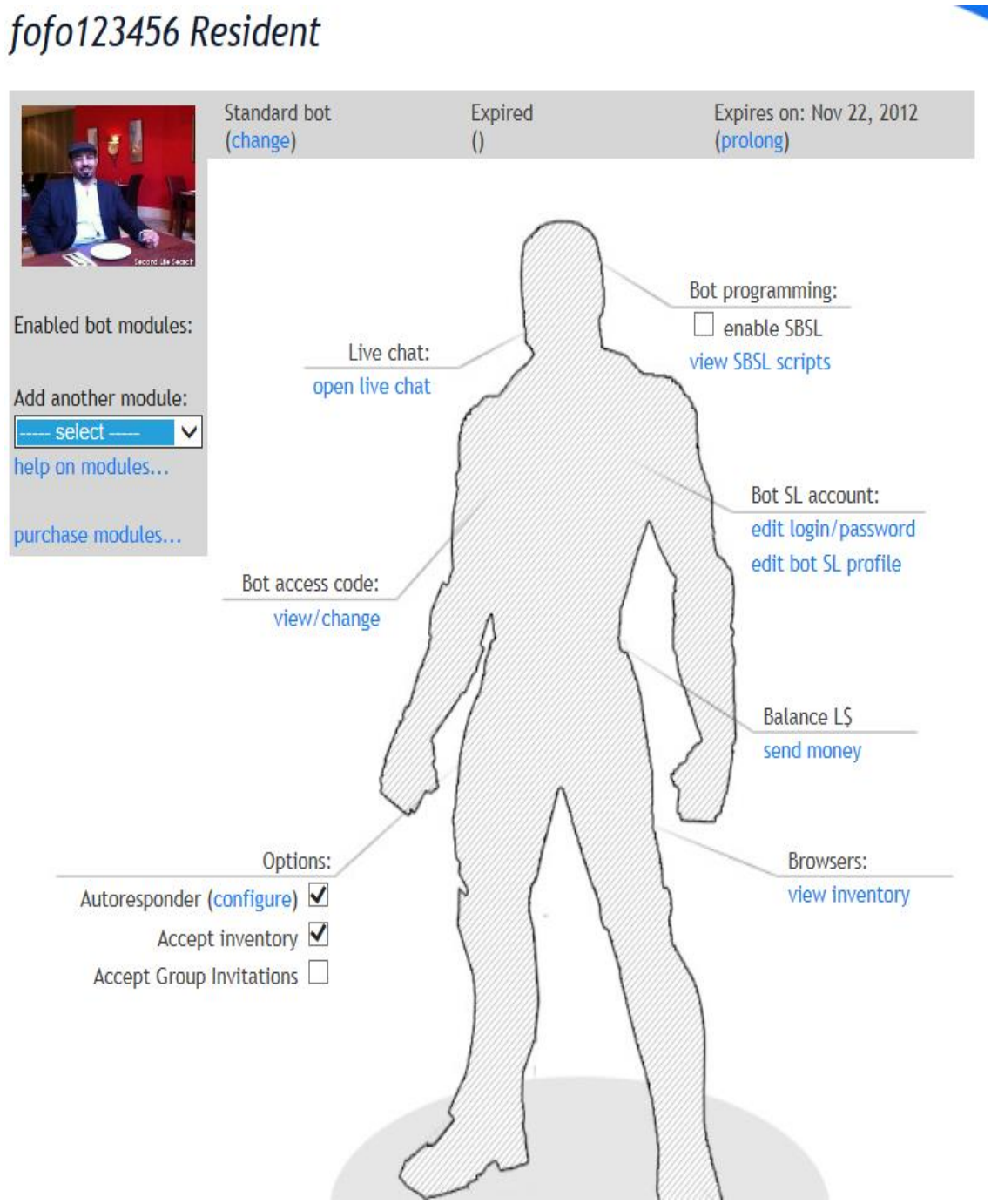


Figure 5.14: The Smartbot body

5.5.2 Personal bot walking using SBSL

The agent smartbot could walk to a particular location in SL land; for instance, if the designer had defined the x, y, z positions, the agent smartbot would automatically walk to that position as far as there were no obstacles in the classroom buildings. The agent smartbot would continue walking and jumping to another place, and he could also walk

upstairs. If the user was familiar with the environment, they would need to define a clear way for the agent smartbot so that it did not bump into any obstacles.

The agent could also walk if it was commanded to do so (X, Y, Z).

```
1 <MPML3D version="1.0">
2 <Head>
3 <Entities>
4 <Entity type="human" name="avatar1" resourcePath="girl">
5 <Property name="agent_name">Your Second Lifeavatars name
here</Property>
6 <Property name="agent_pwd">Your Second Lifeavatars password
here</Property>
7 </Entity>
8 </Entities>
9 </Head>
10
11 <Body startImmediately="task1">
12 <Task name="task1" priority="0">
13 <Action>avatar1.walk(x, y, z)</Action>
14 </Task>
15 </Body>
16 </MPML3D>
```

The developer inserted the code (Fahad123456) inside the bot in order to increase its ability to move from one place to another within the land and the SBSL script was compiled and stored in the inventory, as depicted in Figure 5.15.

Figure 5.15: Adding a new script to the smartbot

5.6 Conclusion

This chapter has provided clear guidelines regarding how to construct a classroom simulation in Second Life using 3D objects in a spatial environment, and how to select suitable values for the objects (X, Y, and Z). All items created in SL must have an ID, name, position, size, rotation, shape and permission. In order to conduct such an experiment, the designer needed to have significant experience in the SL environment, which requires enhanced classroom interaction between the teacher avatar and the student smartbots. Prim objects were used in the construction of the virtual classroom, which represent the building blocks of the SL environment; special attention was given to the construction of the walls, doors and windows, and the design of the chairs, desks and desktops. To create a rich classroom learning environment, the designer enhanced the interaction between the residents of SL by using the smartbot service and scripting. Furthermore, three main kinds of simulated behaviour exhibited by the smartbots or avatars, which included basic, animation and collaboration, were reviewed, and these simulations were undertaken through the use of the scripting language LSL (Linden Scripting Language). This scripting language grants behaviour to SL primitives, objects and avatars, and it involves a group initiative that offers an accurate and open documentation resource on LSL for all scripters with different degrees of skill.

Chapter 6

Evaluation

Objectives

- *Data Analysis Methodology*
- *Using the "Likert scale" and T-test to answer the research questions*
- *The attitudes for Classroom simulator for trainee teacher,observer and student*
- *Scenario Case Studies*
- *Discussion*
- *Comparison between 3D environment*

Chapter 6: Evaluation

6.1 Introduction

The classroom simulation evaluation based SL was undertaken using a variety of approaches simulation-based learning, role-play approach and qualitative and quantitative approaches. The current project grew from a simple question is it possible for a classroom simulation to create a Second Life environment to provide additional experience for trainee teachers and assist in the selection of a teaching methodology in regard to classroom management. The sample for the study included 48 student undergraduates undertaking a computer science course (CS 100) at King Abdul-Aziz University, 6 trainee teachers and 6 expert observers. Each accessed the classroom (at King Abdul-Aziz University) through a Second Life environment. Of the 48 students, 37 were male and 11 female. They were real students who had completed prior coursework that addressed student behaviour in a traditional classroom before carrying out work in our classroom simulation in SL (Tullis & Albert 2008). Also, the students asked about what they needed from trainee teacher, and the majority of the participants observed teacher/student behaviours in a university classroom. Data sources included the notes of the real students, trainee teachers' avatars and observers' avatar. The trainees/observers questionnaire is conduct based on the experiment in SL classroom and using Likert rating scales to support the results. Also, I used two methods to evaluate my research, which comprise data analysis of the statistics and a case study to follow a set of scenarios. The aim of the data analysis is to enhance the teaching and experience impact for tainee teacher toword Seond Life envroinment with observer teacher in same envroinment through evaluate the trainee teacher by teaching role standard.

6.2 Data Analysis

The research analysis comprises the following steps:

1- Descriptive statistics (including tables and relevant graphs).

2- Use of the 'Likert scale' in order to check the attitudes of respondents when answering the research questions.

3- T-test.

4- Interview.

6.3 Descriptive statistics

6.3.1 Quantitative method

Questionnaire concerning a classroom simulation for trainee teachers in a 3D virtual learning environment

The experiment took ten minutes with the trainee teacher in a 3D virtual learning environment, distributed as follows (Table 6.1):

Table 6.1: Experiment time taken by trainee teachers in the classroom using SL

Time taken with experiment	Frequency	Percent
5.0	1	16.7
6.0	1	16.7
8.0	2	33.3
10.0	2	33.3
Total	6	100.0

The mean time was approximately 7.8 min, with a Standard Deviation of approximately 2.04 min. The highest academic qualification held by the trainee teachers in the 3D virtual learning environment was a doctorate. 50% of the trainee teachers held a Bachelor's degree, approximately 33.3% held a Master's degree, and about 16.7% a PhD. This is demonstrated in the following figure:

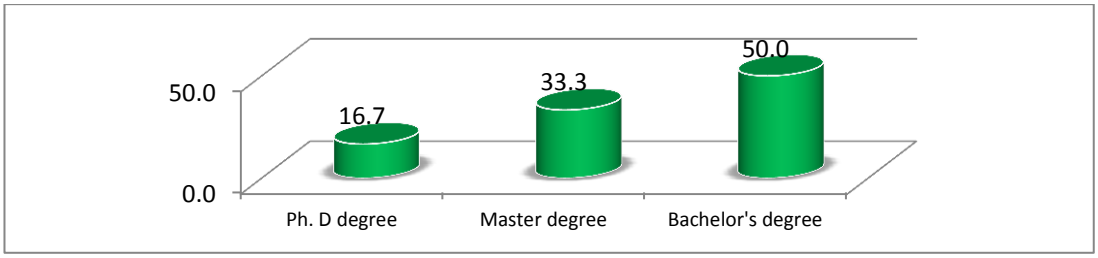


Figure 6.1: Academic qualifications for trainee teachers

6.3.2 Trainee teachers evaluating smartbots by the exchange of messages

There is interaction between trainee teachers (avatars) and students (smartbots) in the classroom within the Second Life environment, which occur when the avatar sends questions or requests to smartbot students via the Chatbot software. It can be seen that 83.33% of teacher avatar interactions were believed to be simulated, or to be behaviours resembling interactions in real life. 16.66% did not believe interaction took place in the classroom, as can be seen in the following figure:

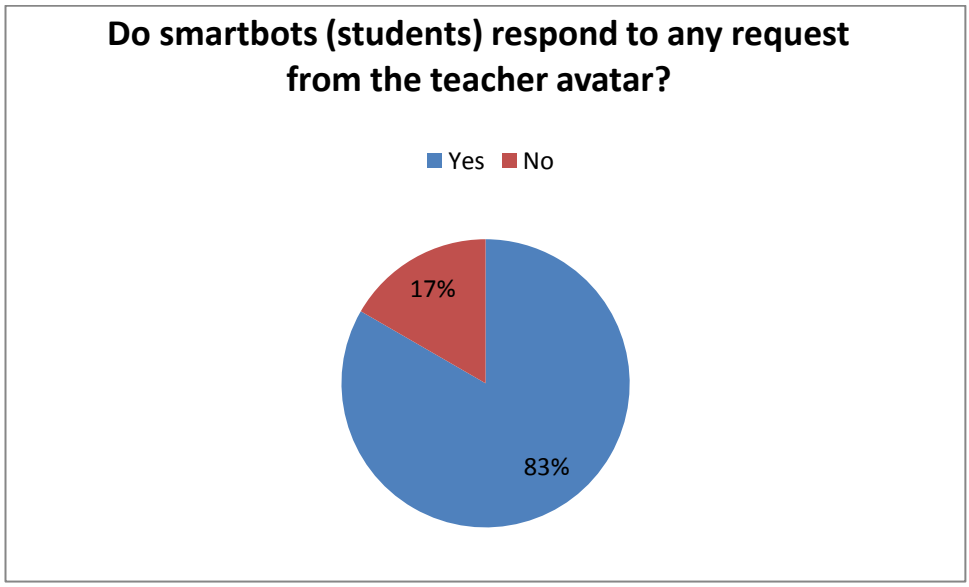


Figure 6.2: Smartbots (student) response to any request from teacher avatar

All trainee teachers needed to treat smartbots as real students when they encountered them in the Second Life classroom. Moreover, the teacher tested smartbots via set behaviours, such as understanding, walking and raising a hand, as can be seen in Table 6.2, which shows that 100% of the teachers believed that the smartbots understood the teacher avatars and walked and/or made head movements to answer any question with yes or no. 83.33% of the teachers claimed that smartbots could hear the teacher, raise a hand, chat to the group, and/or teleport to any place. 66.6% of the trainee teachers agreed that the smartbots indicated animatedly to anything inside the classroom, while 44.4% of trainee teachers saw no indication from the smartbots of animated behaviour.

Table 6.3 shows the responses to two questions that trainee teacher avatars posed to the smartbots by IM Message in SL: “how are you?” (1) and “what is a computer?” (2) The

aim was to measure the behavioural relationship between avatar and bot through a set of questions. The response time was measured, as this confirms a state of interaction between those inside the classroom. The researcher used manual control of time to record send and receive time, which was distributed as follows:

Table 6.2: Smartbot evaluations by trainee teacher

Did the smartbot inside classroom:	Yes	No	Frequency	Percent
Understand the teacher avatar	6	0	6	100%
Hear the teacher avatar	5	1	5	83.33%
Walk	6	0	6	100%
Raise a hand	5	1	5	83.33%
Chat with the teacher avatar	5	1	5	83.33%
Use a head movement to answer any question yes or no	6	0	6	100%
Indicate anything	4	2	4	66.66%
Teleport to any place	5	1	5	83.33%

Table 6.3: Response time between smartbot and trainee teacher avatar

What is the time taken for the message between smartbot and avatar by chatbot?	Question ID	Send Time (teacher)	Received time (bot)	Response time
Teacher G1	1	00:01,1	00:01,4	00.00.3
Teacher G2	1	00:01,3	00:01,5	00.00.2
Teacher G3	1	00:01,7	00:01,9	00.00.2
Teacher G4	2	00:01,0	00:02,0	00.01.9
Teacher G5	2	00:01,5	00:02,4	00.01.1
Teacher G6	2	00:01,2	00:02,6	00.01.4

The response time in question (1), of the interaction between bot and avatar, was approximately 0.1. This indicates that there was rapid interaction between all members when the question was standard or easy, while response time decreased when the question was longer, e.g. question (2), which was very difficult.

6.3.3 Questionnaire about a classroom simulation through observer evaluation of the trainee teacher in a 3D virtual learning environment

The highest academic qualification of the teacher observers in the 3D virtual learning environment was distributed as shown in Table 6.4. From the table, it can be seen that 50% of the observers held a Bachelor's degree, and 50% held a Master's degree:

Table 6.4: Expert observers in the 3D virtual learning environment

Highest academic qualification	Frequency	Percent
Master degree	3	50.0
Bachelor's degree	3	50.0
Total	6	100.0

6.3.4 Questionnaire of classroom simulation for the student with a trainee teacher

The age of the students was distributed as follows:

Table 6.5: Students age

Age	Frequency	Percent
18 to 22	37	77.1
23 to 28	10	20.8
Missing	1	2.1
Total	48	100.0

From the previous table, it is clear that 77.1% of the students were aged from 18 to 22 years, and 20.8% of students were aged from 23 to 28 years. The gender of the students was distributed as follows:

Table 6.6: Students' gender

Gender	Frequency	Percent
Female	13	27.1
Male	34	70.8
Missing	1	2.1
Total	48	100.0

From the previous table, it is clear that 70.8% of the students were male and 27.1% female. The education level of the students was distributed as follows:

Table 6.7: Students' educational level

Education	Frequency	Percent
Postgraduate (Research)	1	2.1
Undergraduate	11	22.9
College	3	6.3
High School	27	56.3
Missing	6	12.5
Total	48	100.0

From the previous table, it is clear that 56.3% of the students had a high school degree, and 22.9% were undergraduates. 6.3% had a college degree, while about 2.1% were at postgraduate level. The number of hours spent by the students on the Internet was distributed unevenly. Figure 6.3 shows that 50% of the students spent less than 3 hours on the Internet, 31.3% spent between 4 to 6 hours, 10.4% from 7 to 9 hours, and 2.1% more than 10 hours.

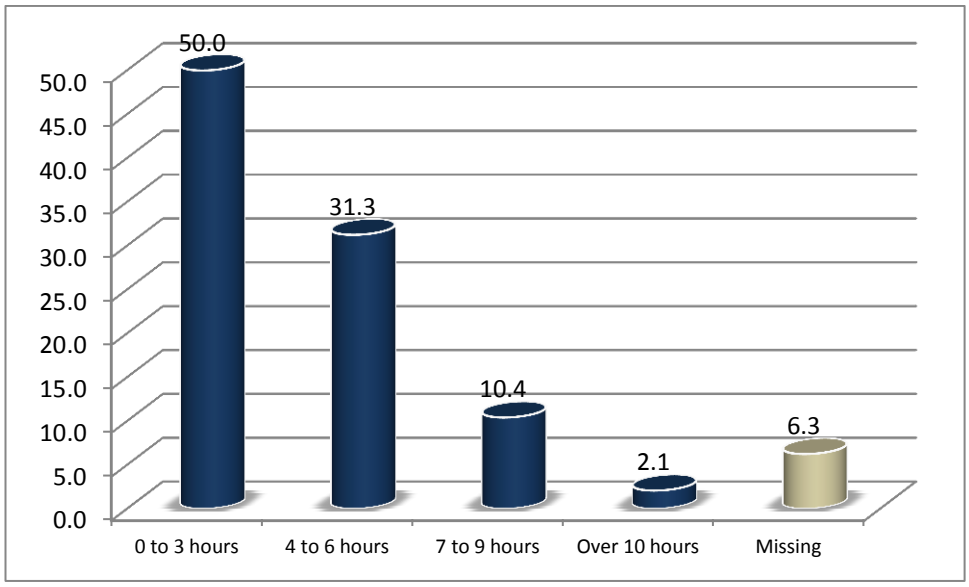


Figure 6.3: Numbers of hours students spend on the Internet

A number of students used the Internet as a resource for finding information and support for their studies. It can be seen that 58.3% of the students used the Internet as an information resource and 35.4% did not use the Internet as a resource, as can be seen in the following figure:

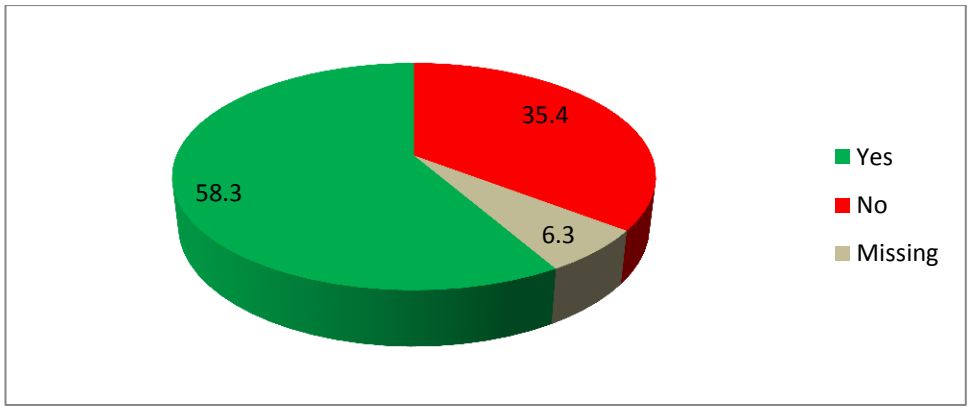


Figure 6.4: Use of the Internet as a resource by students

A number of students used 3D environments such as Second Life, Open Simulator, and Instant Messaging Virtual Universe (IMVU) to teach themselves. These are easy to use and do not involve a high cost. The following figure shows that 27.1% of students used 3D environments to teach themselves, and 72.9% did not use it, This can be seen in the following figure.

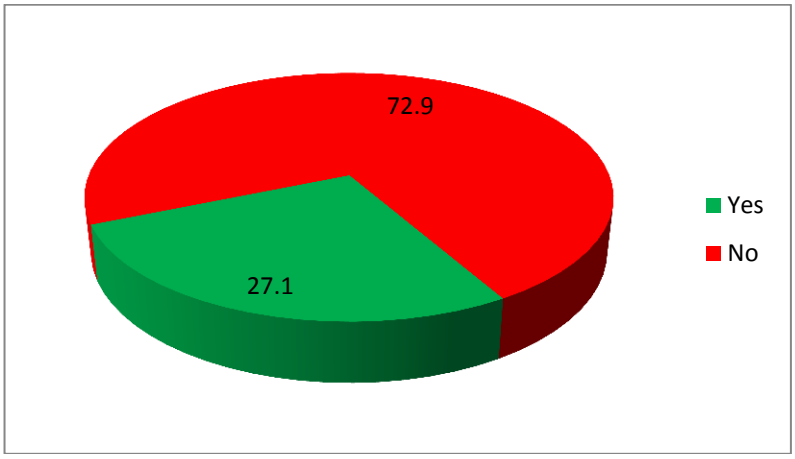


Figure 6.5: Students making use of 3D environments

In addition, in this case we will establish the number of students who studied via the Sentra e-learning system. As can be seen in the following figure, 20.8% of the students studied using the Sentra e-learning system in KAU, and 79.2% did not, This can be seen in the following figure.

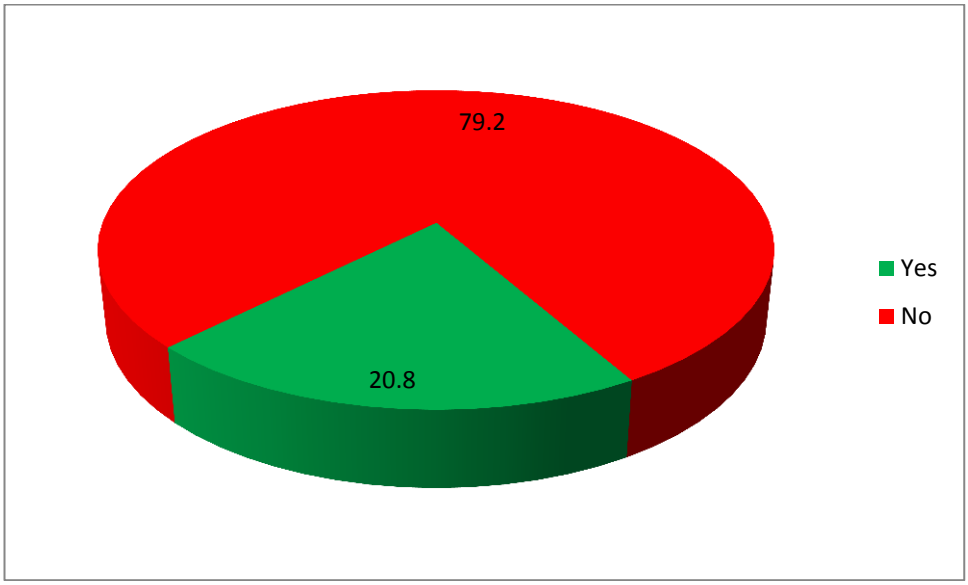


Figure 6.6: Students using Sentra E-learning system in KAU

Finally, it was established that students experienced a number of problems when using the Sentra E-learning system. It was established that 12.5% of the students found this system difficult to understand, 6.3% were not convinced by it, 14.6% found it difficult to use, and 6.3% preferred face-to-face communication. 60% did not answer the question at all, as it was optional, This can be seen in the following figure.

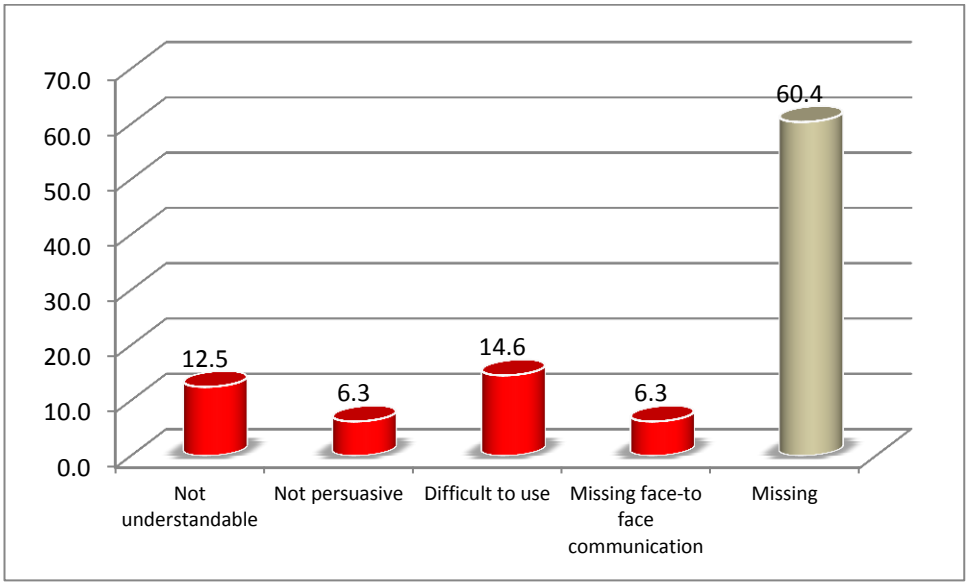


Figure 6.7: Students' assessment of the Sentra E-learning system in KAU

6.3.5 Using the 'Likert scale' in order to answer the research questions

Likert scale

Likert scale is a psychometric scale commonly used in questionnaires, and is the most widely used scale in survey research. When responding to a Likert questionnaire item, respondents specify their level of agreement to a statement. The scale is named after its inventor, psychologist Rensis Likert.

Sample question presented using a five-point Likert item

An important distinction must be made between a Likert scale and a Likert item. A Likert scale is the sum of responses on several Likert items. Because Likert items are often accompanied by a visual analog scale, the items are sometimes called scales themselves. This is the source of much confusion; it is better, therefore, to reserve the

term ‘Likert scale’ to apply to the summated scale, and ‘Likert item’ to refer to an individual item.

In this questionnaire, some questions (variables) were on a five-point scale, others were on a four- or three-point scale. Weighting has been given to reflect the opinions of the respondents. For the five-point scale, the weightings given were as follows:

Table 6.8: Weighting level (5-point)

Agreement level	*Weight*
Strongly Disagree	***1***
Disagree	***2***
Neutral	***3***
Agree	***4***
Strongly Agree	***5***

Since these variables are considered to have ordinal weights, the weighted mean for all respondents may be computed for each variable (and for the whole factor), and this is used to reflect the respondents’ opinions (attitudes). Since there are five categories, attitudes can be determined according to the following classification system:

Table 6.9: Weight mean with agreement attitude

Agreement attitude	*Value of weighted mean*
Strongly Disagree	***From 1 to 1.79***
Disagree	***From 1.80 to 2.59***
Neutral	***From 2.60 to 3.39***
Agree	***From 3.40 to 4.19***
Strongly Agree	***From 4.20 to 5***

The interval length for each category equals to (4/5) or 0.80, and is calculated based on the four distances between the five weightings.

Three-point scale

For the three-point scale, the weightings given were as follows:

Table 6.10: Weighting level (3 point)

Observer evaluation	*Weight*
High level	***1***
Medium Level	***2***
Low level	***3***

Since these variables are considered to have ordinal weights, the weighted mean for all respondents may be computed for each variable (and for the whole factor), and is used to reflect the respondents' opinions (attitudes). Since there are five categories of classification, attitudes can be determined according to the classification system in Table 6.11. The interval length for each category equals (2/3) or 0.66, and is calculated based on the two distances between the three weights.

Table 6.11: Observer level

Observer evaluation	*Value of weighted mean*
High level	***From 1 to 1.66***
Medium Level	***From 1.67 to 2.33***
Low level	***From 2.34 to 3***

6.4 Attitudes Results

6.4.1 The attitudes derived from the classroom simulation for students with a trainee teacher

The distribution of opinions according to the student with the trainee teacher is summarized in the Table 6.12.

As can be seen from this table, the statement "The lecture information provided by the trainee teacher is clear" has the greatest level of agreement, as the respondents 'strongly agree' to the statement. The statements "It is easy to find the information I need with a trainee teacher" and "The interaction with the trainee teacher is understandable" have almost the same level of agreement ('agree'), while the statement "The delivery of information from the trainee teacher enables us to complete the tasks and scenarios" has the lowest level of agreement, although the attitude reveals a tendency to agree. Figure 6.8 reflects the results. As can be seen from Table 6.12, the statement "I felt very confident using new learning environment" and "I found the trainee teacher unnecessarily complex" have the same level of agreement, as the respondents 'agree' with the statements. The statements "I would imagine that most people would learn very quickly with a trainee teacher" and "students would need the support of a technician to be able to use this software in smart learning environments such as Second Life" have almost the same level of agreement from the respondents ('agree'). The statement "The

lecture from the trainee teacher must be easy to understand" has the smallest level of agreement, although the attitude tends towards 'agree'. Figure 6.9 reflects the results.

Statements	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		Weighted Mean	SD	CV	Attitude
	f	%	f	%	f	%	f	%	f	%				
The lecture information provided by the trainee teacher is clear	1	2.1	2	4.2	5	10.4	15	31.3	25	52.1	**4.27**	1.0	22.5%	Strongly Agree
It is easy to find the information I need with trainee teacher	1	2.1	1	2.1	10	20.8	22	45.8	14	29.2	**3.98**	0.9	22.3%	Agree
The interaction with the trainee teacher is understandable	1	2.1	3	6.3	9	18.8	18	37.5	17	35.4	**3.98**	1.0	25.1%	Agree
The delivery of information from the trainee teacher enables us to complete the tasks and scenarios	2	4.2	6	12.5	14	29.2	15	31.3	11	22.9	**3.56**	1.1	31.1%	Agree
Total	**5**	**2.6**	**12**	**6.3**	**38**	**19.8**	**70**	**36.5**	**67**	**34.9**	**3.97**	**0.8**	**21.1%**	**Agree**

Table 6.12: Weight level students' attitudes (A)

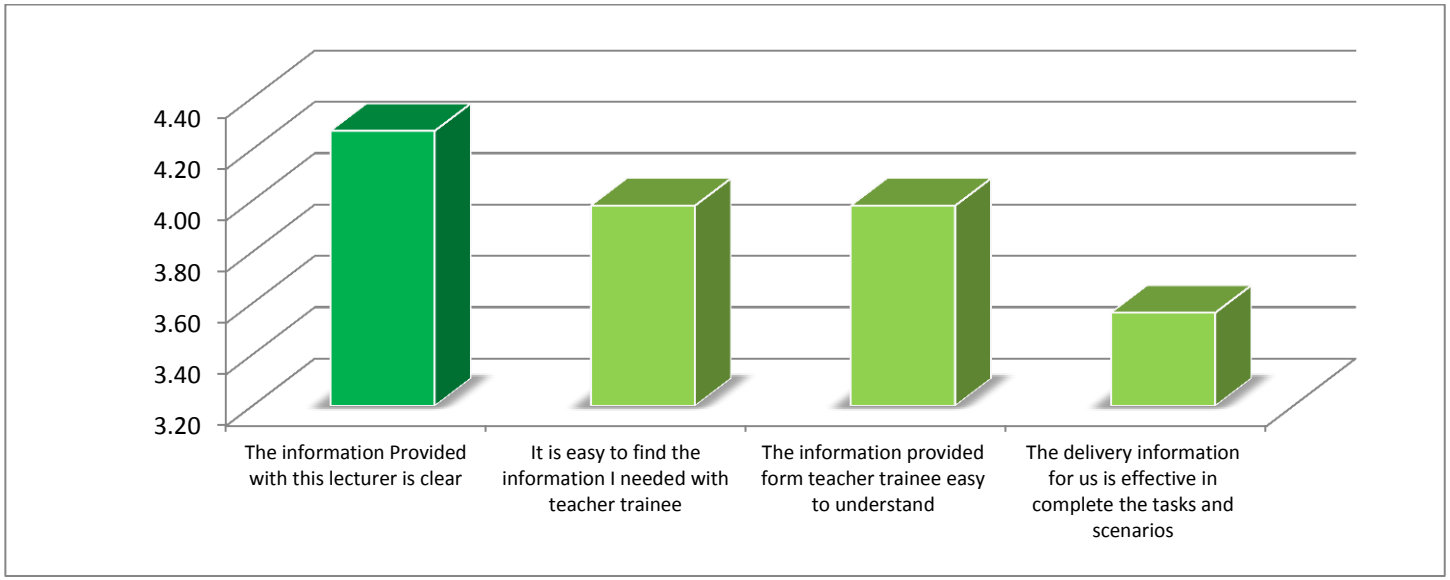


Figure 6.8: Students attitudes (A)

Statements	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		Weighted Mean	SD	CV	Attitude
	f	%	f	%	f	%	f	%	f	%				
Trust: I felt very confident using the new learning environment.	3	6.3	1	2.1	6	12.5	19	39.6	19	39.6	**4.04**	1.1	27.0%	Agree
Ability: I would imagine that most people would learn very quickly with the trainee teacher.	2	4.2	5	10.4	12	25.0	13	27.1	16	33.3	**3.75**	1.2	30.9%	Agree
The lecture from the trainee teacher must be easy to understand	7	14.6	7	14.6	11	22.9	13	27.1	10	20.8	**3.25**	1.3	41.4%	Agree
I found the trainee teacher unnecessarily complex.	3	6.3	2	4.2	8	16.7	12	25.0	23	47.9	**4.04**	1.2	29.3%	Agree
Totalitarianism: Students would need the support of a technician to be able to use this software in smart learning environments such as Second Life	5	10.4	1	2.1	14	29.2	14	29.2	14	29.2	**3.65**	1.2	33.7%	Agree
Total	**20**	**8.3**	**16**	**6.7**	**51**	**21.3**	**71**	**29.6**	**82**	**34.2**	**3.78**	**0.7**	**19.2%**	**Agree**

Table 6.13: Weighting of the level of student attitudes (B)

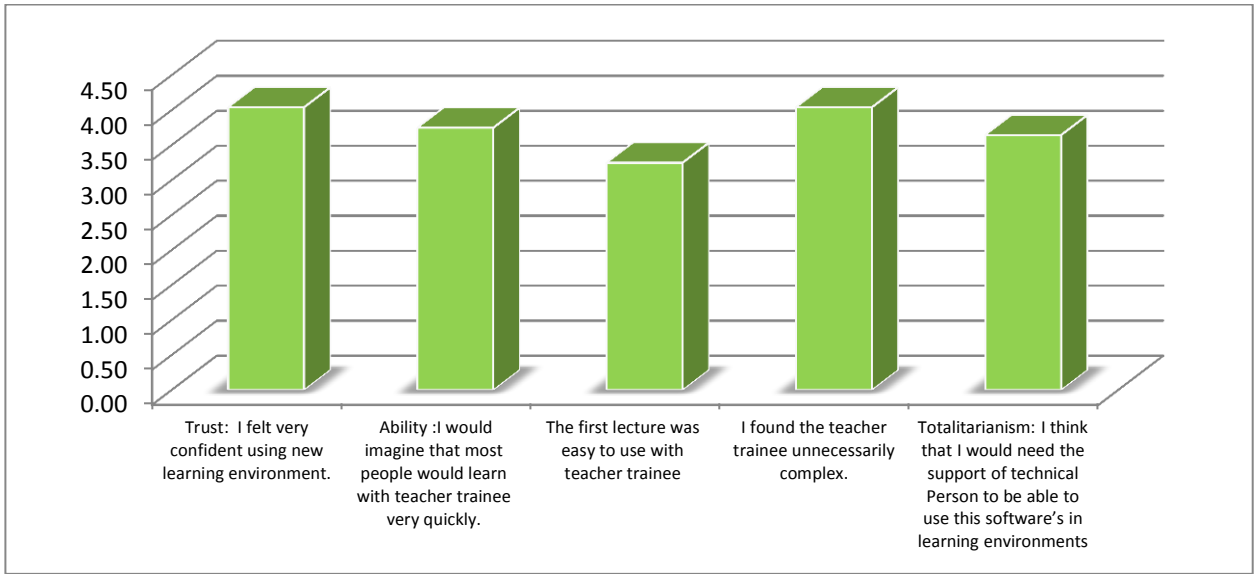


Figure 6.9: Students' attitudes (B)

Statements	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		Weighted Mean	SD	CV	Attitude
	f	%	f	%	f	%	f	%	f	%				
Second Life teaching is a safe environment	0	0.0	0	0.0	1	16.7	3	50.0	2	33.3	**4.17**	0.8	18.1%	Agree
It was easy control my avatar	0	0.0	0	0.0	0	0.0	3	50.0	3	50.0	**4.50**	0.5	12.2%	Strongly Agree
I found this classroom very cumbersome to use.	3	50.0	2	33.3	1	16.7	0	0.0	0	0.0	**1.67**	0.8	49.0%	Strongly Disagree
It was quick to communicate with the smartbot	0	0.0	0	0.0	1	16.7	2	33.3	3	50.0	**4.33**	0.8	18.8%	Strongly Agree
It was easy to carry out my lecture	0	0.0	0	0.0	1	16.7	3	50.0	2	33.3	**4.17**	0.8	41.1%	Agree
SL provided trainee teachers with the capability of teaching without time/space constrains.	0	0.0	0	0.0	2	33.3	2	33.3	2	33.3	**4.00**	0.9	22.4%	Agree
The classroom was easy to build in 3D Second Life.	0	0.0	0	0.0	0	0.0	3	50.0	3	50.0	**4.50**	0.5	12.2%	Strongly Agree
It easy to select teaching methodology in SL land	0	0.0	0	0.0	1	16.7	3	50.0	2	33.3	**4.17**	0.8	23.8%	Agree
The components needed for a lecture to take place were easy to locate.	0	0.0	2	33.3	1	16.7	3	50.0	0	0.0	**3.17**	1.0	31.0%	Neutral
Virtual World (SL) provides a more relaxing environment than traditional classroom	0	0.0	0	0.0	0	0.0	0	0.0	6	100.0	**5.00**	0.0	0.0%	Strongly Agree
Interaction occurred between the teacher avatar and the smartbot student through discussion by email, IM massage and chatbot .	0	0.0	0	0.0	0	0.0	3	50.0	3	50.0	**4.50**	0.5	12.2%	Strongly Agree
The behaviour simulated is effective through smartbot or avatar. such as using smile avatar, then asking a question, then raising a hand in Second Life land	0	0.0	0	0.0	0	0.0	3	50.0	3	50.0	**4.50**	0.5	12.2%	Strongly Agree
In general I feel more comfortable in the SL environment.	0	0.0	0	0.0	0	0.0	0	0.0	6	100.0	**5.00**	0.0	0.0%	Strongly Agree

Table 6.14:Trainee teacher attitudes

6.4.2 The attitudes towards the classroom simulation of a trainee teacher within the Second Life environment

As can be seen from Table 6.14, the following statements had the same levels of agreement, as the respondents 'strongly agreed' to them: "It was easy control my avatar"; "It was quick to communicate with the smartbot"; "The classroom was easy to build in 3D Second Life"; "The Virtual World (SL) provided a more relaxing environment than the traditional classroom"; 'Interaction occurred between the teacher avatar and the smartbot student through discussion by email, IM massage and chatbot"; "The behaviour simulated is effective through smartbot or avatar, such as using a smile avatar, asking a question, then raising a hand in Second Life land'; "In general I feel more comfortable in the SL environment". The following statements also have almost the same level of agreement in that the respondents 'agree': "Second Life teaching is a safe environment"; "It was easy to carry out my lecture."; "SL provided trainee teachers with the capability of teaching without time/space constraints"; "It is easy to select a teaching methodology in SL land". The statement "I found this classroom very cumbersome to use" has the same level of agreement, although the attitude tends towards 'strongly disagree'. Finally, the statement "The components required for a lecture to take place were easy to locate" has the same level of agreement, although here the attitude is 'neutral', as the result was 'strongly agree' in almost all the statements, Figure 6.10 reflects the results.

6.4.3 The attitudes towards the classroom simulation of a observers evaluating the trainee teacher within the Second Life environment

As can be seen from the table, there is approximately the same 'high level' of agreement with the following statements amongst respondents, indicating that the trainee teacher experience in the Second Life classroom was fully trusted: "The trainee teacher promoted good progress and outcomes by students, demonstrating good choice of subject"; "The trainee teacher selected effective activities/exercises to achieve the objectives"; "The trainee teacher put together a plan and taught well-structured lessons following the objectives of the course"; "The trainee teacher used technology (video, audio, presentation) that was appropriate for the courses being presented"; "There was clear interaction between the trainee teacher and the smartbot student"; "The trainee

teacher managed behaviorbehaviour effectively in order to ensure a good and safe learning environment"; "The trainee teacher used the target language in the classroom suitably and effectively"; "Overall performance". The following statements have the same level of agreement from the respondents, being of 'medium' level: "The trainee teacher assisted in motivating and challenging students"; "The trainee teacher dealt with the practice and use of assessments"; "The trainee teacher was adaptable when it came to teaching methodology"; "The teacher was able to receive feedback from the smartbot students". The attitude rises to (High level), as all the trainee teachers taking part in the experiment had been teaching before the start of the course and so they understood their role (QTS). Therefore, the observers had a greater understanding of teachers in these classroom simulations, as reflected in Figure 6.11.

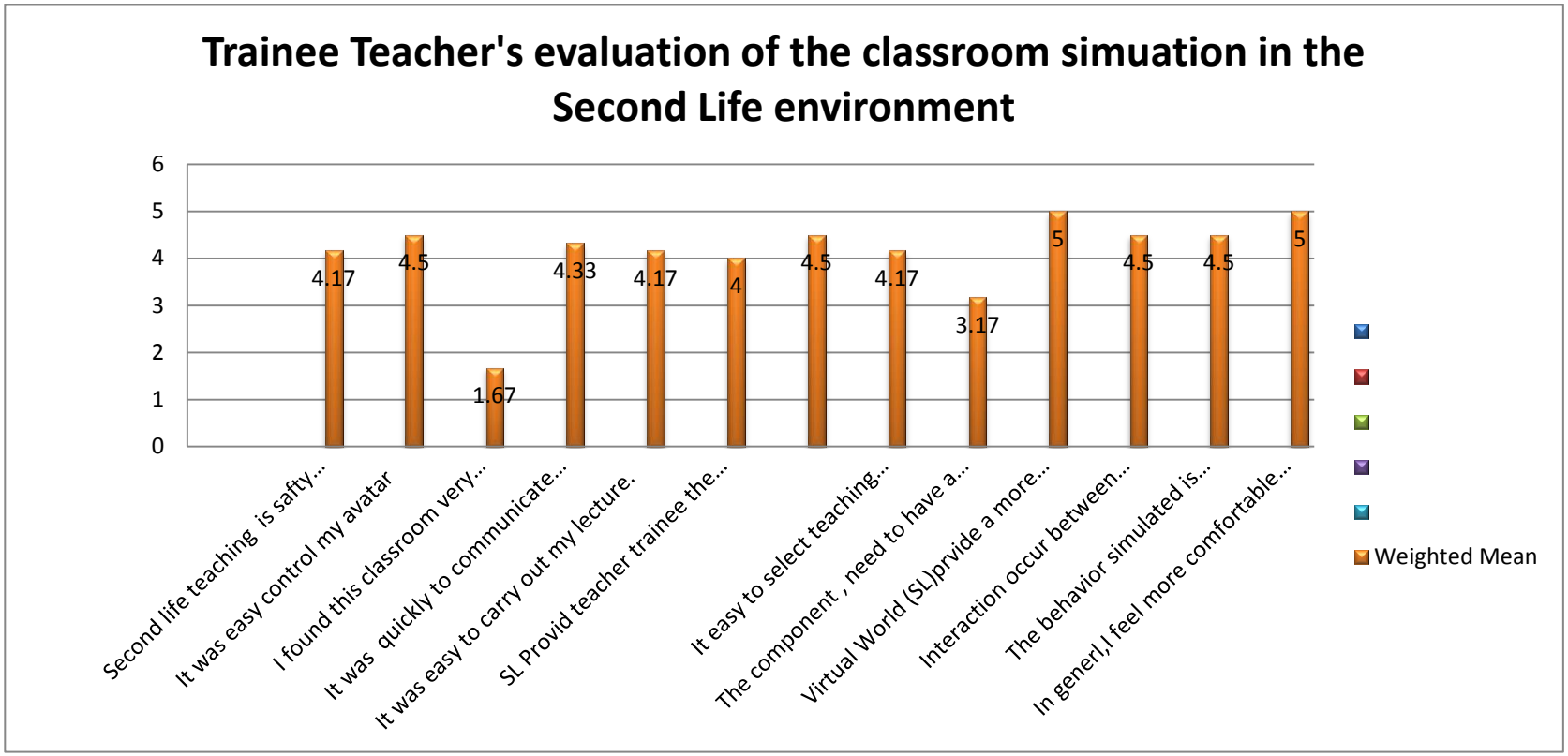


Figure 6.10: Attitudes of the trainee teachers

Table 6.15: Observer attitudes

Statement	QTS Role	High Level		Medium Level		Low level		Weighted Mean	SD	CV	Attitude
		f	%	f	%	f	%				
The trainee teacher assisted in motivating and challenging students.	1	2	33.3	3	50.0	1	16.7	**1.83**	0.8	41.1%	Medium level
The trainee teacher promoted good progress and outcomes by students, demonstrating a good choice of subject.	2,3	4	66.7	0	0.0	2	33.3	**1.66**	1.0	62.0%	High Level
The trainee teacher selected effective activities/exercises to achieve the objectives.	3	4	66.7	2	33.3	0	0.0	**1.33**	1.0	45.4%	High Level
The trainee teacher dealt with the practice and use of assessment.	6	1	16.7	4	66.7	1	16.7	**2.00**	0.6	31.6%	Medium level
The trainee teacher put together a plan and taught well-structured lessons following the objectives of the course.	4	4	66.7	2	33.3	0	0.0	**1.33**	0.6	31.6%	High Level
The trainee teacher was adaptable when it came to the teaching methodology.	5	1	16.7	3	50.0	2	33.3	**2.17**	0.8	34.7%	Medium level
The trainee teacher used technology (video, audio, presentation) that was appropriate for the courses being presented.	6	5	83.3	1	16.7	0	0.0	**1.17**	0.4	35.0%	High Level
There was clear interaction between the trainee teacher and the smartbot student.	5	4	66.7	2	33.3	0	0.0	**1.33**	0.5	38.7%	High Level
The trainee teacher managed behaviour effectively in order to ensure a good and safe learning environment.	7	3	50.0	2	33.3	1	16.7	**1.66**	0.8	49.0%	High Level
The teacher was able to receive feedback from the smartbot student.	2	1	16.7	4	66.7	1	16.7	**2.00**	0.6	31.6%	Medium level
The trainee teacher used the target language in the classroom suitably and effectively.	4	4	66.7	0	0.0	2	33.3	**1.66**	0.8	41.1%	High Level
Overall performance.		3	50.0	2	33.3	1	16.7	**1.66**	0.4	22.3%	High Level

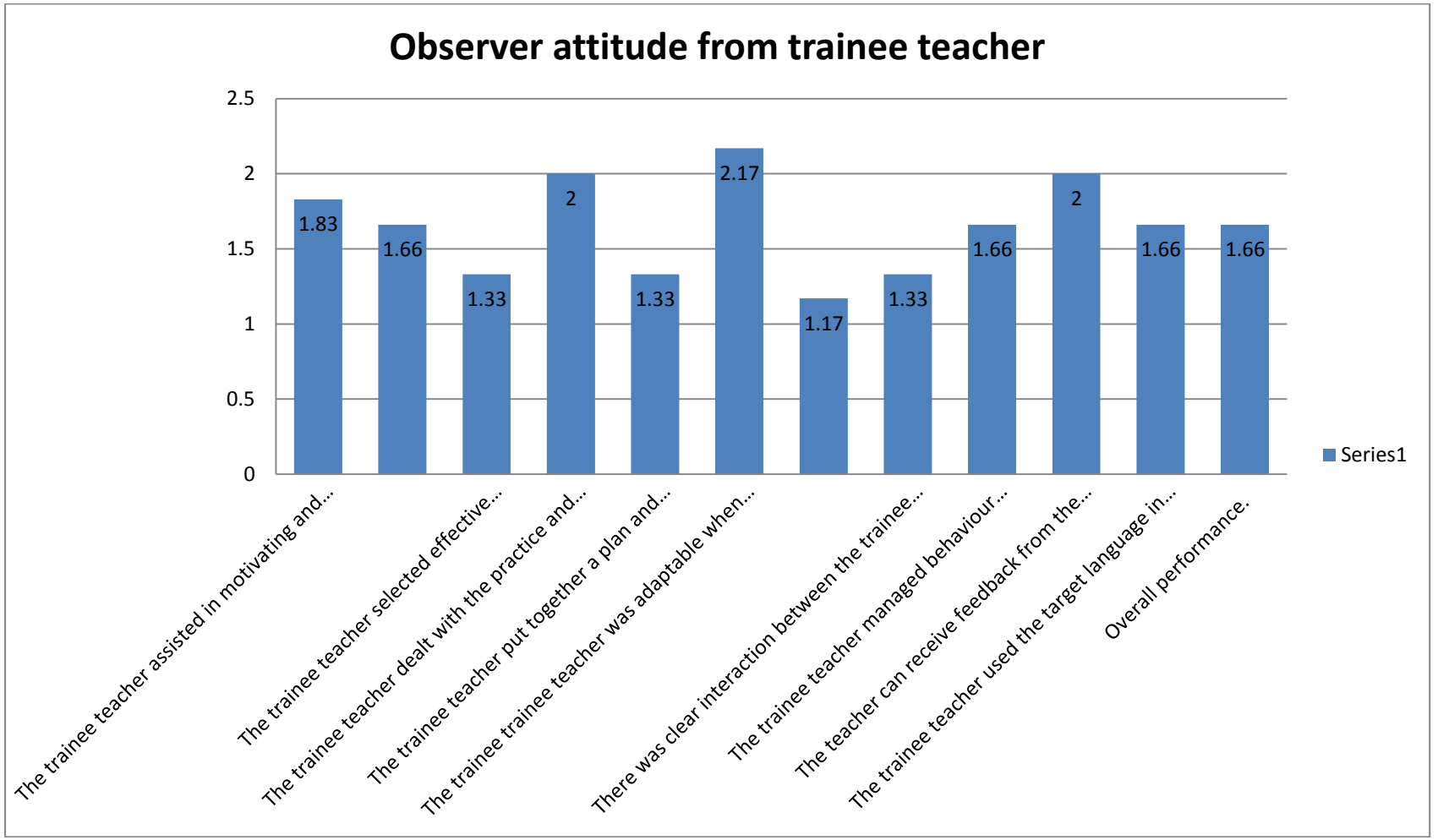


Figure 6.11: Observer attitudes

6.5 T-test

Before I discuss the results, I will provide brief information about the t test:

Statistical significance (p-value)

The statistical significance of a result is an estimated measure of the degree to which it is 'true' (in the sense of 'representative of the population'). More technically, the p-value represents a decreasing index of the reliability of a result. The higher the p-value, the less we can believe that the observed relation between variables in the sample is a reliable indicator of the relation between the respective variables in the population. Specifically, the p-value represents the probability of error that is involved in accepting our observed result as valid, that is, as 'representative of the population'. In many sciences, results that yield $p \leq .05$ are considered borderline statistically significant. Results that are significant at the $p \leq .01$ level are commonly considered statistically significant, and $p \leq .005$ or $p \leq .001$ levels are often called 'highly' significant.

6.5.1 The t-test

The t-test is the most commonly used method to evaluate the differences in the mean between two groups. We can assume that the data are derived from a random sample from a normal population, and that the two-cell variances are the same. The p-value reported with a t-test represents the probability of error involved in accepting our research hypothesis about the existence of a difference. Technically speaking, this is the probability of error associated with rejecting the hypothesis of no difference between the two categories of observations (corresponding to the groups) in the population, when, in fact, the hypothesis is true (Norman 2010).

6.5.2 The t-test for independent samples

The test is used to compare the mean values between two independent variables. Here, the test is done according to two categories of educational levels, namely Master's/PhD (postgraduate) and Bachelor's (undergraduate) degrees. The results are summarized in the following table:

Table 6.16: T-test

Statmants	educational level	N	Mean	SD	T	P-value	Sig
Second Life teaching is a safe environment	Master or PH.D	3	4.33	.577	.500	.643	NS
	Bachelor	3	4.00	1.000			
	Total	6	4.17	.753			
It was easy control my avatar	Master or PH.D	3	4.67	.577	.707	.519	NS
	Bachelor	3	4.33	.577			
	Total	6	4.50	.548			
I found this classroom very cumbersome to use.	Master or PH.D	3	1.00	0.000	4.000	**.016**	**Sig**
	Bachelor	3	2.33	.577			
	Total	6	1.67	.816			
It was quick to communicate with the smartbot	Master or PH.D	3	4.67	.577	1.000	.374	NS
	Bachelor	3	4.00	1.000			
	Total	6	4.33	.816			
It was easy to carry out my lecture	Master or PH.D	3	2.00	1.000	.500	.643	NS
	Bachelor	3	1.67	.577			
	Total	6	1.83	.753			
SL provided trainee teachers with the capability of teaching without time/space constrains.	Master or PH.D	3	4.33	1.155	.894	.422	NS
	Bachelor	3	3.67	.577			
	Total	6	4.00	.894			
The classroom was easy to build in 3D Second Life.	Master or PH.D	3	4.33	.577	.707	.519	NS
	Bachelor	3	4.67	.577			
	Total	6	4.50	.548			
It easy to select teaching methodology in SL land	Master or PH.D	3	3.00	1.000	.500	.643	NS
	Bachelor	3	3.33	.577			
	Total	6	3.17	.753			
The components needed for a lecture to take place were easy to locate	Master or PH.D	3	3.33	1.155	.378	.725	NS
	Bachelor	3	3.00	1.000			
	Total	6	3.17	.983			
Interaction occurred between the teacher avatar and the smartbot student through discussion by email, IM massage and chatbot .	Master or PH.D	3	5.00	0.000			NS
	Bachelor	3	5.00	0.000			
	Total	6	5.00	0.000			
The behaviour simulated is effective through smartbot or avatar. such as using smile avatar, then asking a question, then raising a hand in Second Life land	Master or PH.D	3	4.33	.577	.707	.519	NS
	Bachelor	3	4.67	.577			
	Total	6	4.50	.548			
In general I feel more comfortable in the SL environment.	Master or PH.D	3	4.67	.577	.707	.519	NS
	Bachelor	3	4.33	.577			
	Total	6	4.50	.548			

When using the t-test to compare the teachers' attitudes, I found that there was no significant difference between the teachers with Bachelor's degrees and the teachers with either a Master's or PhD degree; this reason return to the SL experiment in teaching filed for teacher experiences that mean to be trainee teacher received teaching role and understand this role by high level then the trainee teacher became expert teacher through Second Life classroom, where the P-values were greater than 0.05, except for the statement "I found this classroom very cumbersome to use" where the P-value was less than 0.05, and the difference was towards the teachers with Bachelor degree, as the following figure may reflect the results:

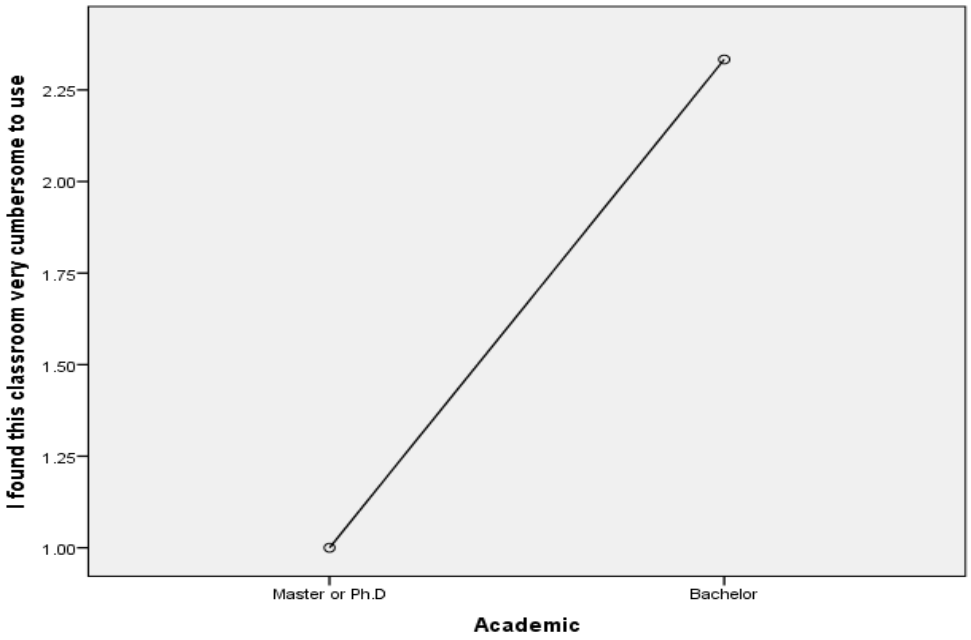


Figure 6.12: Academic qualifications for Trainee Teacher

6.5.3 Expert sampling

Expert sampling involves the assembling of a sample of persons with known or demonstrable experience and expertise in some area. Often, any researcher convenes such a sample under the auspices of a 'panel of experts'. There are actually *two reasons* we might do expert sampling. First, because it would be the best way to elicit the views of persons who have specific expertise. In this case, expert sampling is essentially just a specific subcase of purposive sampling. But the other reason we might use expert sampling is to provide evidence for the validity of another sampling approach we've

chosen. For this reason, in the current study, as my population was bounded, the sample was limited.

6.6 Qualitative Method

Trainee teacher based Second Life experiment

The research show interview with trainee teachers who applied their material in virtual classroom simulation based Second Life when replying to the question "Does it allow you to select a teaching methodology in the virtual classroom simulation?", all the trainee teachers, regardless of their educational level, agreed about selecting teaching methodologies, such as using PowerPoint, posters, whiteboards, slideshows, learning objects as boards, photos, text, all-video multimedia, textures, gestures, animations multimedia methods, and gaming beads. They agreed that these tools helped and improved their teaching in the virtual classroom simulator.

When replying to the question "Is the interaction between bots and avatars realistic?", all the trainee teachers, regardless of their educational level, agreed that there were more interactions in the classroom using Second Life between all participants. This was made possible through question/answer by chat, IM message and email, and because the classroom depends on roleplay simulation method and the exchange of messages between all members, as well as chat inside the classroom, or by the exchange of messages between all members and chat inside the classroom. And it is facilitated by the fact that the interaction is clear between both student and teacher avatar through chat and face to face meeting.

When replying to the question "Do you think the student behaviour is realistic?", all the trainee teachers, regardless of their education level, see that is found and strong especially when deal with avatar by avatar. They believed that student behaviour was realistic, especially as any avatar can be happy, sad and laugh, which is called simulated behaviour, and they approved of responding to and receiving this kind of emotional feedback. They could also see that the students' behaviour was not affected inside the

classroom because of delays in responses or feedback between all students and student can bot or avatar as it can raise a hand in side the classroom by animation.

When replying to the question "From your knowledge and experience in the classroom, does the simulation meaningfully resemble the real environment?", most of the trainee teachers agreed that:

1- The real classroom is similar to the virtual classroom.

2- There are resemblances between the real and the simulation, largely because all of the views in the simulation seem as real as in the real classroom.

3-The simulation is cheaper than studying in a real classroom.

The classroom simulator is similar to a real classroom because all elements are presented at the same time and the interaction becomes more direct.

- Teacher avatars, student bots and content are found between all sides.
- Interactivity equals real interaction in a real environment.
- Behaviours equate to those in a real classroom due to ease of use.

One of the trainee teachers with a Bachelor's degree thought that there was a difference between a real classroom and classroom simulation, as the real environment is more interactive than a classroom simulator beads 3D virtual world.

When replying to the question "what are the strengths of the VCS?", most of the trainee teachers saw that:

- There was no feedback through the Virtual Classroom Simulator (VCS).
- There was less real interaction through the VCS.
- The Internet connection to support our classroom was slow.
- Some people suffer a lack of computer skills.
- Some lose mental focus.
- Some lack implements to control student behaviour.

- Some could not deal with the interface to create a good classroom.
- The virtual classroom in 3D need a very large memory capacity for all PC computers.
- There needs to be an increase in the number of students inside the VCS.
- Real interaction between teacher and student is less.
- There is distrust between teacher and student.
- The implementation of tools for moderating student behaviour in the classroom simulator is not clear.
- The VCS in the 3D world needs a very speedy processor.

6.7 Case Studies

6.7.1 Case Study 1

Scenario: trainee teacher based avatar

The trainee teacher (i.e. X1 Avatar) logs into the Second Life 3D classroom learning environment designed as a simulation for traditional classroom activities called 'King Abdul-Aziz University Class'. The trainee accesses his environment via a user name and password. He immediately moves to his own virtual classroom, which consists of multiple instructional objects (e.g. chairs, desks, whiteboards, slideshows, whiteboards and other similar instructional media tools). This enables him to display his lecture and deliver it to all students using a set of slideshows. The participant trainee teacher is assigned the following tasks in his ongoing acquisition of the required teaching experience, namely the Qualified Teacher State (QTS):

Teaching Role:

1) Set high expectations, which inspire, motivate and challenge students
2) Promote good progress and outcomes of students

3) Demonstrate good subject and curriculum knowledge

4) Plan and teach well-structured lessons

5) Adapt teaching to respond to the strengths and needs of all students

6) Make accurate and productive use of assessments

7) Manage behaviour effectively to ensure a good and safe learning environment

8) Fulfill wider professional responsibilities

The participant trainee teacher prepares his lesson plan, delivering content for students via PowerPoint presentation slides. The lesson content is explained in class using a microphone, with the teacher moving constantly from place to place in front of the students. At the same time, the trainee teacher attends to the students, providing them with the necessary guidance to modify any undesirable behaviour. Afterwards, he writes on the whiteboard in front of the classroom in order to clarify any ambiguous points, or set out a number of relevant homework assignments. Each trainee teacher has a special inventory designed as a database form, which includes all additional proposed movement behaviours, manageable objects, programmable scripts and gestures that can be utilized in teaching situations.

6.7.2 Case Study 2

Scenario: observer based avatar

This depends on the simultaneous presence of an instructor observer (i.e. X2 Avatar) and a participant trainee teacher as the trainee logs into the Second Life-based virtual classroom learning environment, also accessed using a user name and a password. This ‘observer’ is always an educational expert, called an ‘expert teacher’, whose recruitment is based on fulfillment of such criteria as higher-level academic qualifications or several years’ experience of working in various teaching professions.

Notably, such observers are assigned the responsibility of assessing the participant trainee teachers according to a number of selected standards, either instantly, during

teaching their students, or afterwards, focusing on some aspects of their teaching practices for further review and correction in the foreseeable future. This is the same role carried out by trainee teachers (QTS).

The observer is responsible for assessing participant trainee teachers and guiding them in the virtual academic world so that they can master the required experience to eventually become 'expert teachers' themselves.

6.7.3 Case Study 3

Scenario: student-based smartbot

This focuses on students (i.e. Y1, Y2, Y3, etc. bots) using the SmartBots software as an interactive tool to encourage students to participate in their classroom activities. Any SmartBot interface for the formation of a Second Life group consists of a number of bots called 'personal bots'. The researcher employs such advanced features in his instructional design by labeling some of the bots used with actual student names, in a way reminiscent of avatars. However, the bots used are different, as simulated students are under program control via the SmartBots website main page (www.smartbot.com). Alternatively, each bot's management tools can be employed via the addition of some movement actions – changing clothes, giving commands, etc – using each individual bot's inventory. Moreover, such bots can be controlled by the Hud, i.e. a remote control device enabling bot users to sit down at any desk, stand up, raise hands, and walk from one place to another in the classroom using relevant navigation cursors. In addition, such simulated bots possess the ability to sit in class, listening, discussing and interacting with the trainee teacher during the explanation of the lesson using IM Chat or e-mail exchange among all participant group members. Furthermore, an online 'Computer Faculty Group' for the participant class is set up, administered by the trainee teacher acting as the group's 'owner' or administrator who interacts with all registered students. Additionally, each member can invite any other student to participate in his/her group's activities, taking into account the fact that the invited prospective members can be excluded from or refused entry into the group by the group administrator. The trainee teacher is also assigned the responsibility for administering ongoing discussions with all other group members.

In summary, the bot used provides a graphical representation of a student user or his/her alter ego or character that enables him to simulate his/her actual behaviour in real life, using certain movements designed by the SmartBot software, namely:

1. Moving around the classroom space
2. Standing up or sitting down at any desk
3. Raising hands
4. Nodding the head
5. Chatting with any other person using the IM Chat service

By collecting users' experiences and through case studies in the same environment information shared about the virtual classroom simulation based Second Life environment can be derived and used to construct an evaluation framework by Figure 6.13.

The proposed scenarios for the current instructional design project are largely based on Skinner's (1904-1990) 'Radical' Behaviourism Theory of *Operant (or Instrumental) Conditioning*. Operant conditioning is a type of learning in which an individual's behaviour is modified by its consequences, i.e. the behaviour may change in form, frequency, or strength. Operant conditioning is a term first coined by Skinner in 1937 to describe "an item of behaviour that is initially spontaneous, rather than a response to a prior stimulus, but whose consequences may reinforce or inhibit recurrence of that behaviour". Thus, Skinner identified three major factors positively affecting learning, namely: (1) learning situation; (2) behaviour; (3) behaviour consequences. In addition, he highlighted three main components of his learning theory: (1) environment; (2) operational behaviour learning; (3) reinforcement. In particular, Skinner viewed reinforcement as a central concept and mechanism in the shaping and control of behaviour. The research based on design scenarios in relation to the above, based on simulating students' behaviours when interacting with a number of selected stimuli, thereby activating responses, e.g. raising hands to answer posed questions, or directing the student to sit down at a certain desk and mutually interact with his/her other peers during class discussion (i.e. positive reinforcement for positive personal behaviour in learning)

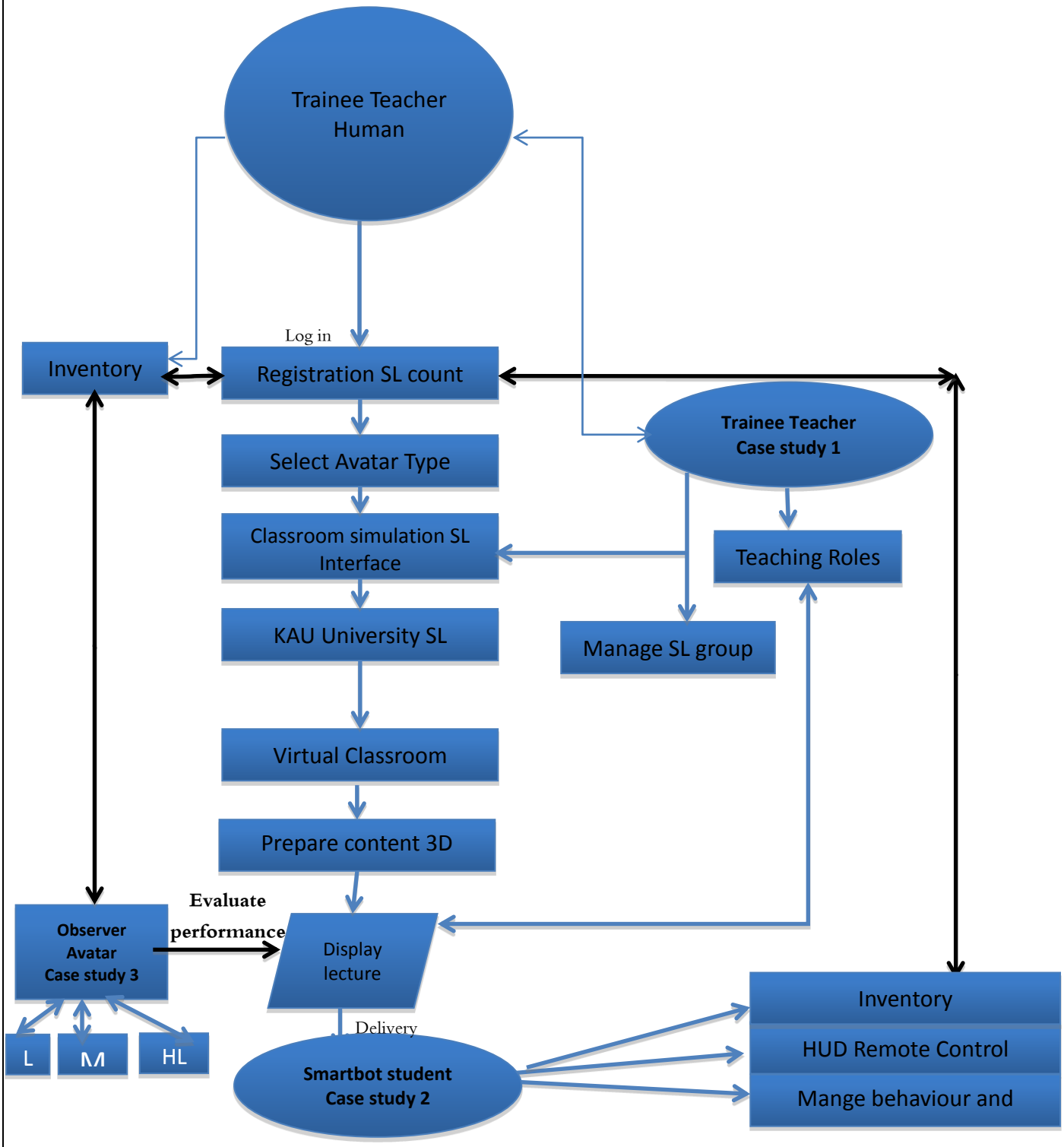


Figure 6.13: Case Study diagram

6.8 Discussion

Technology assisted learning tools and technologies have been in use for the last few decades. These technologies enhance the user experience and help in the delivery of learning contents more effectively. It has been established by various research studies that technology assisted learning is more effective than the traditional classroom teaching environment. With the introduction of state of the art 3D virtual environments such as Second Life, this has added another dimension to the technology assisted learning experience.

A study was carried out to investigate the user experience of the Second Life learning environment and compare some of the basic elements such as usability, ability, interaction, simulated behaviour, environmental safety, understandability and overall user satisfaction. The total sample size for the study was *six* trainee teachers with *six* observers; however, the availability of users experienced in teaching in the Second Life teaching environment was challenging. Analysis of responses suggests that responders had a good understanding of the problem domain.

In response to the question asked regarding the safety of the Second Life teaching environment, over 80% of the respondents said they felt safe in the virtual learning environment. Only 16% of the respondents gave a neutral response. In response to a question regarding the control of the avatar, 100% of the respondents either agreed or strongly agreed with the statement that they could control their avatar easily. In response to this question, it can be concluded that users found it easy to control their avatars. The traditional learning environment in rare conditions becomes inaccessible, which may affect the learning process, whereas SL, being a virtual environment, provides a safe learning environment.

Questioning the ease of use of the technology, respondents were asked if they felt that that the technology was difficult or awkward to use. Over 80% disagree with that statement. This establishes the fact that the Second Life virtual world teaching environment is easy to use. Another question addressing the ease of use of technology asked if the respondents found it easy to construct a basic learning environment within Second Life; 100% agreed with the statement. This again reaffirms that the technology

is user-friendly. In response to a question asking users if it was easy to locate the controls to activate the lecture, however, the overall response to the question was neutral. In another question addressing the ease of use of technology, it was asked if respondents found communicating with the smartbot to be quick; over 80% agreed with the statement.

There was a group of questions addressing the usability, capabilities, and interaction potential of the technology. It was observed that users were satisfied with these features of the Second Life learning environment. The traditional classroom environment may have its own advantages, but it is an established fact that technology assisted learning has a positive influence on the overall experience.

One question addressed the use of technology as learning tool; over **80%** of respondents said they found it easy to use the virtual environment for lecturing. In another question, addressing the application of a virtual environment for teaching and learning without time/space constraints, **66%** of the respondents said they found the technology suitable for teaching. The remaining users had a neutral view about the application of technology. After establishing the user-friendliness of the technology, the application of the technology in a teaching environment was questioned. Teaching is not a simple process, and any technology can be put forward as a candidate for technology assisted learning.

To investigate the effectiveness of the Second Life virtual environment for teaching it was asked if it was easy to select different teaching methodologies within the learning environment; over **80%** of respondents agreed with the statement. Based on the observed results it can be established that the SL learning environment is an effective learning tool which increases the overall learning experience of the user.

To a question asking about the overall learning experience within Second Life compared with the traditional classroom environment, 100% of the respondents found the virtual learning environment to be more relaxing than the traditional classroom. In response to a question investigating the interactivity between the teacher avatar and student smartbot, 100% of the respondents seemed satisfied with the means provided by the technology for the purpose of interaction. It was also investigated whether or not

respondents were satisfied with the behavioural simulation techniques offered by the Second Life learning environment, and if these techniques were comparable with the traditional classroom environment and behavioural techniques. 100% of the respondents agreed that the behavioural and interactivity simulation environment offered by Second Life was comparable to the traditional teaching environment. In response to a question addressing the overall user experience of the Second Life virtual learning environment and its comparison to the traditional teaching environment, 100% of users agreed that they felt more comfortable in the Second Life learning environment. From the current research it is evident that SL teaching is more useful than the traditional ways of learning and teaching through trainee teacher experiences, which is also supported by several studies (Lester & King 2009). From the results of the surveys and experiments it has been determined that SL offers an effective way of teaching students, and that the online version of a class is preferable to traditional face-to-face teaching. It is also commented that if a teacher employs web-based tools rather than traditional tools then students can have an effective overall teaching experience. The final result of this research leads me to conclude that Second Life, although it does not resemble a real classroom through face-to-face interaction, undoubtedly enhances trainee teachers' abilities and experiences dealing with smartbot services.

6.9 Comparison of the 3D Environments

The environments were openly studied, and their features examined concerning openness and availability, interaction of objects, and simulated behaviour. Based on these characteristics I have decided to employ our course in Second Life, which is free and open source, and which at the same time resembles the popular 3DVE Second Life. The ability to import objects from Second Life and the user friendly interface allow us to adapt it to our needs (Table 6.17).

The following classroom simulation provides details on the virtual classroom in SL environment using adapting methodology teaching for course, as well as on the infrastructure supporting the online course through set of measurements is interaction, open sourace, supported server/ client, simulated behaviour of bot, and safty and language that used with this environment .According my experiment with SL to support

trainee teacher get more experince and ability to be expert teacher we have some results from evaluation project and this trainee teacher accept SL environment because he understand Teaching role very well from expert teacher as well as the resident in SL is over 15 million from avatar or bot. This results from teacher trainee after working in SL classroom such as those shown in Table 6.18.

Table 6.17: Characteristics of the 3D environments

	Second Life5	Croquet3 Cobalt	Wonderland2	Open Sim	Active Worlds
Interaction	√	√	√	√	NO
Free Client/Server	√	Free paper	√	√	As guest Yes
Open source	√	√	√	√	NO
Safty and Language environment	√ C++,Java	√Smalltalk	Java	C#	C
Simulated behaviour bot	√	NO	NO	No	No
Abilities avatar control	√	NO	NO	NO	
Satisfaction	√	√	√	√	√

Table 6.18: Trainee teachers after working in simulated classroom

Measurement SL	Ability	Interaction	Simulated behaviour	Safety environment	satisfaction
Trainee teacher avatar	**100%**	**83%**	**90%**	**83.3%**	**100%**

6.10 Conclusion

In this chapter, the researcher used a research sample that was composed of 48 students, 6 trainee teacher avatars and 6 observers in a virtual classroom simulation in a Second Life environment that was specifically designed for this experiment. Also in this research, roleplay simulation methodology was applied in order to enable the trainee

teacher to select an appropriate teaching methodology and instruction materials in the virtual classroom in SL.

Furthermore, two methods of evaluation were used in order to assess the outcome of this research. Firstly, one data analysis (statistic) was used that involved descriptive statistics (such as tables and suitable graphs) the Likert scale was used to assess the attitudes of respondents towards the research questions, the t-test and the interviews of trainee teachers. Secondly, case study methods that involved three case studies were used. The first case study involved a *trainee teacher based avatar* to outline the path for trainees and help them in their role of teaching in the virtual classroom from the moment they enter the virtual class until they leave. The second case study involved an *observer based avatar* that observes the trainees and guides them to follow the teaching role (QTS), enabling them gain experience and become expert teachers or observers. In the third case study, a group of smartbot students using the student-based Smartbot software was selected to report on the status of the students in the virtual classroom. Robots (bots) with simulated behaviour of avatar teachers were also used in order to exchange messages between them via chatbots.

Chapter 7

Conclusions and Future Work

Objectives

- Conclusions
- Revisiting of contribution
- Future Work
- Recommendations
- Limitations

Chapter 7: Conclusion and Future Work

7.1 Conclusion

The work described in this thesis has been concerned with the benefits of a classroom simulation for trainee teachers using 3D virtual environments and simulated students' behaviour. Chapter one set out the main issue and aims of the research, as well as a review of methodology and its contribution to this thesis.

Chapter two summarized the overview of 3D virtual worlds in general, and Second Life – the specific environment used – in particular, as well the difference between avatars, bots and the relationship between them. Also, it explored the advantages and disadvantages in the Second Life environment. The chapter contained a literature review, and looked at related work defining the 3D virtual learning environment, as well as exploring its usage. In order to treat the virtual learning environment in a properly informed way, the chapter defined the classroom simulation and its importance. It then described the merging that happens between trainee teachers and student behaviour in 3D VLE. Then, the chapter defined the virtual learning environment as many researchers define it. The final section described the relationship between training teachers and teachers towards using the virtual learning environment as well as their reactions to using the same environment. Finally, a critical review was made of the studies' perspectives on the 3D virtual learning environment from all of perspectives.

Chapter three showed how a framework for classroom simulation between trainee teacher avatars and student bots works in a Second Life environment, and how the main target of this framework is to increase the interaction between bots and avatars. Overall, this framework has been designed to enable trainee teachers to acquire more experience, knowledge and ability to handle a real classroom situation. However, the framework depends on artificial intelligence, represented through smartbots in SL, which simulate student behaviour. Trainee teachers can improve their practical and theoretical skills in teaching and learning by using the 3D virtual learning environment in Second Life. This helps in overcoming some of the challenges associated with traditional methods of teaching.

In chapter four This chapter reviewed discussing the various standards that trainee teachers should meet before being awarded QTS. Also, most importantly, I proposed a new design model that is composed of a set of components which will guide the trainee teacher in teaching and learning in Second Life. Each of these components and their interrelationships has been discussed in substantial detail.

Chapter five clarified how can I build a classroom based the Second Life virtual world by depending on created objects in the 3D virtual world and selecting value for each appropriate object (X, Y, Z). All objects that are created in SL must have an ID, name, position, size, rotation, and shape, and have secured permission. The conductor of this experiment needs a lot of experience in the Second Life environment in order to support classroom interaction between avatar teacher and student smart bot. Also, building classrooms was done using prims, the building blocks of Second Life, after which classrooms can be developed to become rich environments supporting interactions and behaviour among all residents in SL, depending on smartbot technology and scripting. Moreover, the simulated behaviour between smartbot and avatar teacher derives from what this kind of behaviour is like (Basic, animation, and collaboration) its and effect, represented by the scripting language LSL (Linden Scripting Language) that gives behaviour to Second Life primitives, objects, and avatars. This is a community effort to provide accurate and open documentation resources on LSL for scripters of all skill levels. In chapter six, I evaluated the study result, which consisted of 48 students, six trainee teachers and six observers within a classroom simulation in a Second Life environment by survey and interview for all trainee teacher. Also, in this research I applied a methodology roleplay simulation to help trainee teachers select their teaching methodology in classroom based SL then compare between Second Life environment and set of as Croquet3 Cobalt, Wonderland2 and open Simulator. In addition, this research has two evaluation methods which supported the research results: firstly data analysis (statistical), which includes descriptive statistics (including tables and suitable graphs), T-test and the ‘Likert scale’ to check the respondents’ attitudes to answer the research questions; secondly three case studies: *trainee teacher based avatar*, which sets out the path for trainee teachers to take with roleplay when s/he explains his/her lecture until s/he goes into our classroom in SL; second: *observer based avatar*, which obtains

and observes the trainee teacher and guides him/her to follow the teaching role to get experience and so become an expert teacher or observer of trainee teachers; third: student based smartbots, which represent not a found, real student in the classroom, but instead is a fashioned robot (bot) that can simulate a student's behaviour with an avatar teacher and exchange messages between them.

7.2 Revisiting Original Contributions

The main contribution of this thesis in section (1:7) is to hypothesize a novel 3D classroom simulation for trainee teachers using virtual learning environments and simulated student behaviour, including a set of stages:

- The first stage is producing a framework for the virtual classroom in the Second Life environment to get more experience in teaching for trainee teachers, as well as simulating student behaviour in the form of smartbots (robots) in the same environment, using a roleplaying approach; and this is approved as a research limitation between avatars through teachers, observers, and smartbots, and then the kinds of behaviour between them (see chapter 3).

- The second stage is selecting the roles of trainee teachers and smartbot tasks that, according to previous literary studies, is very important, especially to build a Second Life educational environment which includes many educational islands and many other educational projects carried out in the SL server. To this end, my research carried out a study on how the trainee teacher might deal with roles in SL that will be used most of the time in SL classrooms, such as management of behaviour and feedback from students received as actions delivered by chatbot or email. Also, I looked at how best to evaluate the trainee teacher performance through observational methods (surveys and case studies) that ultimately led teacher trainee performance levels in SL classrooms to attain 'high level'. (see chapters 5 & 6) (answer question 4).

- The third stages is composing a designed model classroom simulator in a 3D virtual world based on creating an object 'prim' in the 3D world Second Life depending on booked land in the server SL. This model component is an

approved merger of the virtual world with the virtual learning environment MOODLE for trainee teacher control in managing courses and enrolment of students in the classroom. SOODLE presenter tools are 3D objects that help in emerg the MOODLE system inside SL (see chapter 4) (answer questions 1 & 2).

- The fourth stage is designing the smartbot intelligent agent that supports increased interaction with avatar teachers through scripting language and HUD control. In this case, my research was carried out and approved by three interaction behaviours: basic, animation, and cooperative (answer question 3).

7.3 Future Work

Through my experiments in the Second Life environment for classroom simulation building, the research uncovered many areas for future research:

Classroom simulation testing: refine classroom activities and, hopefully, continue to refine and design new activities to further enhance learning and improve students' learning experiences. Classroom activities can be improved upon after each succession of courses using Second Life teaching (Zarraonandia 2011).

Smartbot monitoring based SL environment: engage students as smartbots in this classroom simulation within the SL environment through an observer who monitors the students' behaviour in various classrooms by giving them some role in the roleplay instructional.

Specialist schools for children with special needs teaching using the Second Life environment: There are children in the world classified as having a category of special educational needs (SEN) who are wrongly diagnosed and simply want better teaching or more care. Special needs children require explicit classroom simulation to enhance and improve their educational ability, which could be achieved by using avatar teachers along with student avatars in a virtual world. My experimental classroom simulation in SL may provide a suitable environment to help with special needs. All participants in the courses will not need to meet face to face during subject lectures and demonstrations, so long as there are expert teachers in SL dealing with those children,

and who can explain course materials in multiple languages to teach this category of kids without exorbitant costs.

7.4 Recommendations

In the future I seek to develop a larger and more permanent educational space for student interaction. Many institutions are starting to invest in Second Life islands for the establishment of larger online classroom spaces, virtual campuses and libraries, and other experimental setups. SL expert are looking to investigate what strategies of using virtual worlds for education are the most effective for delivering course content. In this research I have examined Second Life as one of the more popular MUVEs as an educational space. I have also reported my preliminary observations and supplied general feedback from students who engaged with Second Life-based activities. The pros and cons of each type of practice were discussed with students, in various formats, through the descriptions of course activities. I also discussed many of the class exercises and set out what I hoped to accomplish in the near future through Second Life. Educational theorists increasingly see Second Life as a useful tool to complement of the traditional classroom teaching environment. Involving students in Second Life-related class projects has led us to believe that there is much potential for this environment, which needs further investigation. Although the experiences so far have been positive and encouraging, based on the observations and feedback received, educationalists wish to continue making changes to improve SL exercises. By experimenting further and gathering more data and feedback, as a discipline I going to look at effective ways to adopt these technologies into teaching methods.

7.5 Limitations

Thes ection presents the limitations of this research. Any proposed system has its drawbacks. The limitations in this research are divided into several parts. Lack of time: some teachers mentioned impediments such as having a huge workload at the time the project was running, or the fact that the timing of the project conflicted with other commitments in life. Consequently, the sample size was reduced, and there were some restrictions on some teachers in this field in implementing the experiment, through lack of time. Technical problems: the Second Life environment’s need for a fast and stable

internet connection is very strong. There are also some limitations in the SL hardware, as well as memory problems, both of which mean the classroom simulation with SL must be supported by a large memory capacity to resolve lag problems such as slow movement when teacher avatars move objects using copy and paste; in some cases it does not work in the inventory. Also, the cost of booking the SL islands is so high through the educational land buy that design of virtual classrooms is difficult through it. Discomfort with SL features: smartbot mentioned either difficulties in orienting in SL or having negative perceptions about SL after seeing some video programmes. Issues other: observer avatars sometimes prevented trainee teachers from attending any of the training sessions due to delays when lessons start.

References

ALARIFI, S.A. (2008) An exploratory study of higher education virtual campuses in Second Life. *University of Nottingham, Nottingham,*.

ALBERT, W. and TULLIS, T. (2013) *Measuring the user experience: collecting, analyzing, and presenting usability metrics*: Newnes.

ALDRICH, C. (2009) *Learning online with games, simulations, and virtual worlds: Strategies for online instruction*. New York: John Wiley & Sons.

ALOBIEDAT, A. and SARAIERH, R. (2010) The Student's Attitude toward Use Platform as Learning Resources at University of Granada. *Review of European Studies,* 2(2) .

ALOTAIBI, F. and DIMITOV, J. (2012) classroom simulator for teacher training using virtual learning environments and simulated students behaviour. *International Journal of Reviews in Computing,* 10.

ANTONACCI, D.M. and MODARESS, N. (2008) Envisioning the educational possibilities of user-created virtual worlds. *AACE Journal,* 16 (2) , pp. 115-126.

ARVANITIS, P. and PANAGIOTIDIS, P. (2008) Language Learning in Virtual Worlds. In: *Proceedings of the International Congress*, pp. 97-107.

BAI, X. and FUSCO, D. (2011) Interdisciplinary Collaboration through Designing 3D Simulation Case Studies. *International Journal of Multimedia & its Applications,* 3 (1) .

BAILENSON, J.N.et al. (2008) The use of immersive virtual reality in the learning sciences: Digital transformations of teachers, students, and social context. *The Journal of the Learning Sciences,* 17 (1) , pp. 102-141.

BARZEGAR, S., SHOJAFAR, M. and KEYVANPOUR, M. (2010) Improvement User Interface in Virtual Learning Environment. *Digital Society (IJDS)* , 1 (3) , pp. 221-229.

BERTRAM, D. (2007) Likert scales. *Calgary, Alberta, Canada: Retrieved may,* 18, pp. 2012.

BHATTACHARYYA, A. (2009) Deaf-blind tech gadgets in educational settings. *Council for Exceptional Children,.DVI Quarterly,* 54, pp. 3.

BIGNELL, S. and PARSON, V. (2010) Best practice in virtual worlds teaching. *Collaboration with Funding from, the Higher Education Academy Psychology Network and Joint Information Systems Committee, University of Derby, Aston University, Birmingham,*.

BRANSFORD, J. and GAWEL, D. (2006) Foreword: Thoughts on Second Life and Learning. In: *Proceedings of the First Second Life Education Workshop, Part of the 2006 Second Life Community Convention, San Francisco, August 20th (pp. iii)* . *Paisley: University of Paisley*.

BRAY, D.A. and KONSYNSKI, B. (2008) Virtual worlds, virtual economies, virtual institutions. In: *Virtual Worlds and New Realities Conference at Emory University*.

BROADLEY, T. (2007) Implementation Of E-Learning: A Case Study Of Three Schools. *Curtin University of Technology (SiMERR WA)* ,.

BRONACK, S.et al. (2008) Presence Pedagogy: Teaching and Learning in a 3D Virtual Immersive World. *International Journal of Teaching & Learning in Higher Education,* 20 (1) .

BUGEJA, M.J. (2008) Second Thoughts About Second Life Liability concerns and the virtual world. *Education Digest,* 73 (5) , pp. 18.

BURNS, M. (2012) Immersive Learning for teacher professional development. *Elearn,* 2012 (4) , pp. 1.

CALONGNE, C. (2007) A View from Second Life's Trenches: Are You a Pioneer or a Settler?. In: *NMC Summer Conference D,* pp. 6-9.

CALONGNE, C. and HILES, J. (2007) Blended realities: A virtual tour of education in Second Life. In: *TCC Worldwide Online Conference*, pp. 70-90.

CHARSKY, D.et al. (2009) Using communication technology to facilitate teamwork. *Techtrends,* 53 (6) , pp. 42-48.

CHEN, G.et al. (2012) An Empathic Avatar in a Computer-Aided Learning Program to Encourage and Persuade Learners. *Journal of Educational Technology & Society,* 15 (2) .

CHEN, I.Y. and CHEN, N. (2009) Examining the Factors Influencing Participants' Knowledge Sharing Behaviour in Virtual Learning Communities. *Journal of Educational Technology & Society,* 12 (1) .

CLARK, M.A. (2009) Genome Island: A virtual science environment in Second Life. *Innovate: Journal of Online Education,* 5 (6) , pp. 6.

Classroom simulations [WWW]. Available from: http://www.ask.com/question/classroom-simulations [Accessed 22/06/2013].

COFFMAN, T. and KLINGER, M.B. (2007) Utilizing Virtual Worlds in Education: The Implications for Practice. *International Journal of Social Sciences,* 2 (1) .

CRISP, G., HILLIER, M. and JOARDER, S. (2010) Assessing students in Second Life–some options. *Curriculum, Technology & Transformation for an Unknown Future.Proceedings ASCILITE Sydney,* pp. 256-261.

DALGARNO, B. and LEE, M.J. (2010) What are the learning affordances of 3-D virtual environments?. *British Journal of Educational Technology,* 41 (1) , pp. 10-32.

DELVENNE, P., FALLON, C., & BRUNET, S. (2011) . Parliamentary technology assessment institutions as indications of reflexive modernization. Technology in Society, 33(1) , 36-43.

DRUCKMAN, D. and NOAM EBNER. (2008) Onstage or behind the scenes? Relative learning benefits of simulation role-play and design. Simulation & Gaming 39.4: 465-497.

ESTRADA, M., NAVARRO-PRIETO, R. and QUIXAL, M. (2009) Combined evaluation of a virtual learning environment: use of qualitative methods and log interpretation to evaluate a computer mediated language course. In: *Proceedings of International Conference on Education and New Learning Technologies, EDULEARN*.

FALLOON, G. (2010) Using avatars and virtual environments in learning: What do they have to offer?. *British Journal of Educational Technology,* 41 (1) , pp. 108-122.

FETAJI, M. et al. (2007) Usability of virtual learning environment for learning java. In: *Balkan Conference in Informatics (BCI 2007) , vol. 1*, pp. 523-534.

FRIEDMAN, D., STEED, A. and SLATER, M. (2007) Spatial social behaviour in Second Life. In: *Intelligent virtual agents*: Springer, pp. 252-263.

GRAVEN, O. H., SAMUELSEN, D., & MACKINNON, L. M. (2008) . Games-based environment for e-learning in analogue electronics. ICL.

GÜL, L.F., WILLIAMS, A. and GU, N. Constructivist Learning Theory in Virtual Design Studios.

HAMALAINEN, R. (2008) Designing and evaluating collaboration in a virtual game environment for vocational learning. *Computers & Education,* 50 (1) , pp. 98-109.

HODHOD, R.et al. (2010) Issues of choosing the suitable virtual learning environment. *Research Journal of Information Technology*, 2 (1) , pp. 24-29.

HONEY, M.L. et al. (2009) Teaching in virtual space: Second Life simulation for haemorrhage management. In: *Ascilite Conference, Aukland*.

IZSÓ, L. and TÓTH, P. (2008) Applying web-mining methods for analysis of student behaviour in VLE courses. *Acta Polytechnica Hungarica*, 5 (4) , pp. 79-92.

JAHANGIRI, L. and MUCCIOLO, T.W. (2008) Characteristics of effective classroom teachers as identified by students and professionals: a qualitative study. *Journal of Dental Education,* 72 (4) , pp. 484-493.

JARMON, L., TRAPHAGAN, T. and MAYRATH, M. (2008) Understanding project-based learning in Second Life with a pedagogy, training, and assessment trio. *Educational Media International,* 45 (3) , pp. 157-176.

JEBAKUMAR, C. (2009) A Study of Virtual Learning Environment with Reference to the Perceived Preparedness of the College Students in Tamil Nadu (South India) . In: *4th Communication Policy Research, South Conference, Negombo, Sri Lanka*.

JENNINGS, N. and COLLINS, C. (2007) Virtual or Virtually U: Educational Institutions in Second Life. *International Journal of Social Sciences,* 2 (3) .

KENNEDY, D.M. (2010) . *Virtual Learning Environments at Lingnan University,*.

KLUGE, S. and RILEY, L. (2008) Teaching in Virtual Worlds: Opportunities and Challenges. *Issues in Informing Science & Information Technology,* 5.

LESTER, P. M., & KING, C. M. (2009) . Analog vs. digital instruction and learning: Teaching within first and Second Life environments. Journal of Computer-Mediated Communication, 14(3) , 457-483.

Linden Labs "Second Life Community Standards" [WWW]. Available from: http://SecondLife.com/corporate/cs.php [Accessed 17/10/2012].

LOVATT, J., FINLAYSON, O.E. and JAMES, P. (2007) Evaluation of student engagement with two learning supports in the teaching of 1st year undergraduate chemistry. *Chem.Educ.Res.Pract.,* 8 (4) , pp. 390-402.

LSL [WWW]. Available from: http://wiki.SecondLife.com/wiki/Bot [Accessed 12/12/2012].

MAHALEY, S. and TEIGLAND, R. Advancing Learning Through Virtual Worlds.

MAHON, J.et al. (2010) Using Second Life to enhance classroom management practice in teacher education. *Educational Media International,* 47 (2) , pp. 121-134.

MASSÉ, ALEXANDRE BLONDIN, et al. (2010) Symbol Grounding and the Origin of Language.

MASCITTI, I. et al. (2011) Teaching and learning in-world: lessons learnt from the AVATAR and the ST. ART projects. In: *Interactive Collaborative Learning (ICL) , 2011 14th International Conference on*: IEEE, pp. 232-236.

MCPHERSON, R.et al. (2011) Using a computerized classroom simulation to prepare pre-service teachers. *Journal of Technology and Teacher Education,* 19 (1) , pp. 93-110.

MINOCHA, S. and REEVES, A.J. (2010) Design of learning spaces in 3D virtual worlds: An empirical investigation of Second Life. *Learning, Media and Technology,* 35 (2) , pp. 111-137.

Niemi, H. (2008) Research- based teacher education for teachers'lifelong learning in Europe. 13 (2008) : 1,pp.61-69.

NORMAN, G. (2010) Likert scales, levels of measurement and the "laws" of statistics. *Advances in Health Sciences Education,* 15 (5) , pp. 625-632.

OSAMA *E_University* [WWW]. Available from: www.lifeheartbeat.com.

PAJU, M. et al. (2010) Framework and indicators for a sustainable manufacturing mapping methodology. In: *Simulation Conference (WSC) , Proceedings of the 2010 Winter*: IEEE, pp. 3411-3422.

POPLIN, A. (2011) Games and serious games in urban planning: study cases. In: *Computational Science and Its Applications-ICCSA 2011*: Springer, pp. 1-14.

RYAN, M. (2008) 16 Ways to Use Virtual Worlds in Your Classroom: Pedagogical Applications of Second Life. In: *Learning in Virtual Environments International Conference*, pp. 269.

SAVIN-BADEN, M.et al. (2011) An evaluation of implementing problem-based learning scenarios in an immersive virtual world. *International Journal of Medical Education,* 2, pp. 116-124.

SCULLY, N. J. (2011) . The theory-practice gap and skill acquisition: An issue for nursing education. Collegian, 18(2) , 93-98.

Script Object [WWW]. Available from: http://www.3greeneggs.com/autoscript/ [Accessed 15/2/2013].

SENGES, M. Virtual Worlds A Second Life beginner's guide UOC Summer University Course.

SIEMENS, G. (2008) . Connectivism: Learning andKnowledge Today.

SHIH, Y. and YANG, M. (2008) A Collaborative Virtual Environment for Situated Language Learning Using VEC3D. *Journal of Educational Technology & Society,* 11 (1) .

Smartbot [WWW]. Available from: http://www.smartbots2Life.com [Accessed 12/04/2012].

SmartBots Documentation [WWW]. Available from: http://www.smartbots2Life.com/docs/SmartBots_Documentation, [Accessed 03/09/2013].

Teaching Role Standard [WWW]. Available from: http://www.education.gov.uk [Accessed 22/09/2013].

University Houston Isand [WWW]. Available from: http://slurl.com/SecondLife/HHP%20at%20UH/134/41/24 [Accessed 13/7/2013].

VASILEIOU, V.N. and PARASKEVA, F. (2010) Teaching Role-Playing Instruction in Second Life: An Exploratory Study. *Journal of Information, Information Technology & Organizations,* 5.

VERPOORTEN, D. et al. (2009) Personalisation of learning in virtual learning environments. In: *Learning in the synergy of multiple disciplines*: Springer, pp. 52-66.

VERPOORTEN, D. et al. (2009) Personalisation of learning in virtual learning environments. In: *Learning in the synergy of multiple disciplines*: Springer, pp. 52-66.

VLACHOPOULOS, P. Reconsidering the role of online tutors in asynchronous online discussions.

WAGNER, G. (2010) Model-driven engineering of Second-Life-style simulations. In: *Proceedings of the Winter Simulation Conference*: Winter Simulation Conference, pp. 791-798.

WAGNER, G. (2010) Model-driven engineering of Second-Life-style simulations. In: *Proceedings of the Winter Simulation Conference*: Winter Simulation Conference, pp. 791-798.

WYLD, D.C. (2010) A Virtual Explosion or SNAFU is Always Better Than a Real One: Exploring the Use of Virtual Worlds for Simulation and Training… and Developing the Leaders of Tomorrow. In: *Technological Developments in Education and Automation*: Springer, pp. 73-78.

YE16, E. et al. (2007) Appalachian tycoon: an environmental education game in Second Life. In: *Second Life Education Workshop 2007*, pp. 72.

ZADOK, A., EYAL, A. and TUR, M. (2011) Stimulated Brillouin scattering slow light in optical fibers [Invited]. *Applied Optics,* 50 (25) , pp. E38-E49.

ZARRAONANDIA, T. et al. (2011) Seminars in Second Life: Teacher and Student Views. In: *DMS*, pp. 210-215.

Appendices

Appendix A: Questionnaire of Classroom Simulator for Student with Trainee Teacher

Experiment (Classroom simulator using Second Life environment)
for PhD research

Fahad Mazaed Alotaibi PhD student at De Montfort University
Under Supervision Dr.Jordan Dimatrov

2012

I would like to inform you that I study for a project as part of PhD at De Montfort University in the United Kingdom. This study will inform my project on Classroom simulator for trainee teacher using 3D virtual learning environments based simulated students behaviour as well as will select Second Life environment from 3D virtual world. The discussions will be so that I can learn more about the topic area and develop my research skills and also to gain knowledge.

Please try to answer all the following questions as truthfully in order to have successful project.

I confirm that I understand the research study and have had the opportunity to ask questions. Also I understand that my participation is voluntary and that I am free to withdraw of any point, without giving reason. I agree to take part in the above study

Signature:

Thank you for completing the following questions.

Phase 1: Background Information

1. Age: (In what group are you)

( ) 18 to 22.
( ) 23 to 28.
( ) 29 to 33.
( ) Over 33 years.

2. Gender: (In what gender are you)

( ) Female.
( ) Male.

3. Education: (What level are you)

( ) Postgraduate (Research) .
( ) Postgraduate (Courses).
( ) Undergraduate.
( ) College.
( ) High School.

Phase 2: Internet Experience

1. The internet: (How many hours do you usually use internet per day)

( ) 0 to 3 hours. ( ) 7 to 9 hours.
( ) 4 to 6 hours. ( ) over 10 hours.

2- Did you used the internet as resources in your study?

( )Yes ( )NO
For Example: ……

Phase 3: About Distance Education

1. Did you used this 3D environments to learn yourself Such as Second Life, open simulator and Instant Messaging Virtual Universe (IMVU)?

( ) Yes.
( ) No.

2. Have you study any materials by Sentra E-learning system in King Abdulaziz Unversity?

( ) Yes. (go to question 3).
( ) No

2. Did you face any problem during deal with Sentra system?

( ) Not understandable. ( ) Not persuasive.

( ) Difficult to use. ( ) Missing face-to-face communication

Phase 4 :

A) Evaluate and Understandability

To accurate survey, we would like to know your attitude concerning interface quality. Please indicate the extent to which you agree or disagree with the following statements about the Classroom simulator in 3D Virtual learning environment. Circle the appropriate number using the scale below.

Code	SD	D	N	A	SA
Description	Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree
Scale	1	2	3	4	5

Statements Of Understandability		Scale of User Attitude				
		SD	D	N	A	SA
1.	The lecture information provided by the trainee teacher is clear	1	2	3	4	5
2.	It is easy to find the information I needed with trainee teacher	1	2	3	4	5
3.	The interaction with the trainee teacher is understandable	1	2	3	4	5
4.	The delivery of information from the trainee teacher enables us to complete the tasks and scenarios	1	2	3	4	5

B) Satisfaction with trainee teacher

Statements		Scale of User Attitude				
		SD	D	N	A	SA
1.	Trust: I felt very confident using the new learning environment.	1	2	3	4	5
2.	Ability: I would imagine that most people would learn very quickly with the trainee teacher.	1	2	3	4	5
3.	The lecture from the trainee teacher must be easy to understand	1	2	3	4	5
4.	I found the trainee teacher unnecessarily complex.	1	2	3	4	5
5	Totalitarianism: Students would need the support of a technician to be able to use this software in smart learning environments such as Second Life	1	2	3	4	5

Part C : any comment

Q1) please write down any suggestion or comments you may wish to add.

Thank you very much for your co-operation

Appendix B: Questionnaire of Classroom Simulator for Trainee Teacher in 3D Virtual Learning Environment

Experiment (Classroom simulator using Second Life environment)
for PhD research

Fahad Mazaed Alotaibi PhD student at De Montfort University
Under Supervision Dr.Jordan Dimatrov

2012

I would like to inform you that I study for a project as part of PhD at De Montfort University in the United Kingdom. This study will inform my project on Classroom simulator for trainee teacher using 3D virtual learning environments based simulated students behaviour as well as will select Second Life environment from 3D virtual world. The discussions will be so that I can learn more about the topic area and develop my research skills and also to gain knowledge.

Please try to answer all the following questions as truthfully in order to have successful project.

I confirm that I understand the research study and have had the opportunity to ask questions. Also I understand that my participation is voluntary and that I am free to withdraw of any point, without giving reason. I agree to take part in the above study

Signature:

Thank you for completing the following questions.

Personal Details:

Your personal details will be kept strictly confidential :(Optional)
Frist name teacher: Last name:
Gender: Male /Female Email address:
Faculty: The Time taken with experiment: 10 Min
Highest academic qualification :

- Ph.D degree
- Master degree
- Bachelor's degree

Part A: Interview General:

Q1) Does it allow you to select teaching methodology in virtual classroom simulator?

Q2) Do you believe the Virtual Classroom simulator (VCS) is an effect on:

Training / feedback /realise is the interaction
Does it give you example of Student behaviour?

Q3) From your knowledge and experience in Classroom, does the simulation meaningfully resemble the real environment?

Please Comment

Q5) what are the strengths of the VCS?
1-
2-
3-

Part B: Satisfaction about Second Life environment

To accurate survey, we would like to know your attitude concerning interface quality. Please indicate the extent to which you agree or disagree with the following statements about the Classroom simulator in 3D VLE. Circle the appropriate number using the scale below.

Code	SD	D	N	A	SA
Description	Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree
Scale	1	2	3	4	5

Statements		Scale of User Attitude				
		SD	D	N	A	SA
1.	Second Life teaching is a safe environment	1	2	3	4	5
2.	It was easy control my avatar	1	2	3	4	5
3.	I found this classroom very cumbersome to use.	1	2	3	4	5
4.	It was quick to communicate with the smartbot	1	2	3	4	5
5.	It was easy to carry out my lecture	1	2	3	4	5
6.	SL provided trainee teacher the capability of teaching without time/space constrains.	1	2	3	4	5
7.	The classroom build was easy to build in 3D Second Life.	1	2	3	4	5
8.	It easy to select teaching methodology in SL land	1	2	3	4	5
9.	The components needed for a lecture to take place were easy to locate.	1	2	3	4	5
10	Virtual World (SL) provides a more relaxing environment than traditional classroom	1	2	3	4	5
11	Interaction occurred between the teacher avatar and the smartbot student through discussion by email, IM massage and chatbot .	1	2	3	4	5
12	The behaviour simulated is effective through smartbot or avatar. such as using smile avatar, then ask a question, then raise a hand in Second Life land	1	2	3	4	5
13	In general I feel more comfortable in the SL environment.	1	2	3	4	5

Part C: Evaluate Smartbot in Second Life environment

1-

Did you think smartbots(student) respond to any request from teacher avatar ?
Yes
No

2- Smartbot with interaction behaviour simulated

Did the smartbot inside classroom:	Yes	No
Understand the teacher avatar	Yes	No
Hear the teacher avatar	Yes	No
Walk	Yes	No
Raise a hand	Yes	No

Did the smartbot inside classroom:	Yes	No
Chat with the teacher avatar	Yes	No
Use a head movement to answer any question yes or no	Yes	No
Indicate anything	Yes	No
Teleport to any place	Yes	No

3 Exchange massage between smartbot and avatar

What is the time taken for the message between bot and avatar by chatbot?	Question ID	Send Time (teacher)	Received time (bot)	Response time
Teacher G1	1			

Part C : any comment

Q1) please write down any suggestion or comments you may wish to add.

Thank you very much for your co-operation

Appendix C: Questionnaire of Classroom Simulator Through Observer Evaluation for Trainee Teacher in 3D Virtual Learning Environment

Experiment (Classroom simulator using Second Life environment)
for PhD research

Fahad Mazaed Alotaibi PhD student at De Montfort University
Under Supervision Dr.Jordan Dimatrov

2012

I would like to inform you that I study for a project as part of PhD at De Montfort University in the United Kingdom. This study will inform my project on Classroom simulator for trainee teacher using 3D virtual learning environments based simulated students behaviour as well as will select Second Life environment from 3D virtual world. The discussions will be so that I can learn more about the topic area and develop my research skills and also to gain knowledge.

Please try to answer all the following questions as truthfully in order to have successful project.

I confirm that I understand the research study and have had the opportunity to ask questions. Also I understand that my participation is voluntary and that I am free to withdraw of any point, without giving reason. I agree to take part in the above study

Signature:

Thank you for completing the following questions.

Part A: Personal Details:

Your personal details will be kept strictly confidential: (Optional)
Frist name observer: ……
Last name:……..
Gender: Male /Female
Email address:……...
Faculty: ……
Highest academic qualification :

- Ph.D degree
- Master degree
- Bachelor's degree

Part B: Observer evaluates for trainee teacher using Second Life

To accurate survey, we would like to know your attitude concerning interface quality. Please indicate the extent to which you agree or disagree with the following statements about the Classroom simulator in 3D VLE. Circle the appropriate number using the scale below.

Code	SD	D	N
Description	High level	Medium Level	Low Level
Scale	1	2	3

Performance				
		SD	D	N
1	The trainee teacher assisted in motivating and challenging students.	1	2	3
2	The trainee teacher promoted good progress and outcomes by students, demonstrating a good choice of subject.	1	2	3
3	The trainee teacher selected effective activities/exercises to achieve the objectives.	1	2	3
4	The trainee teacher dealt with the practice and use of assessment.	1	2	3
5	The trainee teacher put together a plan and taught well-structured lessons following the objectives of the course.	1	2	3
6	The trainee trainee teacher was adaptable when it came to the teaching methodology.	1	2	3
7	The trainee teacher used technology (video, audio, presentation) that was appropriate for the courses being presented.	1	2	3
9	There was clear interaction between the trainee teacher and the smartbot student.	1	2	3
10	The trainee teacher managed behaviour effectively in order to ensure a good and safe learning environment.	1	2	3

Performance				
		SD	D	N
11	The teacher can receive feedback from the smartbot student.	1	2	3
12	The trainee teacher used the target language in the classroom suitably and effectively.	1	2	3
13	Overall performance.	1	2	3

Part C : any comment

Q1) please write down any suggestion or comments you may wish to add.

Thank you very much for your co-operation

Appendix D: Interview with Trainee Teacher

Q1) *Does it allow you to select teaching methodology in the virtual classroom simulation?*

Teacher Cs1 // Mohammad, master degree he answered: - any trainee teacher can select any plan for his course it easy for example: presentation PowerPoint, poster and withborad that is allowed for him to display his lesson.

Teacher Cs2 // Ryan Alsumairi, master degree he answered: - of course, you can secect of teaching methodology in the virtual world when you select the content e.g. slideshow or learning object as board .

Teacher Cs3 // Ahamd, Bachelor degree he answered :- The trainee teacher can
Create teaching methodology that easy to use in his virtual classroom simulator.

Teacher Cs4 // Ali, Bachelor degree he answered :- That is available in virtual classroom to be display the lesson by photo, text, video all multimedia and depend discussion between all participation .

Teacher Cs5 // Bader, Bachelor degree he answered : - The classroom simulator by 3D virtual world it allows to select any topic, through set photo or texture, gesture and animation is fixed by inventory .

Teacher Cs6 // Fahad, PhD degree he answered :- The teaching in a Second Life environment becomes very important in teaching methodology in all universities in the world and depend on some method like Multimedia method, Gaming beads learning and self study for the content.

Q2) *A) Is the interaction between bots and avatars realistic? How*

Yes
No

Teacher Cs1 // Mohammad, master degree he answered: - Yes, there are more interaction in the classroom using Second Life between all role because the classroom depends on roleplay simulation method.

Teacher Cs2 // Ryan Alsumairi, master degree he answered :- yes by exchange massage between all member and chat inside classroom.

Teacher Cs3 // Ahamd, Bachelor degree he answered :- The interaction is clear between bot student and teacher avatar through chat and meeting face to face.

Teacher Cs4 // Ali, Bachelor degree he answered: - If course, the interaction is useful but through Limitation .

Teacher Cs5 // Bader, Bachelor degree he answered:-There are real interaction and realistic between avatar by avatar or bot through set of way like Chatting, mail inside Second Life environment.

Teacher Cs6 // Fahad, PhD degree he answered: - Yes,the trainee teacher can interact with any bot realistic such as : question/answer by chat, IM message and Email between all participating.

B) Do you think the Student behaviour is realistic?

Yes
No

Teacher Cs1 // Mohammad, master degree he answered: - I think simulated student behaviour not effect inside classroom because there are delays with responses or feedback between all students .

Teacher Cs2 // Ryan Alsumairi, master degree he answered: - I can change My behaviour such as: change my clothes, raise hand inside the classroom.

Teacher Cs3 // Ahamd, Bachelor degree he answered :- of course, the student behaviour is realistic because resemble real classroom.

Teacher Cs4 // Ali, Bachelor degree he answered: - I think student behaviour in 3D virtual world is found and strong especially when deal with avatar by avatar.

Teacher Cs5 // Bader, Bachelor degree he answered: - Yes, student can is bot or avatar it available for them to raise a hand in side the classroom by animation it called animation behaviour that is under animation through Inventory Second Life.

Teacher Cs6 // Fahad, PhD degree he answered: - sure, the student behaviour is realistic there are approve to responds and received feedback. Also, any Avatar or bot can to be happy, sad and laugh that called simulated behaviour.

Q3) *From your knowledge and experience in the classroom, does the simulation meaningfully resemble the real environment?*

Please Comment

Teacher Cs1 // Mohammad, master degree he answered: - real classroom similar virtual classroom.

Teacher Cs2 // Ryan Alsumairi, master degree he answered: - I think there are resemble between real and simulation is largely because all views seems real as real classroom.

Teacher Cs3 // Ahamd, Bachelor degree he answered :- Yes, the simulator is cheaper than study in real classrooms and you do not need to pay the high cost with simulation study.

Teacher Cs4 // Ali, Bachelor degree he answered: - Classroom simulator is similar real classroom because all elements is present at the same time and the interaction become directly.

Teacher Cs5 // Bader, Bachelor degree he answered: - I think there different between real classroom and classroom simulation because the real environment is more interactively than a classroom simulator beads 3D virtual world.

Teacher Cs6 // Fahad, PhD degree he answered : - Classroom simulator resembles real classroom for set of reason :

1- (Teacher avatar, student bot and content) is found between all sides.
2- Interactivity equal real interact in real environment.
3- Behaviours equal with real classroom due that easy to use.

Q4) *what are the strengths of the VCS?*

Teacher Cs1 // Mohammad, master degree he answered:-

1- No feedback through Virtual classroom simulator (VCS).
2- Less of real interaction VCS.
3- Internet slow connection to support our classroom.

Teacher Cs2 // Ryan Alsumairi, master degree he answered:-

1- Internet slow.
2- Some people suffer a lack of understand computer skills.
3- Lose mental focus.

Teacher Cs3 // Ahamd, Bachelor degree he answered :-

1- Lack implements student behaviour.
2- Not deal with interface good classroom.
3- Internet lack connection.

Teacher Cs4 // Ali, Bachelor degree he answered:-

1- Virtual classroom in 3D need to very large memory for all PC computers.
2- Student not understands computer skills.
3- - Increase the number of student inside VCS.

Teacher Cs5 // Bader, Bachelor degree he answered:-

1- Real interaction is less through teacher and student.
2- Distrust between teacher and student.

Teacher Cs6 // Fahad, PhD degree he answered:-

1- Distrust all customers.
2- Implementation for student behaviour in classroom simulator is not clear.
3- VCS in 3D world need to very speed processor.

Appendix E: Standard Deviation

The Standard Deviation is a measure of how spread out numbers are.Here we explain the formulas. The symbol for Standard Deviation is σ (the Greek letter sigma). This is the formula for Standard Deviation:

$$\sigma = \sqrt{\frac{1}{N}\sum_{i=1}^{N}(x_i - \mu)^2}$$

SE equals SD divided by the mean

$$SE_{\bar{x}} = \frac{s}{\sqrt{n}}$$

Weighed mean

is an average computed by giving different weights to some of the individual values. If all the weights are equal, then the weighted mean is the same as the arithmetic mean. Whereas weighted means generally behave in a similar approach to arithmetic means, they do have a few counter instinctive properties. Data elements with a high weight contribute more to the weighted mean than do elements with a low weight. The weights cannot be negative. Some may be zero, but not all of them; since division by zero is not allowed. Weighted means play an important role in the systems of data analysis, weighted differential and integral calculus.

In this case, the weighted mean formula is used. The weighted mean formula is as follows:

$$\bar{x} = \frac{\sum f_i x_i}{\sum f_i}$$

Where, $\bar{x}$ = weighted mean.

$x_i = x_1, x_2, x_3, \ldots$ = Items given.

and $f_i = f_1, f_2, f_3, \ldots$ = Frequencies corresponding to the given items.

Appendix F: Creating Virtual Classroom Simulation Using Second Life

The developer started to build the classroom simulator walls inside the SL environment. The first wall was started with one object (prim) with the following size values:

X= 6.192

Y= 5.000

Z = 0.5

A hollow value of 60 was provided so that there could be a window hall in the middle of the wall.

The rotation values for this were:

X = 270

Y = 0

Z = 0

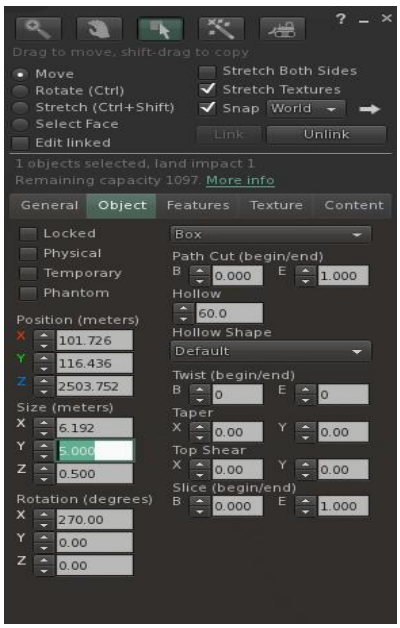


Figure (1) Edit menu objects.

The developer needed to copy this single object repeatedly two times in order to have three objects with a window in the middle. To copy the object, the following commands were required:

Holding down the shift key and moving the object left by the mouse whilst holding the shift key; and subsequently leaving the shift key to get a new prim and repeating this process in order to obtain the third prim.

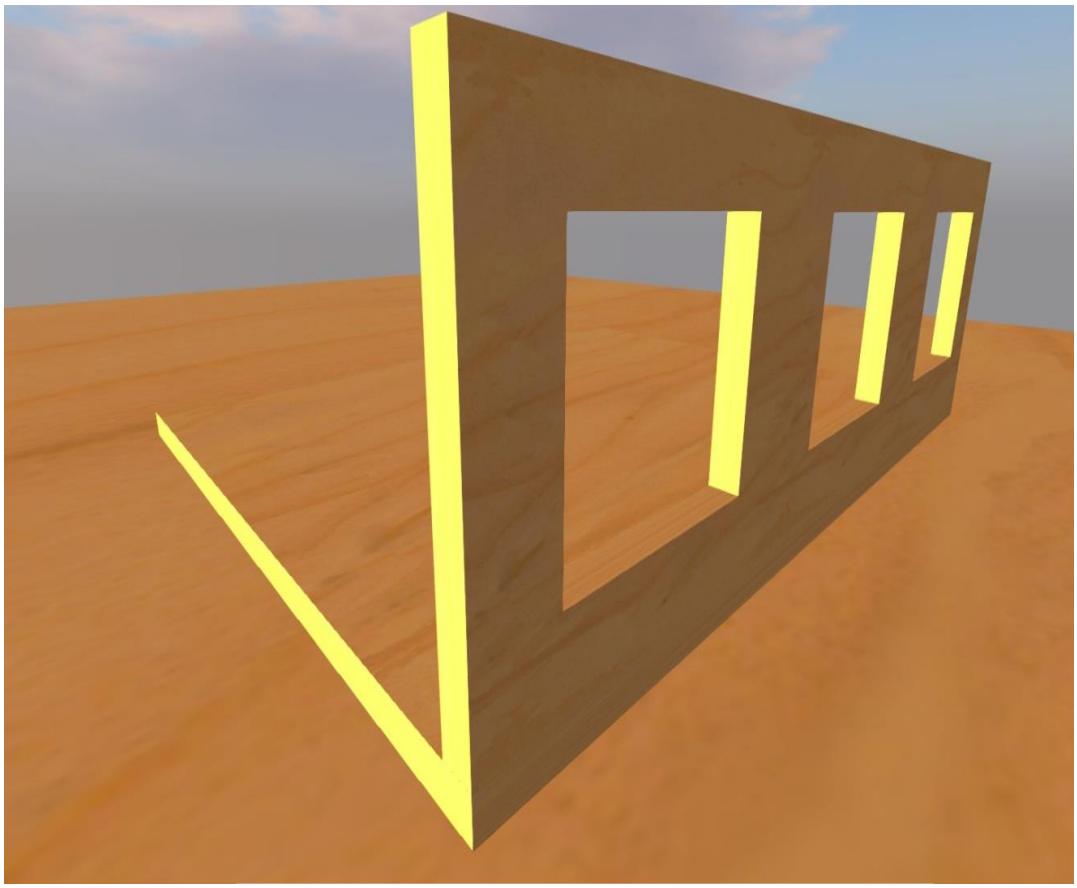


Figure (2) Setting the object with windows.

The next step involved the creation of a new prim at the corner with the following size values:

X = 1.091

Y = 5.000

Z = 0.715

This was copied four times on the same wall.

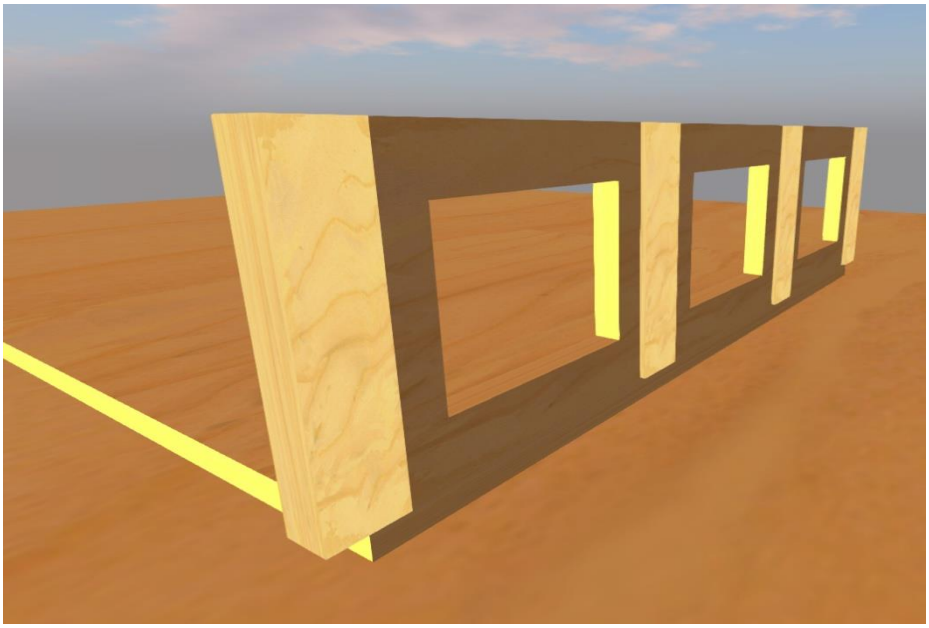


Figure (3) Setting new objec.

The next step involved the creation of windows for each of the three walls. The window texture was designed in Photoshop. The file was comprised of 512 pixels and provided a glass transparency of 30%. This file was subsequently saved as a png file. In SL the user would need to go to ‘file’ and upload ‘texture’ in order to upload this file.

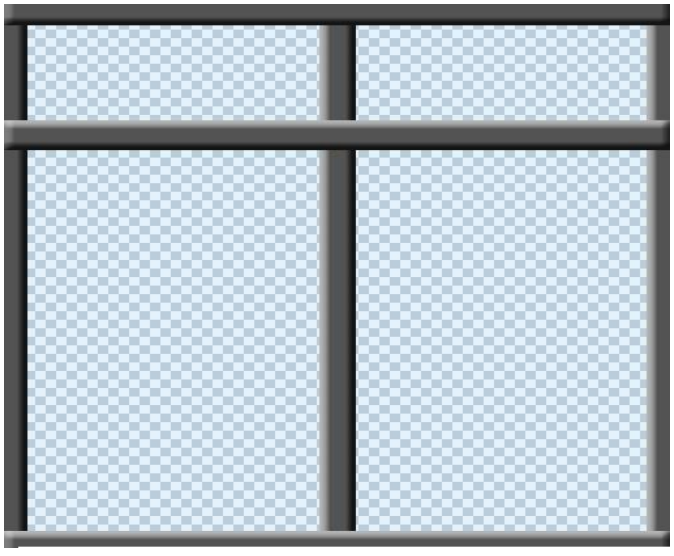


Figure (4) The creation of object windows.

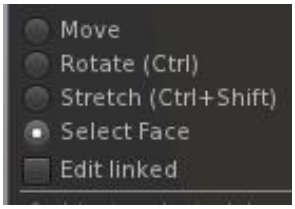
Inside the SL the developer needed to create a new prim with the following size values:

X = 3.733

Y = 3.020

Z = 0.500

This window texture was applied to the first face of the prim. The developer right clicked on the prim, clicked on edit to open the edit menu, and subsequently clicked on select face.



Following this the researcher left clicked on the other face/side of the prim and applied the window texture. This prim needed to be copied two times on each wall.

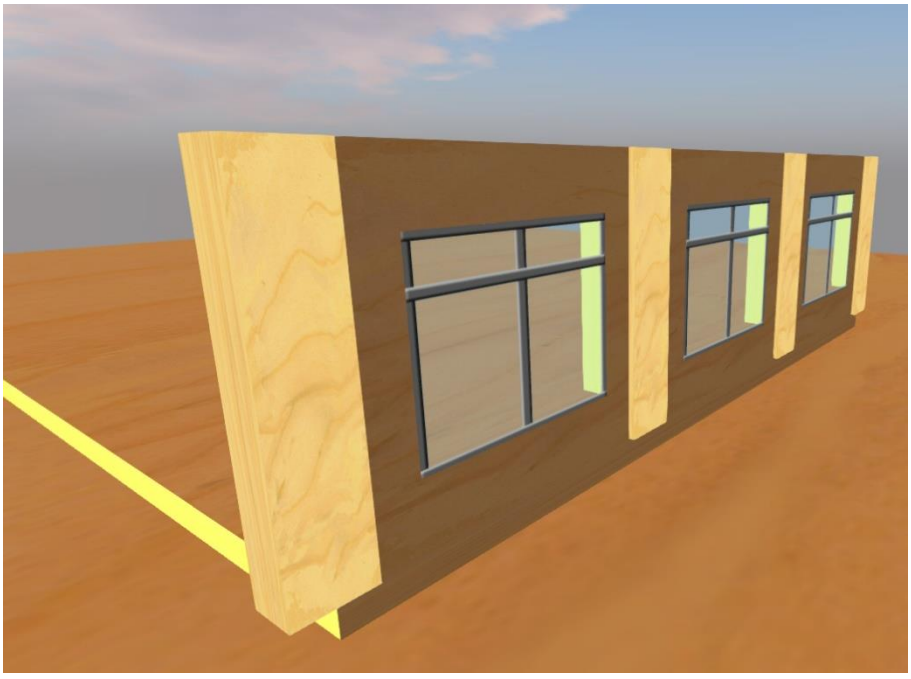


Figure (5) Copying two prim objects with windows.

The developer then copied four prims together to create a new wall.

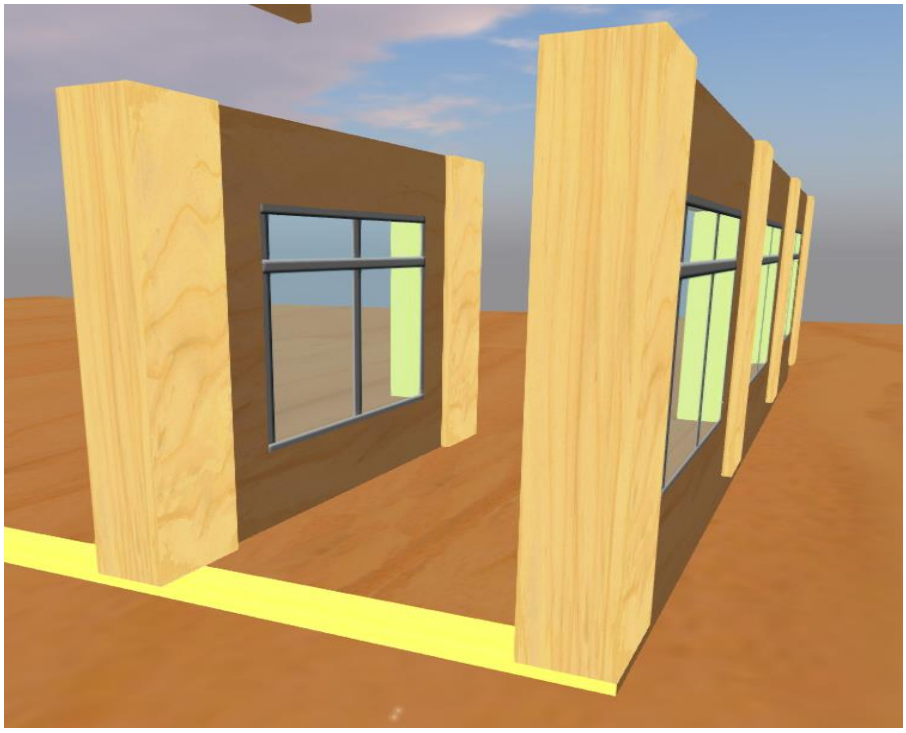


Figure (6) Copying object windows from two sides.

After this the same prims could be copied one more time. The final space needed to be different, and the class door and the other part of the wall needed to be built. Space was left for the door and for building a new prim at the end of the wall. The prim size needed the following size values:

X=3.442

Y=5.000

Z=0.500

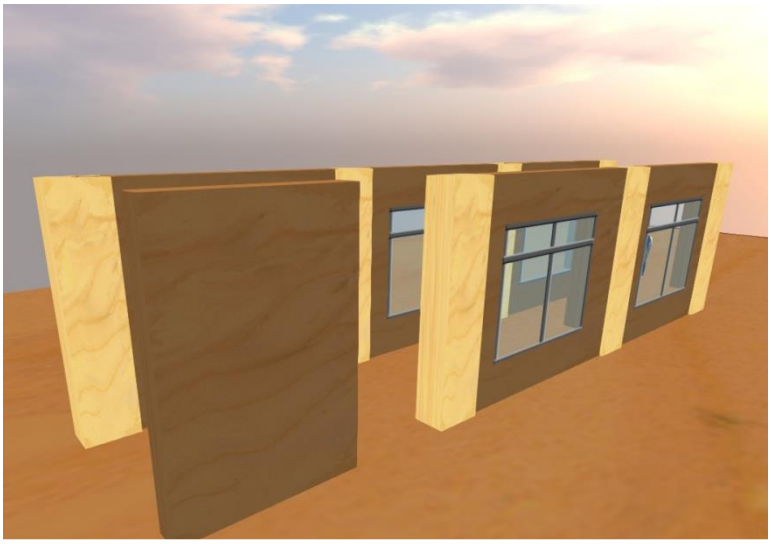


Figure (7) The class door object.

A new prim for the door ceiling was created with the following prim size values:

X = 2.176

Y = 0.742

Z = 0.500

The remainder of the wall prims was copied as represented below:

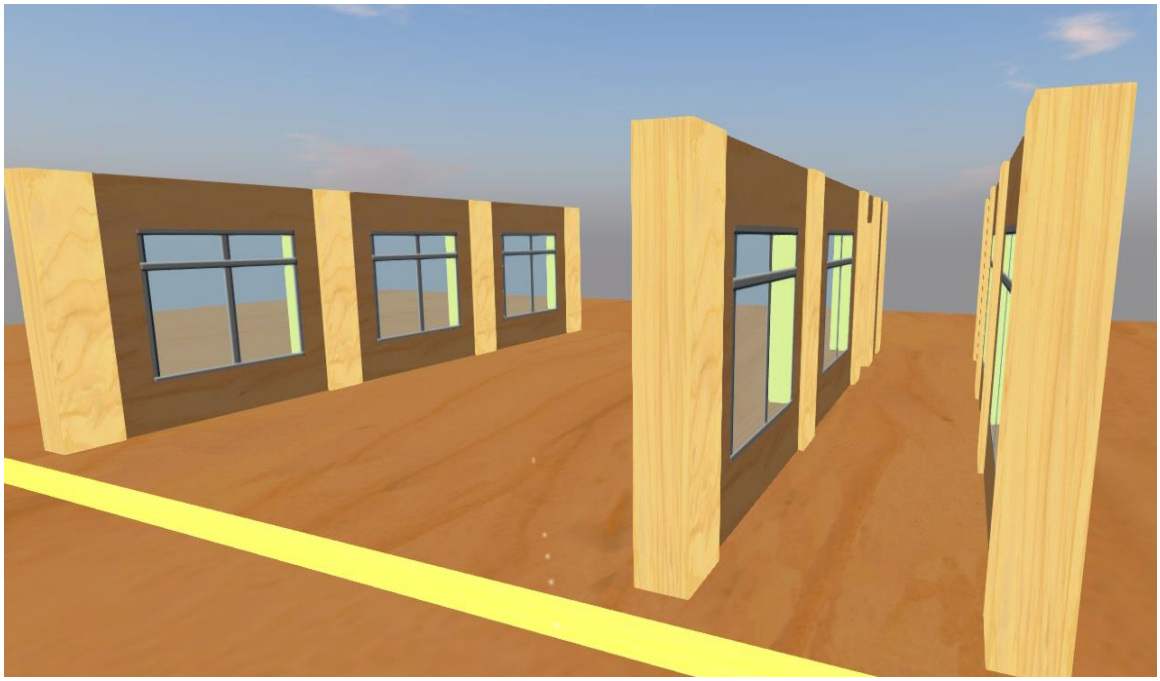


Figure (8) Building the class door ceiling

The first whole of the wall was copied and moved to the left side of the school platform.

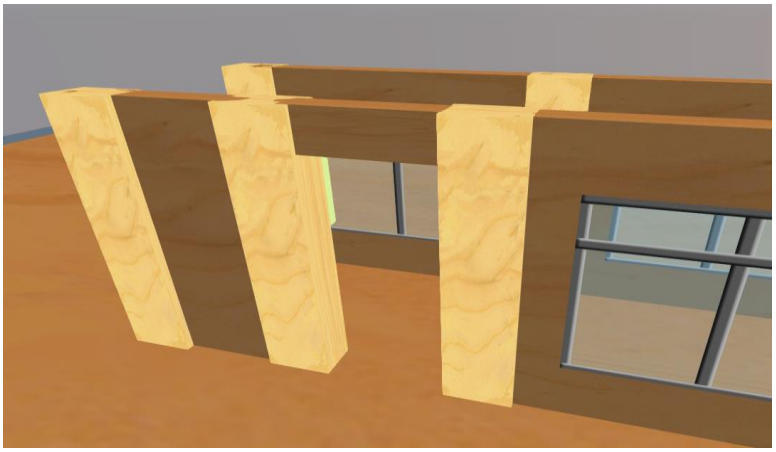


Figure (9) Coyping the wall object

The floor prim was copied and moved up to create the ceiling with the following size values:

X = 19.713

Y = 17.499

Z = 0.500

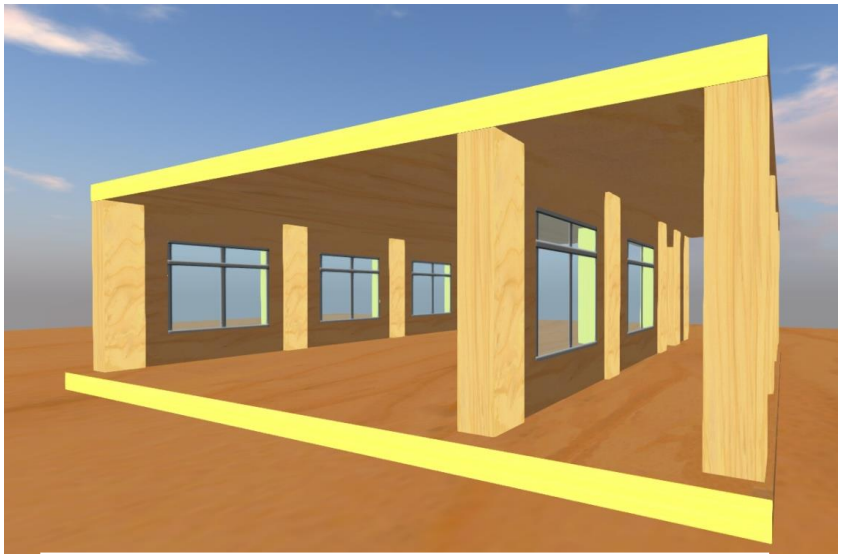


Figure (10) Building the floor prim.

The wall at the front side was created with the following size values:

X = 4.965

Y = 16.723

Z = 0.500

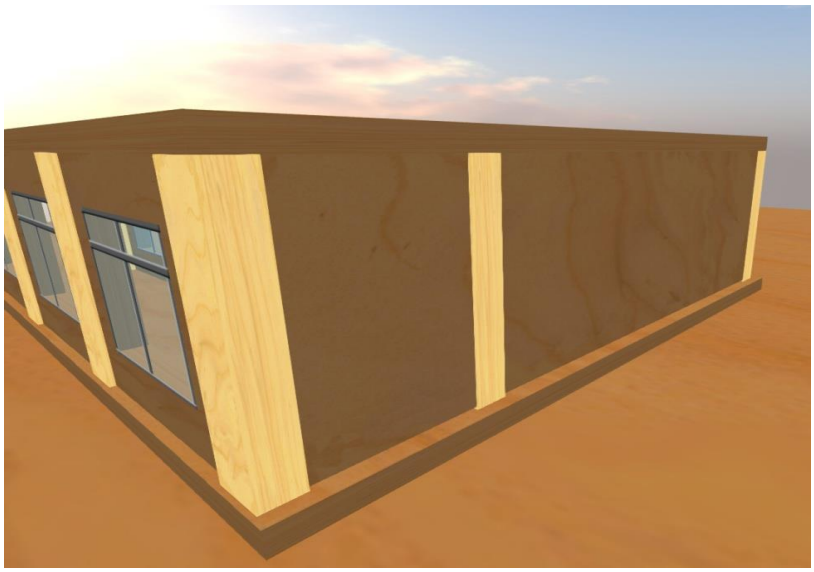


Figure (11) Building the wall prim

This was copied to the other side and the sizes changed for the entrance of the classroom as highlighted:

X= 4.965

Y=12.987

Z= 0.500

Figure (12) The classroom entrance.

The school was now complete, and the other interior items were required.

Appendix G: Development of the Classroom Campus

The following parts are required for the classroom campus within the SL environment:

- A noteboard and whiteboard object.
- A student desk and chair object.

Creating a noteboard object:
In order to create a new prim the following size values were used:

X = 2.253

Y = 3.134

Z = 0.500

The texture of the noteboard was created using Photoshop software after the process image, and this was uploaded and applied to this prim.this the developer could not move the board.

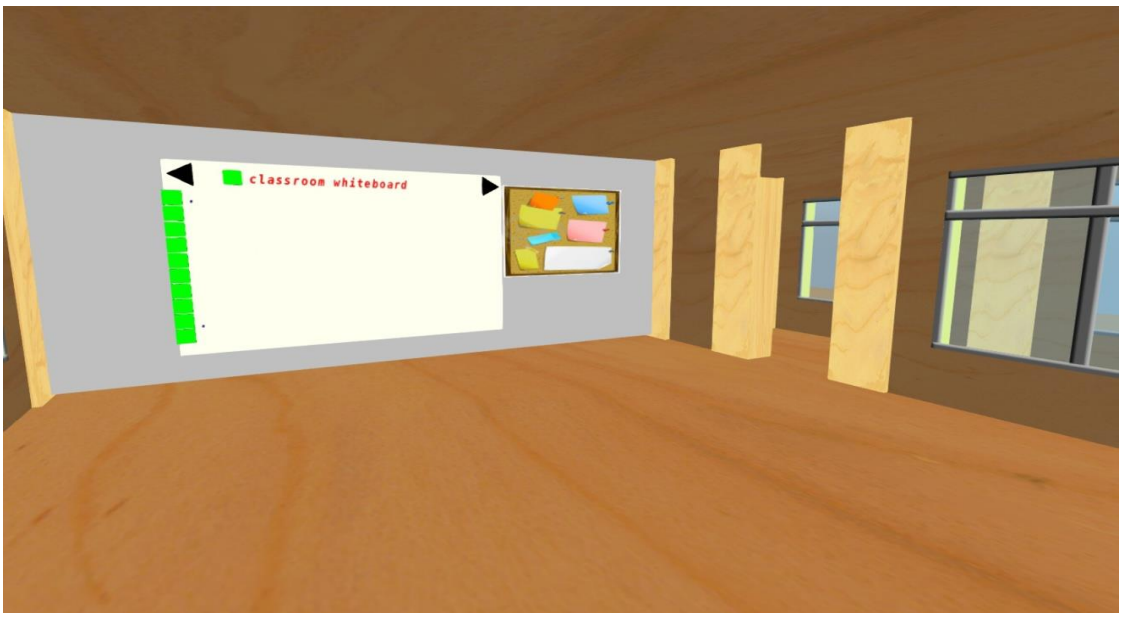


Figure (13) Creating the notecard and whiteboard objects.

Student chair and desk object through SL

Building the student desk object:

A new prim (box) was created with the following size values:

X = 0.698

Y= 0.874

Z = 0.029

This represented the desk plate.

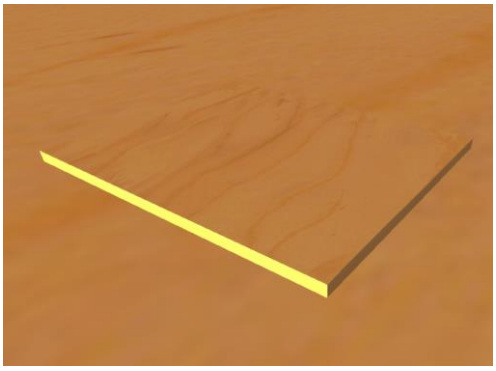


Figure (14) The desk plate object.

The lower part of the desk was created with a new box with the following size values:

X = 0.102

Y = 0.732

Z = 0.578

And given hollow = 90

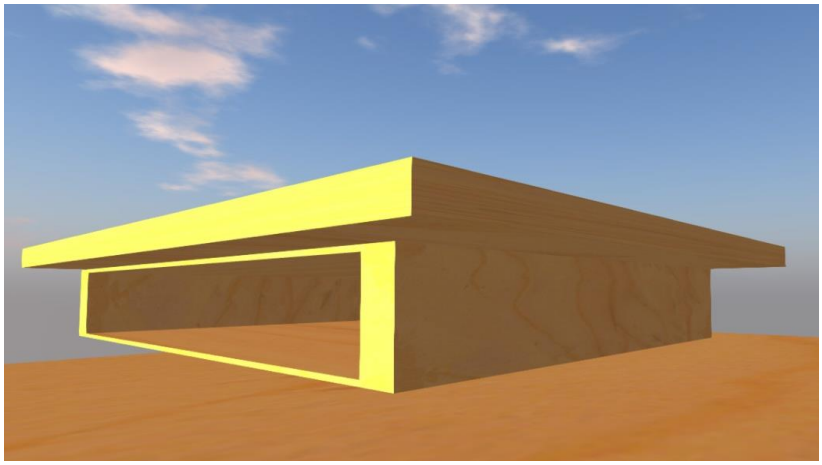


Figure (15) The new box object.

The desk legs/parts were then created.

A new torus was created with the following size values:

X = 0.064

Y = 0.225

Z = 0.210

This was given other values as presented in the image below:

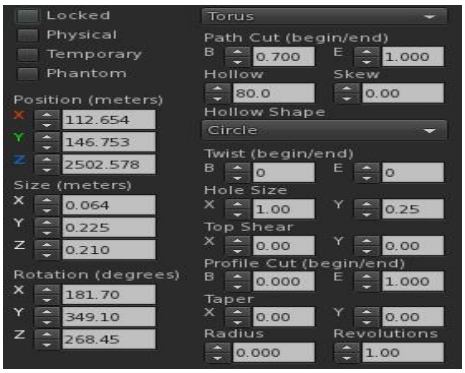


Figure (16) Values X, Y, and Z in the edit menu object.

A cylinder was created with the following dimensions:

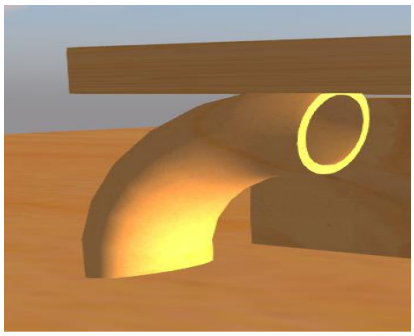


Figure (17) The cylinder object

X = 0.070

Y = 0.070

Z = 0.464

This was positioned like the image represented below (close to the torus):

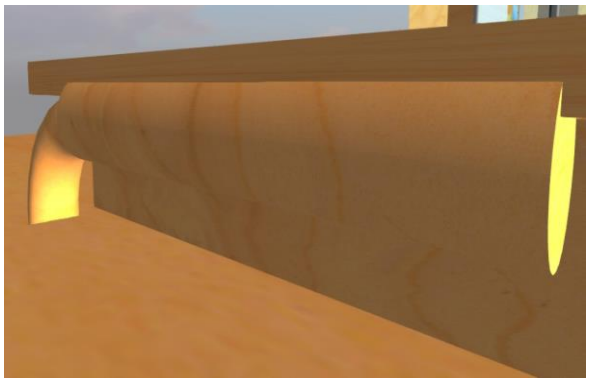


Figure (18) The torus object

A new cylinder was created with the following size values and positioned under the torus.

X = 0.070

Y= 0.070

Z = 1.314

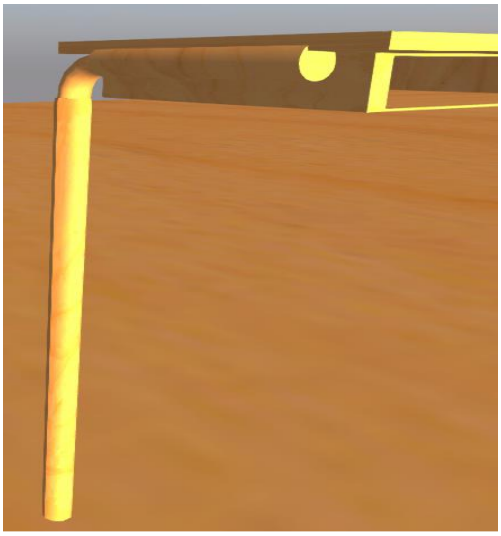


Figure (19) The new cylinder object.

The developer copied the torus and the cylinder that had just been created, to the other side (in front). It was necessary to create a new cylinder and position this under each of these long cylinders, with the following size values:

X = 0.092

Y = 0.092

Z = 0.122

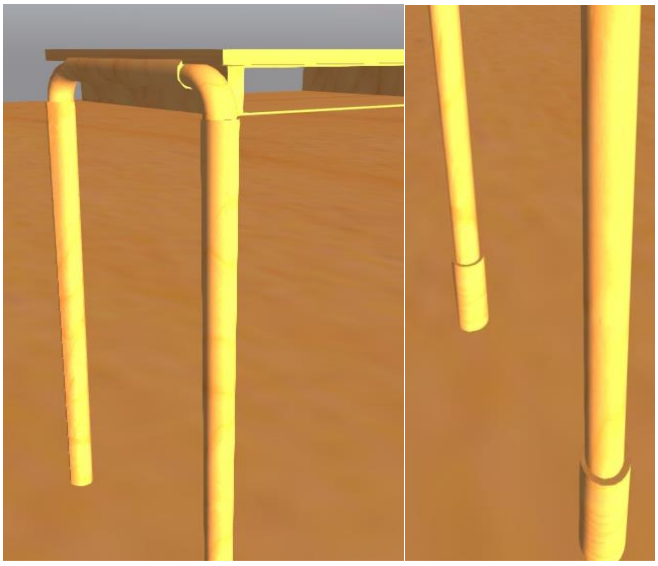


Figure (20) Creation of the long cylinder object.

The legs of the prims (objects) were copied to the other side of the desk.

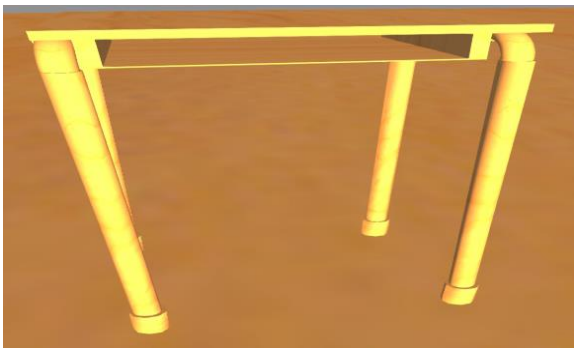


Figure (21) Creation of desk long cylinder object

A new torus with the following size values was subsequently created:

X = 0.063

Y = 0.219

Z = 0.204

Rotation values:

X = 91.70

Y = 346.75

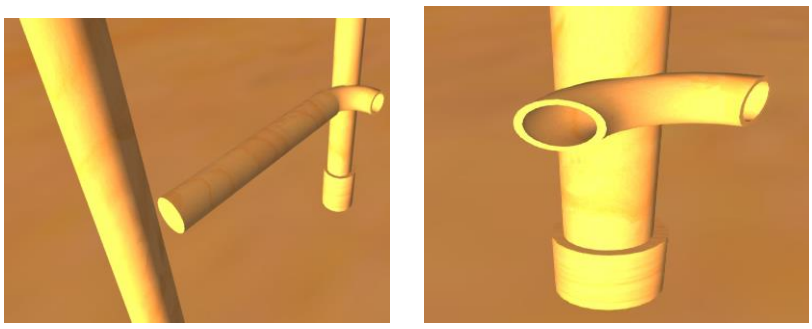


Figure (22) Creation of the desk with torus object.

Z = 268.35

Path cut: B = 0.700

Hollow: = 80

A new cylinder was created with the following size values:

X = 0.068

Y= 0.068

Z = 0.450

The following rotate values were used:

X= 265.85

Y = 272.35

Z = 265.90

The torus was copied to the other end of the cylinder with the following rotate values:

X = 89.95

Y = 320.55

Z = 90.15

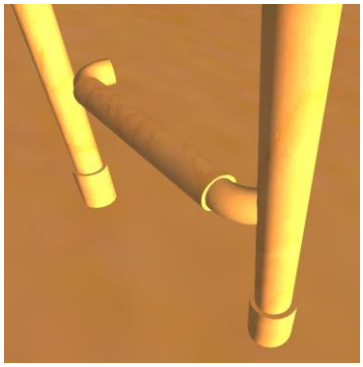


Figure (23) Creation of the desk with copied torus object.

The copied these three prims to the other side and rotated them in the correct direction. It was possible to select all three prims together by holding the Shift key and then holding the Ctrl key to rotate them manually.

The designer could then create a new cylinder with the following size values:

X = 0.068

Y = 0.068

Z = 0.670

Rotate values:

X = 272.00

Y = 2.25

Z = 91.60

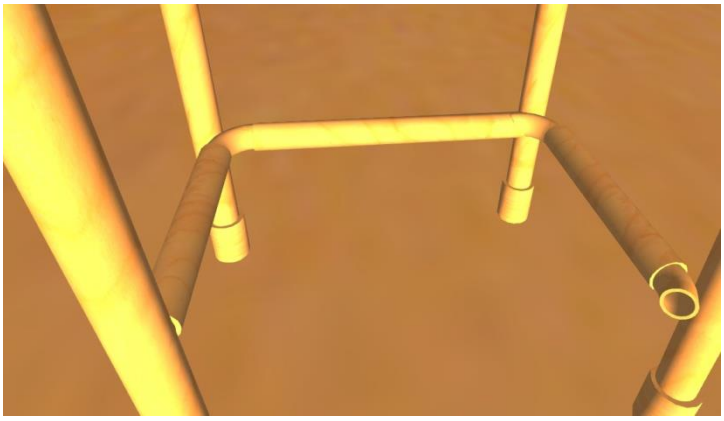


Figure (24) Creation of cylinder desk object.

The desk was then completed.

Figure (25) Creation of a desk.

Building a student chair:
A new box was created with the following size values:

X = 0.370

Y= 0.608

Z = 0.029

Rotate values:

X = 90.00

Y = 89.60

Z = 90.00

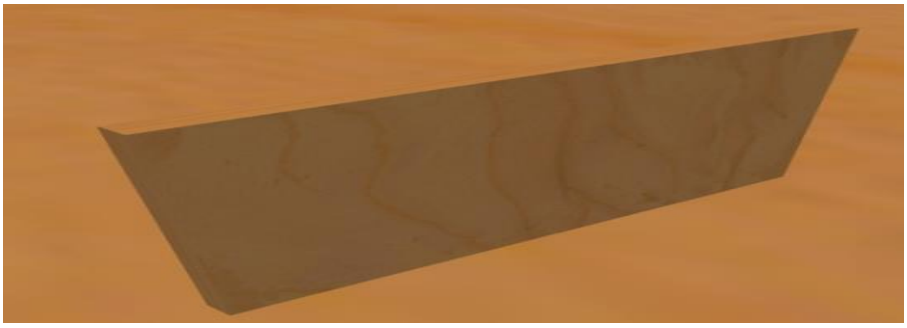


Figure (26) Creation of a new object.

The developer created a new cylinder with the following size

values:

X = 0.070

Y = 0.070

Z = 0.568

Rotate values:

X = 180.00

Y = 359.75

Z = 268.40

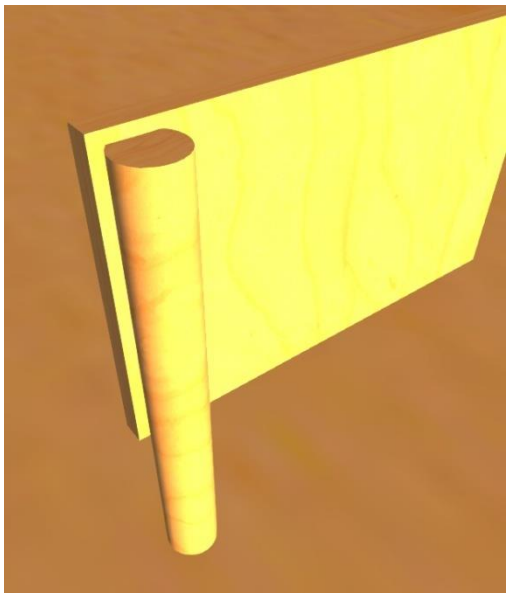


Figure (27) Creation of a new cylinder.

A new torus was created with the following size values:

X = 0.064

Y = 0.225

Z = 0.210

Rotate values:

X = 359.70

Y=11.25

Z = 91.65

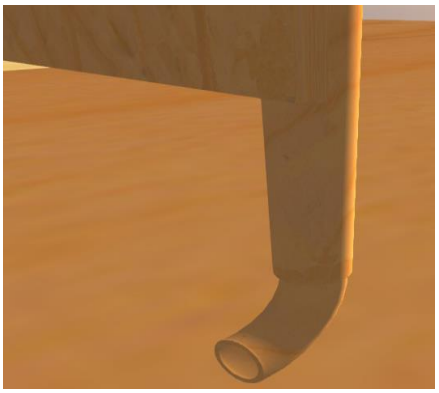


Figure (28) Creation of a torus cylinder.

Path cut: B=0.700

Hollow: = 80

The designer then created a new cylinder with the following size values:

X = 0.070

Y = 0.070

Z = 0.532

Rotation values:

X = 206.05

Y = 270.85

Z = 294.05

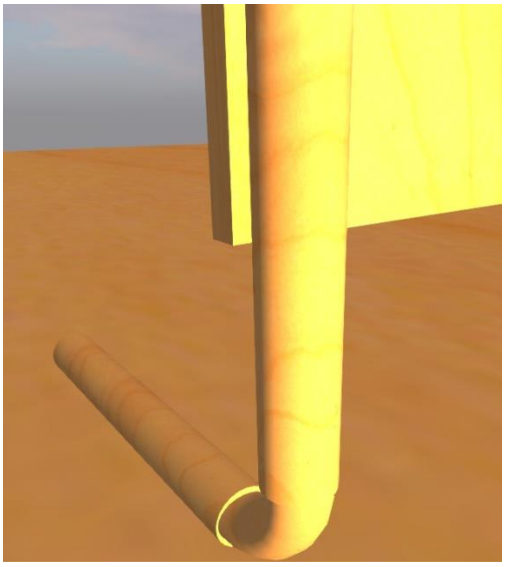


Figure (29) Creation of a new cylinder.

The torus was copied to the other side with the following rotate values:

X = 148.85

Y = 280.85

Z = 59.90

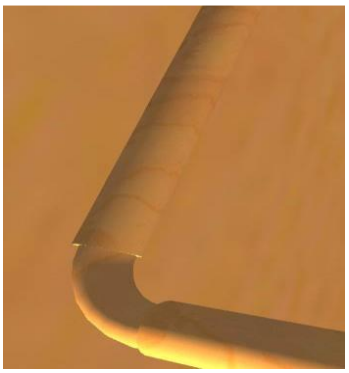


Figure (30) Creation of a copied torus.

A new cylinder was created with the following size values:

X = 0.070

Y= 0.070

Z = 0.532

Rotate values:

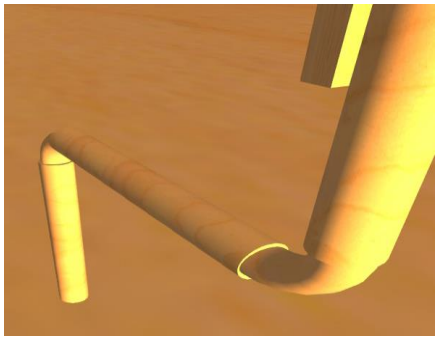


Figure (31)
Creation of a new cylinder.

X = 0.25

Y = 2.75

Z = 273.35

The torus was copied again with the following rotate values:

X = 6.00

Y = 348.70

Z = 271.35

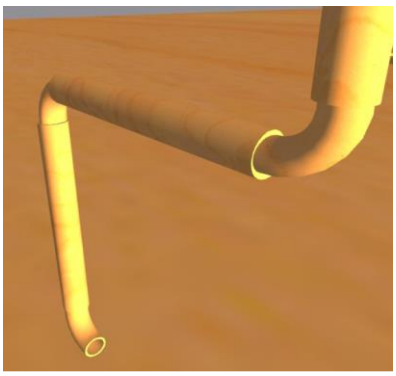


Figure (32)
Creation of copied torus and rotate.

The cylinder was copied and positioned close to this created torus.

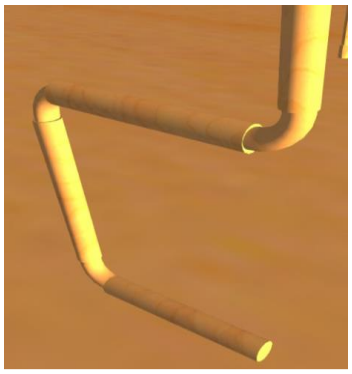


Figure (33) Creation of copy cylinder.

The torus was copied again with the following rotate values:

X=87.35

Y= 359.65

Z = 93.20

Figure (34)
Creation of copied torus with rotate.

The developer copied all prims except the flat prim and moved it to the other side.A new cylinder was created with the following cylinder size values:

X= 0.070

Y= 0.070

Z= 0.407

Rotate values:

X = 89.75

Y = 356.75

Z = 90.10

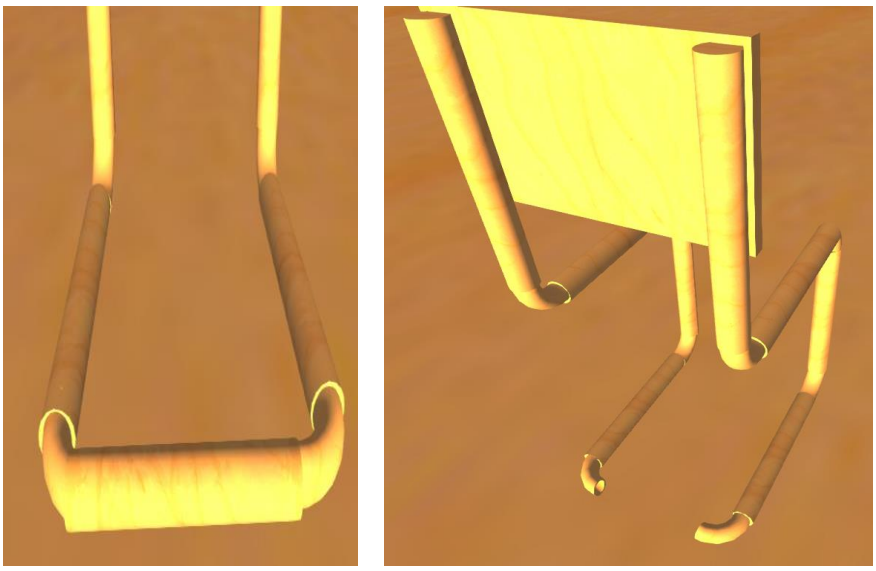


Figure (35) Creation of a new cylinder.

Finally the sit prim was created. This was a new box with the following size values:

X = 0.556

Y = 0.608

Z = 0.029

Rotate values:

X = 0.0

Y = 0.0

Z = 179.65

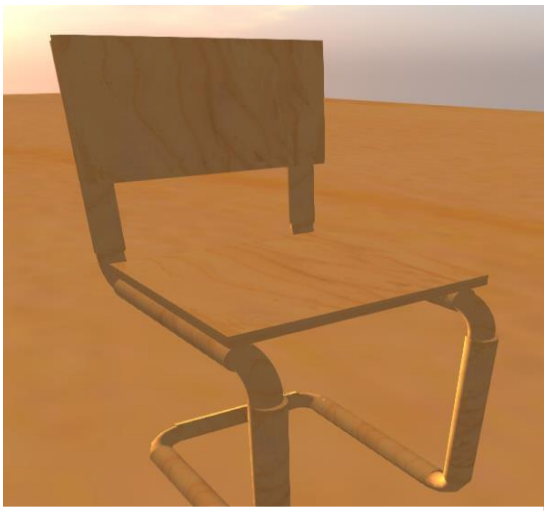


Figure (36) Creation of the final chair.

The chair was completed.

The classroom project was completed as represented by the following image below:

[lifeheartbeat.com]

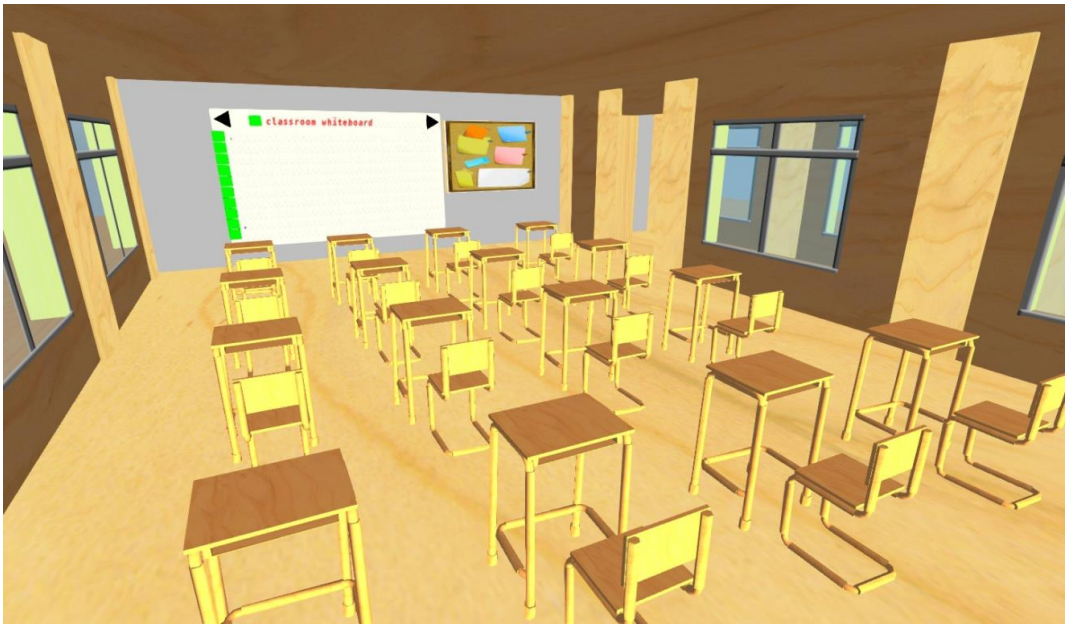


Figure (37) Completed classroom.

After the completion of the building additional classroom items and textures were added. The classroom building from the outside.

Figure (38) Classroom building using different textures.

Finally, the completed classroom building can be seen from the outside and inside.

A **B**

Figure (39) Classroom building inside (A)
and outside (B)